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ORIGINAL PAPER

Antidumping protection hurts exporters: firm-level evidence

Jozef Konings · Hylke Vandenbussche

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Abstract This paper estimates the impact of antidumping protection on export behavior of French firms covered by antidumping cases. Traditional models suggest that all domestic firms covered by antidumping protection should benefit from protection. However, in an environment of globally fragmented supply chains, firms may be damaged by protection if duties increase input costs for firms covered by the protection. Results from this paper indicate that while non-exporting firms benefit from protection, domestic sales of export-oriented firms and exports in general, are depressed due to protection. This effect is more severe for multinational firms.

Keywords Antidumping · Firm-level exports · Intensive margin · Extensive margin · Productivity · Global supply chains

JEL Classification F13 · L41 · O30 · C2

J. Konings
Department of Economics, University of Leuven, Leuven, Belgium
e-mail: joep.konings@kuleuven.be

J. Konings
Department of Economics, University of Ljubljana, Ljubljana, Slovenia

H. Vandenbussche (✉)
Department of Economics, IRES and CORE, Université catholique de Louvain,
Place Montesquieu 3, 1348 Louvain-la-neuve, Belgium
e-mail: hylke.vandenbussche@uclouvain.be

H. Vandenbussche
LICOS, KUleuven, Leuven, Belgium

1 Introduction

The use of contingent protection in the World Trade Organization (WTO) is on the rise and is characterized by two phenomena. First, the fast proliferation of import protection laws amongst WTO members in recent years,[1] which has resulted in an increase in contingent import protection and especially antidumping (AD) measures worldwide. Second, an increase in AD protection coincided with the outbreak of the financial crisis in 2008. A further rise in protectionism is one of the greatest fears of the WTO. Despite the political will of the G-20 leaders not to increase protectionism,[2] Fig. 1 suggests that antidumping measures are on the rise and increased worldwide by about 20 % in 2008 and 30 % in 2009.[3]

Within the WTO agreement, AD duties are an instrument that countries can use against unfair imports. An importing country can "punish" a trade partner by levying duties if imported products are *dumped and causing injury to domestic import-competing industries* (WTO AD Agreement, article 3). An important question is to what extent this frequently used type of import protection is affecting firms within the domestic industry. Is the protection always beneficial for domestic firms (Blonigen 2006) or are firms affected differently (Konings and Vandenbussche 2005)? In this paper we show that the protectionist measures have a heterogeneous effect on domestic firms covered by the AD order, depending on their international orientation. Exporting firms suffer from AD protection, while non-exporting firms, benefit. Hence, this paper adds to the literature arguing that the international scope and heterogeneity of domestic firms is an important dimension, which should be taken into account when evaluating the effects of contingent import protection (Konings and Vandenbussche 2008; Amiti and Konings 2007).

While most of the literature analyzed how imports are affected by AD policy (Blonigen and Prusa 2003), we instead focus on how exports are affected by the policy. We document the effects of protection on the exports and domestic sales of domestic firms. To this end, we use information of products involved in protection cases and match them with the income statements of firms that produce the product that is under an AD investigation. For reasons of data availability we turn to European *firm-level* data where income statements are reported annually. But differences exist among EU countries in terms of data availability. In countries like France and Belgium the reporting is particularly good since companies are required by law to submit full income statements to the Central Bank.[4] In France, additional information on the fraction of exports in total turnover is provided at the firm level,

[1] E.g., Vandenbussche and Zanardi (2008), for a more historical perspective of the rise of AD see Irwin (2005).

[2] G-20 leaders' statement, London summit, April 2009: "We will not repeat the historic mistakes of protectionism of previous eras".

[3] Gamberoni and Newfarmer (2009), Bown (2010) and Baldwin and Evenett (2009) report in more detail how antidumping has been on the rise since the start of the financial crisis. For a more general discussion see Irwin (2009).

[4] For example, German firms are much less required to publish information, which is why the availability of German firm-level information is relatively limited. Also, the German income statements in AMADEUS, the data source that we use, have no information on exports.

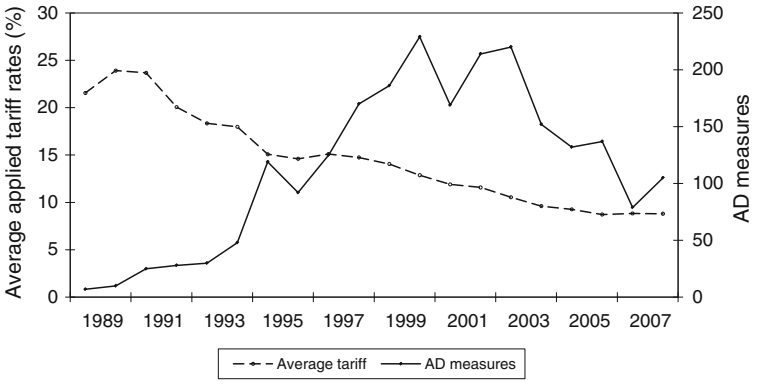

Fig. 1 Evolution of tariffs versus antidumping measures. *Source:* The tariff data for 1980–2007 from UNCTAD TRAINS which runs to 2008. The AD data are from the WTO and the Bown database (2010) and refer to the total number of AD measures that are decided in a given year by both developed and developing countries

which is why we focus our analysis on France. An important limitation of our data, however, is that the product-level imports that we observe cannot be mapped to the firm level. Previous literature however allows us to infer that exporting and importing activities at the firm level are highly correlated (Mayer and Ottaviano 2008). Therefore, it seems plausible that exporting firms in our data are also more likely to be importing firms. Focusing our analysis on one European country has the advantage that we are less likely to encounter endogeneity problems. AD policy is a European wide policy, which during our period of analysis, was the joint decision of fifteen European countries. Therefore, it is reasonable to assume that the policy making was exogenous to the French firms affected by the policy.[5]

In addition, we supplement the firm-level data with more detailed *product-level* data on export values and volumes at the 8-digit product level with information on export destinations. This allows us to distinguish between intra-EU and extra-EU exports. The firm-level analysis further allows us to decompose the effects of import protection on the intensity of exports (intensive margin) and the entry and/or exit of firms in export markets (extensive margin).

We empirically evaluate the effect of AD policy on French firms' exports using several control groups of exporting firms with comparable pre-treatment characteristics. We find that AD protection raises firm-level domestic sales of non-exporters by 5 %. For exporters, we find that AD protection lowers their exports abroad by about 8 % and this fall is not compensated by an increase in exporters' domestic sales which also fall by around 4 %. At the product-level extra-EU French exports drop by 36 % while total extra-EU exports fall by 21 %.[6]

[5] Disdier and Mayer (2007) use a similar approach to deal with the endogeneity of policy.

[6] In this paper we consider a European Union of 15 member countries which was the EU's constellation up to 2004.

In Sect. 2 we list anecdotal evidence and provide a theoretical framework, which will serve as a useful background for interpreting our results later on in the paper. In Sect. 3 we discuss the data, in Sect. 4 we present the empirical methodology and results. Section 5 provides some further evidence and Sect. 6 concludes the paper.

2 Theoretical framework

2.1 Literature

Traditional trade theory predicts that all firms in the protected industry are import-competing firms, that sell domestically. The reason is that in traditional trade theory a sector is either import-competing or exporting but not both. Based on this view of the world, one would expect all firms in the domestic industry to benefit from the import protection. For import-competing firms, protection raises the consumer price for the protected product which is predicted to raise demand for all domestic substitute products.

Newer trade theories, introducing a representative firm and economies of scale in production, predict that an import-competing firm benefits from import protection in the form of higher domestic sales which in turn also results in higher export sales due to increasing returns to scale (Krugman 1984).

Hence, both the traditional and the new trade models predict that import protection is beneficial for the import-competing industry and its firms.

In contrast to these predictions, the findings presented in this paper suggest that there are "winners and losers" from import protection even within a narrowly defined domestic industry. Using a firm-level data set for France that distinguishes between exporters and non-exporters, we find the "winners" to be non-exporting firms and the "losers" to be exporting firms. This can only be explained by recognizing that firms are heterogeneous in nature and that there is a fundamental difference between the activities of exporters and non-exporters within the same industry, as recently has been recognized by the newest trade models (Melitz 2003; Helpman et al. 2004).

The empirical evidence that we present in Sect. 3 supports that heterogeneity view. Purely domestic firms without any international activity benefit from import protection and see their domestic sales rise, while exporters and especially those belonging to a global network, lose sales relative to unprotected firms. We find that the negative effects of import protection on the domestic sales and exports of exporting firms becomes more negative as the share of exports in total sales of the firm goes up. This suggests that the larger the average size of the exporter, the stronger the results.

2.2 Case evidence

Our empirical findings are largely consistent with case evidence available in the literature. For example, Isakson (2007) describes in great detail a European AD case of imported leather shoes in the EU where the imposition of a duty was heavily

supported by relatively small Italian shoe producers mainly selling locally, but was strongly opposed by large and more "globalized" EU shoe producers like the Danish Ecco firm. The reason for Ecco to oppose the protection was the fact that it imported shoes from China and after branding and labeling in Europe, exported the shoes to destinations outside the EU. As a result of the AD duty, the importing of shoes became more expensive, resulting in losses on domestic and exported sales. Other European manufacturers like Diesel, Adidas, Hush Puppies and Puma also opposed the shoe tariffs in that same case for the same reasons.[7] In another but equally famous AD case on light-bulbs a similar phenomenon occurred. The AD order on the imports of light-bulbs from China was strongly opposed by Philips Electronics from the Netherlands, a producer of light-bulbs that outsourced most of its production to China and whose imports of light-bulbs were negatively affected by the duty upon entry into the EU.[8] Also, in an EU bicycle case against Vietnam, large UK bicycle producers like Raleigh and Saracen expressed their dissatisfaction with the anti-dumping proceeding against imported bicycles. As they produced part of their bikes in Vietnam, they were against EU trade restrictions on bikes (Eckhardt 2011, p. 19, footnote 38). In that same case also a large French multinational, Decathlon, was unhappy about the import duties on bicycles, because it was actually importing bicycles and selling them locally (Eckhardt 2011, pp. 5–6). There are plenty of other cases that illustrate that multinationals often oppose the AD protection they receive. This is not limited to EU AD cases but also occurs elsewhere. For instance, the French multinational Michelin, operating in India opposed the imposition of duties on Chinese imports of truck tires by India because Michelin had a truck tire facility in China from which it exported its tires to India.[9] Admittedly, all these cases belong to a more recent past than the cases included in our analysis and for which similar public statements cannot so easily be found. For a meaningful empirical analysis we need to turn to earlier AD cases initiated in 1997 and 1998. Given that our data on firm-level exports and annual income statements of unconsolidated firms cover the period 1995–2005, the AD cases initiated in 1997 and 1998 permit us to evaluate sales and exports in some years before the protection and during the 5 year protection period following the affirmative decision. This would not have been possible by turning to more recent cases. Thus, while our period of analysis does not coincide with the anecdotal cases that made it to the press discussed above, it seems a recent enough period for similar issues to be at work.

2.3 Theoretical framework

To explain the gains and losses of protection for the different types of firms involved, we turn to a simple theoretical framework which we illustrate using the shoe case discussed above.[10] We consider a mass of consumers that have well-behaved

[7] http://www.industryweek.com/global-economy/eu-end-long-standing-anti-dumping-taxes-against-china.

[8] http://www.nytimes.com/2008/01/13/business/worldbusiness/13iht-trade.4.9181765.html.

[9] http://www.thehindubusinessline.com/todays-paper/tp-corporate/article1000942.ece.

[10] While shoes is a product that was not covered in the AD orders included in our analysis, we use it as an example to explain the model and to link it to the mediatized shoe case discussed just above.

preferences over differentiated goods. Firms in the EU market are atomistic and compete under monopolistic competition. There are two types of firms in the market. Firms of type j outsource the production of shoes abroad and then import the shoes as an intermediate into the EU market. Firms of type d, produce the intermediate shoe inside the EU (in-house or outsourcing to another EU producer). For firms of type j, the consumer price of a final shoe is p_j and the price of an intermediate imported shoe, used by firm j[11] as an input in the final shoe, is p_i. We restrict attention to underlying preference structures that generate a corresponding inverse demand for the final shoes of the form $q_j(p_j, Q)$ where the number of shoes sold by firms of type j depends negatively on its own price and on market aggregate quantity Q.[12] When the imports of shoes are subject to an AD order with a duty t imposed upon entry into the EU, an importing firm like Ecco has the following operational profits $\pi\ (p_j, p_i) = p_j\ .\ q_j - p_i(t)\ .\ q_i$. For simplicity we assume type j firms to have no other marginal costs other than the input cost and we allow for a simple production function that converts one imported shoe into a final shoe $q_j = q_i$ which simplifies the operational profits of the firm to $\pi\ (p_j, p_i) = [p_j - p_i\ (t)].\ q_j$. The AD duty, t, can be additively (specific duty) or multiplicatively (ad valorem) to the importers' price exclusive of the duty c_i, as in $p_i\ (t) = c_i + t$ or in $p_i\ (t) = c_i\ (1 + t)$, respectively which is not important for our purposes. What is important is that in both cases a duty, t, raises the marginal cost of the importing firm, $\frac{\partial p_i}{\partial t}$, and as such will also impact the final consumer price, p_j^*. First-order conditions of profit maximization on the firm's profits result in equilibrium consumer prices $p_j^*(c_i, t)$, where $\frac{\partial p_j^*}{\partial t} > 0$ and $\frac{\partial q_j^*(p_j^*(t))}{\partial t} = \frac{\partial q_j^*(t)}{\partial p_j} . \frac{\partial p_j^*}{\partial t} < 0$. This holds independent of the functional form of demand.[13] In other words, an AD order on a monopolistically competitive firm facing downward sloping demand, results in higher consumer prices for those firms importing an intermediate that is subject to protection which in turn reduces the quantity that can be sold in all markets. The question remains what the net effect on sales will be of this tradeoff. Will the cost of higher input costs outweigh the benefit of higher domestic prices and will sales of the final product increase or decrease as a result of protection $\frac{\partial [p_j^*(t).\, q_j^*(t)]}{\partial t} \gtreqless 0$? This derivative is equivalent to $p_j^* \frac{\partial q_j^*(t)}{\partial t} + q_j^* . \frac{\partial p_j^*}{\partial t} \gtreqless 0$ where it can be verified that the first term is a negative one and the second term a positive one. After dividing all terms by q_j this expression can be rewritten in terms of the price elasticity of demand, ε. The condition arising is the following, $1 \gtreqless \varepsilon$, which entails a very intuitive result. The more elastic the demand that EU firms face,

[11] Firm j stands for all firms that are covered by the AD order and that import an intermediate product also covered by the AD order.

[12] The market aggregate quantity, Q, can be thought of as the total number of final shoes sold by firms (j) as well as by domestic firms (d).

[13] For example, in a CES model of monopolistic competition with additive duties, the equilibrium price expression is $p_j^* = \frac{\varepsilon}{\varepsilon - 1} .(c_i + t)$ which is a markup $(\frac{\varepsilon}{\varepsilon - 1} > 1)$ over marginal cost $(c_i + t)$, where ε is the constant elasticity of demand (substitution). It is straightforward to see that $\frac{\partial p_j^*}{\partial t} > 0$. In a quadratic utility model with linear inverse demand of the type $p_j = z\ (Q) - q_j$ with z(Q) as the intercept of demand, the equilibrium price equals $p_j^* = \frac{z(Q) + c_i + t}{2}$ where again $\frac{\partial p_j^*}{\partial t} > 0$.

the larger the loss in sales from protection. While the example discussed here is about imported shoes as an intermediate, in many cases listed in Table 1, the intermediate nature of the products in AD orders is more evident. Typical for intermediate products is the strong elasticity of demand they face, which in case of protection is bound to result in a loss of sales for the importing firms, no matter which market they sell to. Exporting firms are likely to face a more elastic demand abroad, i.e., $\varepsilon \gg 1$ than at home $\varepsilon > 1$ in view of the stronger competition that exists in global markets as compared to domestic markets. Therefore, based on our framework we would expect the exports of an importing firm as a result of protection to drop more strongly than their domestic sales. Indeed, our empirical results suggest that export-oriented firms experience reduced domestic sales of only 4 % while their exports are reduced by 8 % which seem in line with the predictions of this framework.

Our framework can also be used to explain the effect of protection on domestic firms that do not import neither export shoes, (bearing in mind that exporting and importing activities tend to be highly correlated, which is the maintained assumption throughout). As a result of the protection, the total imported quantity of shoes Q_i $(=\sum q_i^* \ (t))$ will go down on the protected market since $\frac{\partial q_i (=q_j)}{\partial t} = \frac{\partial q_j^*}{\partial p_j} \cdot \frac{\partial p_j^*}{\partial t} < 0$. This is good news for those firms that sell domestically and do not import the intermediate shoes and whose joint quantity sold is Q_d $(=\sum q_d^*)$. These domestic firms either do in-house production of the intermediate shoe (at cost c_d) or source it domestically. The total output of shoes on the market is thus equal to $Q = Q_j + Q_d$. A reduction on imported shoes, Q_j $(=Q_i)$ will shift out the individual demand of each individual domestic shoe producer, since the inverse demand q_d (p_d, Q) depends negatively on total Q. Bearing in mind that the marginal cost of domestic producers does not change with protection, the equilibrium price of domestic producers does not change either (see footnote 10), i.e., $\frac{\partial p_d^*}{\partial t} = 0$. But as a result of reduced aggregate imports, the demand for shoes of in-house domestic producers shifts out, resulting in higher domestic sales $\frac{\partial q_d^*}{\partial t} = \frac{\partial q_d^*}{\partial Q_i} \cdot \frac{\partial Q_i}{\partial t} > 0$ for those firms that do not import, like it was the case with the majority of the Italian shoe manufacturers in the shoe case discussed above. The prediction obtained here thus suggests that protection raises domestic sales for domestic producers $\frac{\partial}{\partial} [p_d^*(t) \, . \, q_d^*(t)] > 0$. This is in line with the empirical results that domestic sales of non-exporting firms increase significantly after AD protection.

The above simple model can be useful to fix ideas and shows that the impact of protection on firms is heterogeneous and depends on whether or not they are importing the protected intermediate when covered by an AD order.[14]

3 Data

An AD case typically involves an investigation of the evolution of the volume of imports and of import prices from countries that are accused of dumping by the

[14] Essentially, it is a matter of the "effective rate of protection" (Greenaway and Milner 2003) that a firm receives.

Table 1 New antidumping cases initiated by the EU in 1997–1998

Year of AD initiation	Product	# CN per case	NACE rev. 1	Decision (duty/ undertake/termination)	Year of AD decision	Average duty[a] (%)	Defendants
1997	Fax machines	1	3220	D	1998	43	China, Japan, South-Korea, Malaysia, Singapore, Taiwan, Thailand
	Potassium permanganate	1	2413	D	1998	21	India, Ukraine
	Polysulphide polymers	1	2417	D	1998	13	United States
	Synthetic fibre ropes	4	1752	D	1998	82	India
	Monosodium glutamate	1	2441	T	1998	0	Brazil, United States, Vietnam
	Cotton fabrics	15	1720	T	1998	0	China, Egypt, India, Indonesia, Pakistan, Turkey
	Strips of iron or non-alloy steel	4	2732	T	1998	0	Russia
	Synthetic fibre ropes	4	1752	T	1998	0	South-Korea
	Unwrought magnesium	2	2745	D	1998	32	China
	Stainless steel bright bars	4	2731	D	1998	25	India
	Thiourea dioxide	2	2414	T	1998	0	China
	Hardboard	10	2020	D/U	1999	16	Japan, Korea, Malaysia, China, Taiwan
	Bicycles	2	3542	D	1999	18	Brazil, Bulgaria, Estonia, Latvia, Lithuania, Poland, Russia
	Electrolytic alumin. capacitor	3	3210	T	1999	0	Taiwan
	Woven glass fibre	1	1720	T	1998	0	United States, Thailand
1998	Polypropylene binder	1	1752	D/U	1999	26	Japan
	Steel stranded rope and cables	1	2873	D/U	1999	45	Poland, the Czech. Republic, Hungary
	Stainless steel wire	4	2734	D/U	1999	56	China, India, South Africa, Ukraine
	Steel stranded rope and cables	1	2873	D/U	1999	44	India, Korea
	Polyester filament yarn	4	2470	T	1999	0	Hungary, Mexico, Poland
	Stainless steel heavy plates	1	2710	T	1999	0	Korea, India
	Seamless pipes and tubes	2	2722	D/U	2000	31	Slovenia, South Africa

Source: Bown (2010), global antidumping database

[a] The average duty is the country wide duty that applies to "all other exporting producers". Exporters that co-operate in the EU antidumping (AD) investigation often get a lower duty

[b] A price-undertaking (U) involves a voluntary price increase by the alleged dumpers to offset the injury to the import-competing industry

import-competing domestic industry. Our analysis focuses on cases initiated by EU firms against firms abroad. The dumping complaint is investigated by the European Commission and can result in 'Protection' or in 'Termination'.[15] Any dumping complaint must be supported by EU producers representing at least 50 % of total EU production.[16] During the investigation period, that can take up to a year, the European Commission usually imposes a temporary measure resulting in temporary import relief. If after the investigation period, the European Commission decides the complaint was justified, it imposes a final measure, usually an import tariff, which will remain in place for a period of 5 years. When the Commission decides to 'terminate' the AD case, the dumping complaint is rejected and the EU industry does not get further import relief.

For the purpose of analyzing the relationship between AD protection and firm-level exports, we use annual income statements of unconsolidated firms,[17] covering the period 1995–2005,[18] obtained from a commercial database named AMADEUS. The coverage of number of companies and type of data, such as sales and employment, vary by country, depending on the national accounting legislation. In France information at the firm level on the fraction of exports of total turnover is also available. We therefore direct our attention to French data, where we identify 3,695 firms that operate in the same sector as the dumped products and that are affected by an AD investigation and hence can potentially receive protection. About 25 % of all firms in our sample are exporters and their share of exports in total sales on average is about 26 % with shares ranging between 0 and 100 %.[19] The frequency distribution of firm-level export shares of exporters at the start of our sample is illustrated in Fig. 2. Less than one-third of the firms we consider and that are involved in AD cases, export. Of those that export, the sales from exports are on average almost one-third of their total sales so on average we are dealing with firms that are rather export intensive. In addition to information on exports, the data also provides information on the ownership structure of the firm, in particular whether it is part of a multinational group and whether it has affiliates elsewhere. This is information that we will use to identify the importance of being part of a global supply change.

In Table 1 we give an overview of all the new AD cases[20] that were initiated in 1997 and 1998 and for which we could retrieve all the variables from the income statements required for our analysis both before and during protection. In total, our

[15] In the United States many cases end in "withdrawals" by the complaining industry as shown by Prusa (1992). In the EU there are few withdrawals. "Terminations" refer to a negative ruling by the European Commission.

[16] Article 5 of the EU antidumping regulation.

[17] Unconsolidated financial statements are similar to plant-level information. In contrast, consolidated financial statements group together the information of several affiliates domestic and abroad.

[18] More details are given in the data appendix.

[19] After dropping firms with missing variables, i.e., operating revenue, employment etc., the share of exporters rises to 33 % suggesting that missing observations occur amongst the smaller non-exporters.

[20] 'New' implies that these cases were not subject to protection when the case was initiated.

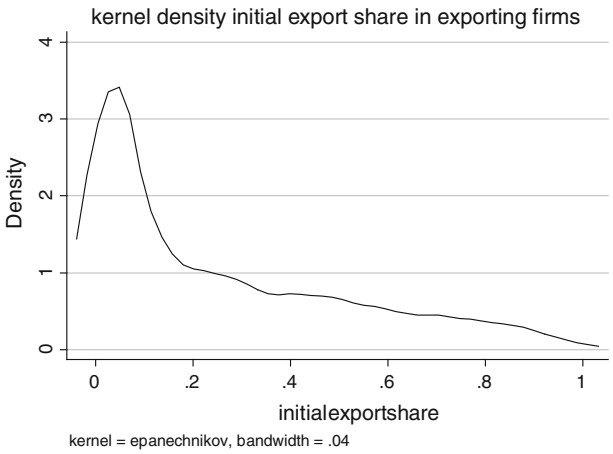

Fig. 2 Initial export shares of exporters. *Source:* AMADEUS, French firm-level data

data set includes 20 new[21] AD investigations when we count by product group, which corresponds to 57 cases when we count cases by defending country. For each case, Table 1 lists the year of initiation, the corresponding 4-digit industry NACE revision 1, the average number of 8-digit CN codes involved, the year of decision, the average duty and the importing countries involved. We collect firm-level data for the firms in the French import-competing sector based on the 4-digit NACE sector the product under investigation was classified in.[22] In 12 of the new cases (by product group), the outcome of the case was protection.[23] Under the Sunset Clause, AD protection stays in place for five consecutive years. Duties range between 10 and 67 %, with an average duty of 30 %. In 8 other cases (by product group), the European Commission did not grant import relief, after which the case was terminated. A minority of cases in Table 1 involved a French petitioning firm. We identify five French petitioning firms each of them in a different case. In the empirical analysis we verify results when excluding these cases to reduce potential endogeneity of trade policy on French firms even further.[24]

Table 2 provides summary statistics of exporters versus non-exporters which confirm earlier findings, i.e., initial exporters are larger both in terms of number of

[21] Table 1 lists 22 AD cases but there are two overlaps, i.e., more than one AD case falls into the same NACE 4-digit sector. A first one is in sector 1720 and another one in sector 1752. We deal with overlaps in the following way, i.e., in the case of 1720, both the first and the second case was initiated in 1997. In both cases the case was terminated so we classified both as terminations. In the case of sector 1752, a first case was initiated in 1997 and a second one in 1998. In both cases a duty was imposed. This led us to consider the firms in this sector as being protected from the first year after the case was introduced in 1997 since the investigation usually takes about a year.

[22] The NACE classification is a detailed industry classification used by the European Union with 400 different 4-digit NACE codes.

[23] AD protection usually comes in the form of a duty but in some cases price-undertakings were imposed. A price-undertaking involves a voluntary price increase by the alleged dumpers to offset the injury to the import-competing industry (Tharakan et al. 1998).

[24] Cases with French petitioners involve NACE 2020, 2710, 2722, 2734, 3542.

Table 2 Summary statistics on exporters and non-exporters

	Non-initial exporters (1)	Initial exporters (2)	*t*-test on the difference in means of (1) and (2)
Operating revenue (in 1,000€)	5,860 (188.02)	15,516 (393.41)	−22.14***
Employees (number of full-time equivalents)	41 (1.12)	92 (2.29)	−20.20***
Labor productivity (in 1,000€)	52 (0.85)	57 (1.23)	−3.06***
Tangible fixed assets (in 1,000€)	876 (38.06)	2,892 (104.12)	−18.12***
Foreign subsidiary dummy	0.02 (0.01)	0.094 (0.03)	−20.40***

Source: AMADEUS, French firm-level data

(1) Standard errors in parentheses, *** statistically significant at the 1 % level. (2) In the original data set, initial-exporters represent 25 % of all firms, but when dropping those firms with missing observations on operating revenue and employment, the number of initial exporters rises to 33 %, which means that especially small non-exporters do not report all variables. (3) Initial exporter is defined as a firm exporting in the year of the AD case initiation

employees, turnover and assets. Furthermore we observe that exporters are more productive (value added per worker) and have significantly more foreign subsidiaries than non-exporters. Table 3 compares summary statistics for firms in 'Affirmative cases', whose products received import relief through AD tariffs, to firms in 'Termination Cases' where the European Commission decided against import relief. From this it can be noted that firms in termination cases appear to be similar to firms in protected cases. In our empirical approach we will apply a standard difference-in-difference methodology, where we will use firms in the termination cases as a (natural) control group. To make correct inferences when using a difference-in-difference approach it is important that pre-policy characteristics that are thought to be associated with the outcome variables need to be comparable between a treated and an untreated group of firms (e.g., Abadie 2005). The outcome variables we focus on in the remainder of our analysis are firm-level exports, productivity and global network status. When we compare the pre-treatment values of these variables for firms in termination cases to firms in affirmative cases as we do in Table 3, we find export share in turnover, labor productivity and foreign subsidiaries to be very similar and statistically not different from each other as can be seen from the *t*-test in the last column. Another summary statistic that is useful to report for both termination cases and affirmative cases is the "sales growth" before protection to verify whether firms are in declining sectors to start off with. We report the sales growth both in the year before case initiation and for all years prior to the protection and find it to be positive, thus reflecting an upward trend in sales in the period before protection. Important to note also is that the growth rate is not significantly different between the two groups of firms, i.e., the protected versus the terminated. For the difference-in-difference analysis to provide correct estimates one has to ensure that the trend in sales in the control group is similar to the trend in the protected group of firms before the protection starts, which is what the statistics confirm. Furthermore they ensure that our results are not driven by a continuation of a downward trend before protection, since the trend of sales growth is positive and similar for both groups of firms prior to protection.

Table 3 Summary statistics on terminations and affirmative EU antidumping cases in year before case initiation

	Terminations (1)	Affirmative cases (2)	*t*-test on the difference in means of (1) and (2)
Sales growth in year before initiation	0.11 (0.015)	0.13 (0.016)	−1.012
Sales growth in all years before protection	0.08 (0.01)	0.11 (0.013)	−1.4
Labor productivity (in 1,000€)	46 (3.13)	48 (3.61)	−0.465
Av. export share in turnover	0.11 (0.01)	0.11 (0.007)	−0.317
Foreign subsidiary dummy	0.07 (0.01)	0.06 (0.008)	1.296

(1) The comparison is executed in the year before the case initiation. (2) Standard errors in parentheses. (3) Terminations represent 44 % of firm-level observations and affirmative cases represent the remaining 56 %

This similarity in pre-characteristics as shown in Table 3 makes firms in termination cases a control group to use. Another useful feature of terminations is that estimates of the trade policy effect on the protected firms will be more prudent than when using any other counterfactual. The reason is a common "filing effect" between protected and termination cases.[25] If filing would already have a negative effect on firm-level exports, comparing exports of protected firms to unprotected firms, other than those in termination cases, is likely to yield a smaller effect than the true effect. Therefore, in our opinion using firms in termination cases is likely to yield the most reliable difference-in-difference estimate of the decrease in exports suffered by protected firms and is our most preferred control group.

Nevertheless, to verify our main result we also turn to additional control groups. A first additional control group consists of all firms in 'related' sectors that are part of the same 2-digit NACE sector as the ones we have in the AD case, but that belong to a different 4-digit NACE sector than the AD case and were not subject to AD protection. For instance, for the AD case 'Stainless Steel Bright Bars', which is part of 4-digit NACE sector 2731, we consider all firms that operate in the 2-digit NACE code 27, which is 'Steel'. But we only include those firms in the control group that do not belong to the 4-digit sectors that are part of an AD investigation. We refer to these firms as firms belonging to a related sector. By taking firms from sectors related to the control group, we make sure that they have characteristics in common with treated firms such as a similar growth path before the protection, which is necessary to truly assess if they have a different growth pattern after the protection that is not due to pre-protection trends that are different between the two groups, but can be ascribed to the protection itself. It should however be noted that by considering related sectors, we cannot rule out the possibility that some sectors may have opposing interests in trade protection. For example, if the protection is on "steel bars", then firms in this sector may support the protection whereas a sector like "steel constructions" that uses "steel bars" as an input may oppose the protection. We remedy for this potential bias by considering additional control groups.

[25] Staiger and Wolak (1994) have shown that *filing* can already impact trade even if protection does not follow in a later stage.

A second additional control group was inspired by the matched sampling techniques developed by Heckman et al. (1997) and used in Konings and Vandenbussche (2008). To identify a matched control group, a multi-nominal logit model at the 4-digit NACE level[26] was first estimated using sector-level data for the entire European Union (EU). The variables included in our multi-nominal logit approach are based on the model developed by Blonigen and Park (2004). Our dependent variable can take three outcomes: 'no filing', 'filing that resulted in a termination' and 'filing that resulted in protection'. As explanatory variables we include 'lagged import penetration' defined as yearly imports from outside the EU (from EUROSTAT) into the 4-digit NACE sector over the sum of domestic production in the EU (from PRODCOM data) in the NACE 4-digit sector and imports from outside the EU. We also include 'lagged industry employment', 'EU GDP growth' and the 'number of previous AD filings' in the NACE sector up to year $t - 1$, where we count the number of previous AD filings from 1985 onwards and 'lagged labor productivity' in the sector as additional variables. The results of the multi-nominal logit model are included in Table 10 in the Appendix. It can be noted that firms in industries with high import penetration, previous AD filings and lower average labor productivity, seem more conducive to filing for AD protection. The "matched" control group then consists of firms in 4-digit NACE sectors that have similar characteristics and therefore a similar probability of protection, but never had protection.

In what follows we first report results for the firm-level analysis (Sect. 4.1). But due to data limitations in the firm-level data involving the multi-product nature, the absence of export destination markets and the absence of firm-level imports we complement our approach with a product-level one (Sect. 4.2) where we turn to the 8-digit product-level (CN) trade data available from EUROSTAT. The use of product-level data allows us to look at exports of products identical to the ones protected by AD measures on the importing side. The product-level data also has exports by destination country which allows us to further distinguish between French exports to the rest of the EU (intra-EU exports) and French exports to the rest of the world (extra-EU exports). Since AD protection applies to the whole EU market we would expect AD protection to predominantly affect exports outside the EU, i.e., on extra-EU exports.

4 Results

4.1 Firm-level analysis of export flows

4.1.1 The intensive margin of firm-level exports

To evaluate the effects of AD protection on firm-level exports, we pursue a difference-in-difference approach on the exports of protected versus unprotected firms as given by the following specification:

[26] We do the matching at the 4-digit NACE sector level in order to control for sector level variables that have been shown to affect AD protection such as import penetration and other independent variables included in the empirical model.

Table 4 Antidumping protection and the intensive margin of exports

	Export turnover control group: termination cases (1)	Export turnover control group: related sectors (2)	Export turnover of control group: matched sample (3)
AD effect	−0.077***	−0.061**	−0.052*
	(0.035)	(0.026)	(0.03)
Year dummies	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
No. of obs.	6,893	45,247	10,920

(1) Export turnover is the log of real export turnover. The results shown in this table represent the loss in exports conditional on continuing export status since those whose exports fall to zero (log not defined) are dropped from the analysis. (2) Standard errors in parentheses. (3) *, **, *** significance at the 10, 5 and 1 % level, respectively

$$\ln Exports_{it} = \alpha_i + \alpha_1 AD\_Effect_{it} + YEAR\_Dummies + \varepsilon_{it} \quad (1)$$

where ln(Exports) is the log of real export turnover and refers to firm-level exports out of France, α_i is a firm-level fixed effect; AD_EFFECT is a dummy that takes a value of 0 for the years before AD protection and 1 in the years during AD protection but only for the protected firms. In addition we also include a set of year dummies to control for common time effects and business cycle effects that may affect the exports of both the protected and the unprotected exporters.[27] One concern is that AD policy may be endogenous. But it has to be kept in mind that AD is an *EU policy* and we study its effect on *French* firm-level exports where simultaneity is arguably much less likely to occur than if the policy were French. Also to further exclude the potential influence of French firms on EU trade policy we verify our results when we exclude French firms that were involved in the petitioning[28] and the cases that these petitioning firms belong to.

We start in Table 4 by estimating the difference-in-difference regression in specification (1) on the total set of initial exporters, i.e., we only include firms that prior to the protection period were involved in exporting activity and by comparing them to exporting firms in termination cases. Column 1 in Table 4 shows the results when using the log of real export turnover as a dependent variable where we deflated exports with a simple 4-digit producer price deflator.[29] We also experimented with using the export share in total sales instead as a dependent variable, which avoids the deflation problem. From column 1 we note that AD

[27] For example, the entry of China in the WTO in 2001 may have depressed all firms' exports (Ma et al. 2009). To make sure that the reduction of exports that we observe is driven by import protection and not by China's presence on international markets we include year dummies. It can also be noted that China features quite prominently as a target country in both protected as termination cases suggesting that both the treated and the control group firms are affected in a similar fashion which truly makes the depression of exports of protected firms stronger than for firms in the control group.

[28] Petitioning firms are firms that publicly support the dumping complaint but typically only represent a small number relative to the total number of EU producers.

[29] Ideally, we should use an export price deflator, but then we would require destination markets at the firm level, which is not available in our firm-level data.

Table 5 Antidumping protection and the intensive margin of exports

	Export turnover of global firms	Export turnover of global firms with only affiliates outside the EU	Export turnover of non-global firms	Export turnover of large initial exporters	Export turnover collapsed panel
	(1)	(2)	(3)	(4)	(5)
AD effect	−0.166***	−0.248**	−0.070**	−0.135***	−0.32***
	(0.09)	(0.125)	(0.037)	(0.038)	(0.09)
Year dummies	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
No. of obs.	546	305	6,347	4,190	3,565

(1) Export turnover is the log of real export turnover. The results shown in this table represent the loss in exports conditional on continuing export status since those whose exports fall to zero (log not defined) are dropped from the analysis. (2) Standard errors in parentheses. (3) **, *** significance at the 5 and 1 % level, respectively. (4) Control group are firms in termination cases. (5) AD EFFECT takes a value of 0 before AD protection and a value of 1 for the 5 years after protection but only for the protected firms. (6) Initial exporter are firms that are exporting in the year of case initiation. "Global firms" are those firms that have foreign subsidiaries

protection results in a significant decrease in export turnover of about 7.7 % on average over the protected sectors. Export shares also declined after AD protection. In column 2 of Table 4, we run specification (1) again but now using all firms in "related sectors" as a control group (described in the data section). The coefficient on the AD effect is very similar to the one in column 1 where we used firms in termination cases as a control group. This confirms our finding that AD protection lowers exports of protected firms in comparison to a similar group of firms that are unprotected. And finally in column 3 of Table 4, the coefficient on the AD effects is reported where we used firms in a 'matched' sample which refers to firms that are part of 4-digit NACE sectors that have the propensity score, i.e., same probability of obtaining protection, yet that were not part of an AD investigation. While the result is somewhat less strong than with the previous two control groups, the coefficient is significantly negative and qualitatively similar to the previous finding, confirming the negative impact of import protection on exporters.

The results in Table 4 using the different control groups all point to the same effect and therefore in what follows we will only report the results using one control group, which will be based on the termination cases for reasons explained before, i.e., with this control group we also control for a potential common filing effect.

In Table 5, we engage in some refinements. In column 1 we limit the data to the "global firms", i.e., firms that have one or more affiliates abroad and we compare their exports to firms in termination cases. It can be observed that the exports of global firms fall more drastically. The coefficient reported in column 1 of Table 5 shows that exports of "global firms" fall by as much as 17 % as opposed to the 8 % reported in Table 4 column 1 where we considered all initial exporters. Our data allows us to distinguish between the location of the affiliates in terms of intra- or extra-EU. When we consider "global firms" with only affiliates outside the EU, we find the effect of AD protection on exports to be much more negative which can be

seen from column 2. This is what one would expect since AD policy is an EU-wide policy and mainly affects firms that outsource outside the EU.

In order to know whether the global status of a firm solely explains the drop in exports, in column 3 of Table 5 we do the same but now only include the non-global firms. The effect of AD protection on firm-level exports is still negative and significant. This suggests that even those exporting firms that do not have affiliates abroad suffer from AD protection in terms of their sales abroad. And finally in column 4, we drop all small initial-exporters in terms of exports in total sales, by considering a cutoff of 10 % as the minimum export share in total sales. It can be noted that the result becomes stronger, suggesting that it is large exporters that suffer most from the import protection which is in line with what we would expect on the basis of heterogeneous firm models as discussed in Sect. 2.

When we exclude from the analysis French petitioners and the related five AD cases they belong to reduce potential policy endogeneity, the results reported in Table 5 are reinforced. For example the coefficient in column 1 drops further to −0.08 suggesting an 8 % depression of exports of initial exporters relative to exporters in the control group, resulting from AD import protection.[30] We also verify that our results are not driven by a few sectors. For instance, when we dropped the steel sector, a sector that is often the subject of AD investigations, the negative effect of AD protection on exports was estimated at −0.15. Similarly when dropping the chemical sector from the analysis, yields a negative and significant effect of AD protection on exports of −0.13.

An important caveat to note here is that a failure to account for underlying hidden dynamics (correlation of errors over time) in a difference-in-difference analysis may result in inconsistent estimates of the standard errors. Bertrand et al. (2004) suggest various approaches to deal with this problem. One is to collapse the panel into two periods, averaging the variables over the treated period and the non-treated period. Therefore, as a robustness check we collapse our sample into two periods, the period before protection and the period during protection. In column 5 of Table 5 we report the results from this experiment. The results show that exports decrease on average by 32 % as a result of AD protection. This number seems rather high but can be interpreted as a cumulated effect as the typical duration of AD protection takes 5 years.

The next step is to analyze whether the drop in exports documented in Tables 4 and 5, was compensated by an increase in domestic sales. If protection increases the domestic market size, firms that were previously exporting may suddenly find it more profitable to increase their sales at home especially since by selling locally they would save on transport costs. We fail to find such substitution effect. In Table 6 we report the results of a similar specification as in (1) but now focus on the effect of AD protection on domestic sales in France. Our results indicate that after AD protection sets in, domestic sales in France significantly drop for firms that are initial exporters (column 1, 2 and 3 in Table 6). The average drop in domestic sales for all initial exporters is around 4 %. But for initial exporters that are "global

[30] The number of French petitioners and the cases they belong to is too small for a separate analysis on petitioners. Moreover such an analysis is more likely to suffer from endogenous policy effects.

Table 6 The effect of antidumping protection on *Domestic Sales* in France

	Initial exporters			Non-exporters		
	All initial exporters (1)	Global firms (2)	Non-global (3)	Non-exporters (4)	Global firms (5)	Non-global (6)
AD effect	−0.044***	−0.228***	−0.030**	0.050***	0.08	0.049***
	(0.018)	(0.080)	(0.018)	(0.016)	(0.126)	(0.164)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	6,893	546	6,347	15,180	282	14,898

Source: AMADEUS, French firm-level data

(1) Domestic sales is the log or real domestic sales. (2) Standard errors in parentheses; **, *** significance at the 5 and 1 % level, respectively. (3) Control group in the difference-in-differences analysis consists of firms in termination cases. (4) Initial exporter is an exporter in the year of case initiation. (5) "Global firms" are those firms that have foreign subsidiaries

firms", the drop in domestic sales is as much as 22 % as shown in column 2 whereas the drop in domestic sales for initial-exporting firms without affiliates abroad (non-global exporters) lies around 3 %.

In contrast, for firms that do not export and that do not have affiliates abroad, domestic sales significantly increase with about 5 % during AD protection which can be seen from columns 4 and 6 in Table 6. Put differently, for firms with most of their sales on the domestic market, AD protection appears to be an effective way to increase their market size and their sales. But for exporting firms, both exports and domestic sales are lowered especially when they belong to a global network.

At this point it is important to point out some of the limitations of our *firm-level* analysis. First, the firm-level data available to us are multi-product in nature but do not entail a breakdown of exports by product which makes the product correspondence with the protected product less than perfect. Ideally we want to identify exported products that are directly comparable to the imported product. For this reason we turn to *product-level* trade in Sect. "4.2".

4.1.2 The extensive margin of firm-level exports

Thus far we have focused on the effects of AD protection on exporters' intensive margin. But a related question is whether import-competing protection alters the number of exporters referred to as the extensive margin. Without the use of firm-level data this distinction cannot be made. In the first column of Table 7 we report the results of a difference-in-difference analysis where the dependent variable is dummy with a value of zero if a firm does not export and a value of 1 when a firm starts exporting. Since including firm-level fixed effects in a probit equation can bias estimates (Woolridge 2002, p. 483) we include instead a dummy equal to 1 for all firms that ever received protection (Ever_protection dummy) and equal to 0 for all other firms, i.e., those in the control group. AD protection has a small but significantly positive effect on the probability to start exporting for those firms that were not initial exporters

Table 7 Antidumping protection and the extensive margin

	Start to export (1)	Quit to export (2)
AD effect	0.030***	0.001
	(0.006)	(0.004)
Ever_Protection	−0.034***	−0.002
	(0.004)	(0.004)
Trend	0.008***	−0.002***
	(0.0006)	(0.0007)
Initial productivity	–	–
Log likelihood	−3,045	−1,040
No. of obs.	15,188	8,237

Source: AMADEUS, French firm-level data

(1) The dependent variable in columns (1) and (2) is a dummy taking a value of 0 for a non-exporting firm in the years it does not export and a value of 1 for an exporting firm in exporting years. (2) The dependent variable in columns (3) and (4) is a dummy taking a value of 0 in the years if the firm is an initial exporter and a value of 1 in the years exporting stops. (3) Standard errors in parentheses; *** significance at the 1 % level

before the protection. AD protection raises the exporting probability by 3 % compared to the unprotected firms. The expansion in domestic market size for the non-exporters resulting from the AD protection is a likely explanation for this observation. Domestic firms benefit from protection and can increase their domestic sales. This allows firms to spread their fixed costs of production over more units than before thereby reducing their average cost per unit and possibly also lowering their marginal costs. This increase in productivity brought about by the protection may be such as to allow them to incur a fixed cost of entering export markets after which they become exporters which was not possible to them before.

In the second column of Table 7 we look at the opposite question, i.e., whether AD protection affects the probability of exporters to quit exporting. We report the results of a difference-in-difference analysis where the dependent variable is a dummy with a value of zero if a firm continues to export and a value of 1 when a firm quits exporting. The results indicate that there is no statistically significant effect of AD protection on the probability of exporters to quit exporting. The effect of AD protection on the extensive margin is small especially when compared to the effect AD protection has on the intensive margin of trade documented in the previous section. Several reasons may account for that. Hysteresis in export activity is one possible explanation. Since protection is in principle limited to 5 years, exporters may "hang in" there and despite lower volumes being shipped out still continue their exporting activity. Given that exporting initially requires a fixed cost to enter the export market, this explanation would be in line with the real option theory (Dixit and Pindyck 1994) observed whenever activities require a substantial amount of sunk cost outlays. Empirical evidence to date on exporting activity supports the hysteresis argument (Roberts and Tybout 1997). AD protection at best only seems to have a limited effect on the extensive margin.

Table 8 Antidumping protection and intra- versus extra-EU product-level exports from France

	Intra-EU exports				Extra-EU exports			
	Volume		Prices		Volume		Prices	
AD effect	−0.284**	–	−0.037	–	−0.369***	–	0.003	–
	(0.133)		(0.087)		(0.1215)		(0.052)	
AD effect × year 1		−0.104		−0.017		−0.506***		0.021
		(0.253)		(0.166)		(0.235)		(0.099)
AD effect × year 2		−0.282		−0.061		−0.344*		−0.137*
		(0.232)		(0.152)		(0.215)		(0.092)
AD effect × year 3		−0.250		0.053		−0.298*		−0.034
		(0.238)		(0.156)		(0.220)		(0.094)
AD effect × year 4		−0.339		0.0147		−0.243		0.0006
		(0.237)		(0.155)		(0.211)		(0.092)
AD effect × year 5		−0.325		0.018		−0.177		−0.064
		(0.228)		(0.150)		(0.211)		(0.081)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	690	690	690	690	724	724	724	724

Source: EUROSTAT trade statistics, product-level data at 8-digit CN level

(1) Products in termination cases serve as a control group in the difference-in-difference regressions reported in the table. (2) Standard errors in parentheses; *, **, *** significance at the 10, 5, and 1 % level, respectively. (3) Intra-EU and extra-EU trade refers to the French trade in the protected products

4.2 Product-level analysis of export flows

To overcome some of the limitations of our firm-level data which typically involves their multi-product nature and the absence of export destination markets, we complement our approach with a product-level one where we turn to the 8-digit product level (CN) trade data available from EUROSTAT. The use of product-level data allows us to look at exports of products identical to the ones protected by AD measures on the importing side. The product-level data also has exports by destination country which allows us to distinguish between intra-EU and extra-EU exports. Since AD protection applies to the whole EU market we would expect AD protection to predominantly affect exports outside the EU, i.e., on extra-EU exports.

The results of the effect of AD protection are listed in Table 8 where we show the results of the following difference-in-difference estimation

$$\ln Exports_{kt} = \beta_k + \beta_1 AD\_Effect_{kt} + YEAR\_Dummies + \varepsilon_{kt} \quad (2)$$

where subscript k refers to the product(s) in the AD cases and where we use products in termination cases as a control group. The inclusion of year dummies control for business cycle effects on exports. From the results in Table 8 we clearly see that AD protection has a strong negative effect of about 36 % on the volume of

extra-EU exports while intra-EU exports go down by 28 %. A potential explanation for the added effect on extra-EU exports may stem from the fact that these sales are more likely to come from firms importing inputs covered by the order.

When we do the same exercise, not just for French extra-EU exports, but for all EU countries' extra-EU trade in the same products we find exports to fall by 21 % and imports by 12 %. The larger number found when we only look at French exports instead of total EU exports, could reflect France's relatively larger share of import-competing production in some of the products affected by AD. These *product-level* results indicate that the AD effect measured earlier at the firm level, can be regarded as "lower bound" estimates due to the multi-product nature of firms. The true export depressing effects of AD measured at the product-level obtained here are substantially higher. But interestingly, from the firm-level analysis we know that the fall in exports is predominantly driven by the intensive margin of trade, an observation we could not obtain by limiting ourselves to a product-level analysis.

From Table 8 it can also be noted that when interacting the AD effect with year dummies, the effects on extra-EU product-level export volumes tend to kick in especially in the first 3 years during protection.

Table 8 also documents the AD effect on prices, proxied by the unit values as in Trefler (2004). The export prices are remarkably stable over time, despite the AD protection that the products are subject to. This is equivalent to a zero pass-through of higher input-costs for those firms covered by the protection which implies highly competitive markets characterized by an infinitely high elasticity of demand in all destination markets. Both internal EU prices proxied by intra-EU unit values as well as export prices do not seem to be significantly affected during the protection period but remain stable over time. One possible explanation for the moderate effect that European AD policy has on domestic EU prices is the "Public interest" clause. In principle this clause prevents the EU from imposing AD protection if consumer interests—in the form of rising prices—would be hurt by it.[31] Another plausible explanation is that firms aim towards price stability. But even with stable export prices, importers of the protected products can still be hurt. They may engage in supplier-switching on the input side toward domestic or non-targeted suppliers. This change in the supply chain may be costly (switching-costs), thereby damaging the firm and causing disruptions on the exporting side. Interestingly Liebman (2006) for the United States, using disaggregated product-level monthly panel data for steel, also fails to find a significant increase in US steel prices after a safeguard was put in place by the US government but concludes that prices were more affected by business cycle conditions and industry rationalization than by the safeguard protection.

[31] The EU argued that AD duties on shoes from China and Vietnam were justified given that the price of European shoes would at most go up by 1.5 Euros a pair (http://ec.europa.eu/trade/issues/respectrules/anti_dumping/pr230206_en.htm).

Table 9 Antidumping protection and product-level exports to and imports from targeted countries

	Exports to target countries				Imports from target countries			
	Volumes		Prices		Volumes		Prices	
AD effect	−0.666**		0.131		−0.801***		0.046	–
	(0.286)		(0.137)		(0.211)		(0.074)	
AD Effect × year 1	–	−1.05**	–	0.269	–	−0.747**		−0.050
		(0.272)		(0.272)		(0.39)		(0.137)
AD effect × year 2	–	−0.475	–	−0.150	–	−0.700**	–	0.061
		(0.483)		(0.230)		(0.38)		(0.132)
AD effect × year 3	–	−0.738*	–	0.046	–	−1.13**	–	0.094
		(0.458)		(0.218)		(0.367)		(0.128)
AD effect × year 4	–	−0.417	–	0.393*	–	−1.261***	–	0.432**
		(0.481)		(0.22)		(0.390)		(0.136)
AD effect × year 5	–	−0.656	–	0.109	–	−0.540*	–	−0.165
		(0.504)		(0.240)		(0.373)		(0.130)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed product effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	363	363	363	363	506	506	506	506

Source: EUROSTAT trade statistics, product- level trade data at 8-digit CN level (1) The estimates above involve export and import volumes to target countries as reported in last column of Table 1 on a case-by-case basis where we only consider target countries outside the EU. (2) Standard errors in parentheses; *, **, *** significance at the 10, 5 and 1 % level, respectively

5 Further evidence

In this section we discuss a number of further robustness checks that support our claim that there is a link between the international orientation of a firm that determines whether the firm benefits from import protection.

5.1 Retaliation

An alternative explanation that may come to mind for the fall in exports that French exporters experience, could be related to reduced market access abroad. This could result from retaliatory action of targeted trade partners outside the EU (Prusa 2001). Such retaliatory actions are difficult to capture empirically since they may or may not occur in the same sector and may take some time to materialize (Blonigen and Bown 2003).[32] Based on our product-level analysis, we find that exports of protected products to target countries outside Europe fall by as much as 66 % as a result of European AD protection as shown in Table 9.[33] But despite the statistical significance, the economic significance of exports going to targeted countries is low.

[32] Retaliation can take the form of petition against an industry in a specific country that has filed against the petitioning industry in the past. This is the most transparent form of retaliation. But it can also entail the filing against an industry in a country that has other industries that have filed petitions against industries in the home country previously.

[33] For the products in the AD protection cases, there is a strong positive correlation between product-level imports and exports of 79 %.

Exports to target countries represent only 1 % of the total export value of products in our AD cases. This suggests that while retaliation adds to the fall in exports, it cannot explain the decrease in exports we find. Therefore, we can rule out retaliation as the main explanation for the loss in exports we observe during AD protection.

5.2 Imports and prices

Based on the trade theory of heterogeneous firms explained in Sect. 2, we expect protection to lower the demand of the import good on which the protection is imposed. In the case of non-exporting firms that are producing and selling a close substitute product to the imported one, as their domestic sales go up, we expect this to crowd-out the demand for imported varieties. Also, in the large exporting firms that are outsourcing and importing the good as an input, as a result of more costly inputs following protection, we would expect an increase in the price and a decrease of imports. Hence, in both cases we would expect imports from target countries to go down as a result of AD import protection. This is indeed what we find. In Table 9, it can be noted that imports in the EU from foreign trade partners accused of dumping fall significantly after the trade protection which is a finding similar to Prusa (1997) and others and consistent with the explanations we gave in Sect. 2 for our findings. Import prices however appear remarkably stable which suggests that there is no terms of trade effect of the AD order on import prices. But the reduction on imported volumes after protection can still be explained by the fact that consumer prices will now include the duty and thus will be higher, resulting in lower sales. Also, since exporters are more likely to be "global firms" and to belong to a network with affiliates abroad, these are typically firms that engage more in the fragmentation of production through imports and outsourcing (Bernard et al. 2011).[34]

6 Conclusion

The empirical evidence presented in this paper shows that import protection affects firms in the same domestic industry differently. The difference lies in the international orientation of firms. The "winners" of AD protection are the non-exporters. During protection their domestic sales increase as well as their average firm level measured productivity. The "losers" of AD protection are the exporting firms. Their domestic sales and exports fall during protection. We verified that these results are not driven by retaliation policy, endogeneity or the choice of control group.

From a policy point of view our results are highly relevant. If future AD policy does not take into account the negative externality it has on protected firms' exports, this is likely to have negative long-run consequences for any country using protection as an instrument to protect its domestic import-competing industry. One

[34] We refer to the "enriched uranium" protection case in the United States which was heavily opposed by US outsourcers.

implication could be that exporting firms negatively affected by the protection relocate some of their activities. Especially those firms belonging to a global network may divert production outside the EU to avoid the negative effects of protection. Firms today no longer operate within the confines of one country or market but their operations increasingly become international. While import protection laws may have been an effective way to temporarily boost a country's trade surplus and current account two decades ago where firms mainly sold domestically, it is no longer the case today. In a world that is increasingly globalized, exporters' success seems to positively depend on the free entry of imports rather than the other way round.

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Appendix

See Table 10.

Table 10 Multi-nominal logit estimation of the probability of AD protection and termination

Explanatory variables	Dependent variable: "1" if no filing; "2" if "filing and termination; "3" if "filing and protection"	
	(1)	(2)
Determinants of terminations given filing		
Industry import penetration share lagged	0.024**	0.028**
	(0.012)	(0.014)
Real EU GDP growth rate	0.171	0.219
	(0.290)	(0.305)
Previous no. of AD filings	0.135***	0.143***
	(0.026)	(0.029)
Industry employment lagged	−0.002	−0.023
	(0.193)	(0.188)
Average labor productivity lagged	–	−1.199*
		(0.728)
Determinants of protection given filing		
Industry import penetration share lagged	0.015*	0.014*
	(0.010)	(0.01)
Real EU GDP growth rate	0.067	0.066
	(0.245)	(0.254)
Previous AD filings	0.144**	0.145***
	(0.027)	(0.029)

Table 10 continued

Explanatory variables	Dependent variable: "1" if no filing; "2" if "filing and termination; "3" if "filing and protection"	
	(1)	(2)
Industry employment lagged	−0.034	−0.015
	(0.185)	(0.188)
Average labor productivity lagged	–	0.197
		(0.65)
Chi squared statistic	92.70***	102.04***
Pseudo-R^2	0.25	0.26
Number of observations	1,286	1,284

Based on the estimated probabilities in this table, a matched control group of similar NACE 4-digit sectors is constructed with firms in these sectors serving as a control group (Konings and Vandenbussche 2008). The data that we use includes information on filings and outcomes of all AD cases at the 4-digit NACE level 1995–2002. *, **, *** significance at the 10, 5 and 1 % level, respectively

Data appendix

European antidumping cases

European AD initiations and decisions are published in the *Official Journal of the European Union* which is available online: http://eur-lex.europa.eu/JOIndex.do. A notice of case initiation typically lists the name and 8-digit CN code of the dumped product, a handful of European petitioning firms publicly supporting the dumping complaint and the professional association that the petitioning firms belong to (i.e., CEFIC for the Chemical industry). Petitioning firms only represent a small fraction of the total number of EU producers in the import-competing industry. It is typically the professional association that assembles support for the complaint that needs to exceed 50 % of total EU production in order to be eligible for further investigation.

Firm-level data

For the firm-level data we use AMADEUS data. This is a pan-European data set of firm-level company accounts, which is collected and commercialized by Bureau Van Dijck (BvD, Brussels). BvD does not allow to make the data available to users who have not purchased the data. The coverage varies between countries depending on the local accounting legislation. For France all incorporated firms have to submit their company accounts to the Central Bank for fiscal purposes. Apart from financial and operational information, the company accounts data for France also involve an indication of export revenue in total revenue, which is not available for other countries. We retrieve data for the period 1995–2005. Each firm is characterized by a 4-digit NACE industry code that corresponds to its primary activity. The NACE codes are comparable to the 5-digit SIC codes in terms of the degree of detail. There are 644 different 4-digit NACE codes. The European AD initiations in the years

1997 and 1998 are matched with the income statements of firms that produce the product that is under an AD investigation. This matching is done on the basis of the corresponding 4-digit NACE code the firm is operating in and the product which is linked to the 4-digit NACE code that is subject of an AD investigation.

Product-level data

For the product-level data we use EUROSTAT external trade statistics. This provides values and weights of exported and imported products at the 8-digit CN (HS) level by country of destination and country of origin, respectively. We retrieve export values and volumes as well as import values and import volumes for each 8-digit CN product which is subject of an AD investigation initiated in 1997 or 1998 and retrieve data for the period 1995–2008.

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