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The Good, the Bad and the Ugly: Chinese Imports, European Union Anti-Dumping Measures and Firm Performance

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Abstract

This paper analyses the effects of the European Union's anti-dumping tariffs against Chinese imports on all affected firms: "the good" European import-competing firms, "the bad" Chinese exporters and "the ugly" European importers of dumped products. The results show that temporary import tariffs are beneficial to the least productive "good" EU producers, but harms the most productive "ugly" EU importers. Overall, the net effects of anti-dumping policy on European employment and exports are largely negative. Also tariffs enhance the productivity of surviving "bad" Chinese exporters and widens the productivity gap with European competitors.

JEL classification: F13; F14; D22; L25
Keywords: anti-dumping; difference-in-differences; China; European Union; trade policy; firm heterogeneity

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1 Introduction

The "China Shock" associated with the emergence of China as the "factory of the world" and the world's top exporter of goods has had significant implications for economies across the globe, especially in developed countries (WTO, 2015; Autor et al., 2016; Baldwin, 2016; Qiu and Zhan, 2016). Import competition from China and other low-wage countries has been linked to plant closure, lower firm-level growth and negative employment and wage effects at the industry and local labor market levels.[1]

China's rise as a global economic power and the resulting turmoil in developed countries' labor markets led to a significant shift toward protectionism, mainly through the adoption of anti-dumping (AD) and anti-subsidy measures, which are some of the few trade defense instruments allowed under the World Trade Organisation (WTO) framework (Feigenbaum and Hall, 2015).[2] The use of AD measures has been on the rise, especially since the 2008 financial crisis. As the world's largest exporter, China has been the main target of a significant share of these AD measures, especially from the United States (U.S.) and the European Union (EU). Between 1995 and 2014, of a total of 3,058 AD cases, China has been the target of 759 (almost 25% of the total), and since 2008 China's share in AD measures has increased to around 40%.[3]

Although international trade policy measures such as AD duties aim to protect domestic industries, they often result in higher prices for consumers, and increase the costs of import-dependent firms impacting their exporting capability (Irwin, 2017). In addition, these measures constrain the ability of import-dependent firms to access cheaper or higher-quality intermediate inputs from foreign markets, with negative implications for their position in the global value chains of production and for their productivity more generally (Konings and Vandenbussche, 2013; Vandenbussche and Viegelahn, 2018).

The aim of this paper is to evaluate the effects of the EU's AD policy on Chinese imports between 1999 and 2007 and to provide a comprehensive economic analysis of its implications on the performance of all categories of affected firms. We consider France as a representative EU country and combine firm-level and international trade transaction-level data from France and China to study the implications of AD measures on the total factor productivity (TFP), employment, total exports and investment in research and development (R&D) of all affected firms. Following the European political narrative, these include "the good" import-competing European producers facing unfair import competition, defined as French producers that belong to 4-digit manufacturing sectors that are protected by the EU AD measures (Konings and Vandenbussche, 2008; Pierce, 2011); "the bad" Chinese firms that export to the EU the products targeted by the AD measures

[1] For a detailed overview of the literature on the effects of import competition from China, see Autor et al. (2016) and Qiu and Zhan (2016).

[2] Dumping is a strategy by which firms export products at a price lower than the price usually charged in the home market or at a price lower than the cost of production. For details on anti-dumping, please refer to Article VI of the GATT 1994 Anti-Dumping Agreement.

[3] See the "Statistics on anti-dumping" section of the WTO webpage (`https://www.wto.org/english/tratop_e/adp_e/adp_e.htm`) for details.

and "the ugly" European import-dependent firms that we define as the French manufacturing firms that import from China products that were targeted by the AD measures. We identify 36 AD cases approved by the EU and targeting Chinese imports between 1999 and 2007. These cases are linked to almost 700 "ugly," 2,000 "good" and 2,780 "bad" firms.[4] Our methodological approach is to apply a difference-in-differences (DID) methodology combined with a propensity score matching (PSM) approach to control for selection-bias issues (Konings and Vandenbussche, 2008; Pierce, 2011).

The availability of rich, firm-level data for French manufacturing firms allows the identification of producers and importers of protected products and the construction of various measures of firm-level performance. Moreover, several studies have highlighted the similarities among European firms, particularly in terms of the link between internationalization strategies and firm-level performance (Ottaviano and Mayer, 2007; Rubini, 2010; Bekes et al., 2011). Hence, our contribution is twofold. First, to the best of our knowledge, this is the first study to provide a comprehensive micro-level analysis of the effects of the AD measures on the performance of foreign exporters, domestic producers and domestic importers of the targeted products. Second, we precisely identify import-dependent firms that rely on the import of products affected by AD duties and therefore consider the implications of these duties on their performance.

To briefly summarize our results, our findings suggest that the EU AD policy is successful in constraining Chinese exports to the EU, mainly through a reduction in the number of Chinese exporters. Protected import-competing firms enjoy an improvement in productivity and employment, but these positive effects are limited to the least productive firms, mainly those that do not export outside the European Single Market. However, the same AD measures have a negative effect on the productivity, employment, and total exports of import-dependent firms, particularly the most productive. These negative effects are not limited to firms that import the products directly from China, but extend to firms that may import the products from other source countries, since the prices of these products tend to rise in general. Although the EU AD duties lead to the exit of some Chinese exporters, the surviving ones experience an increase in productivity, employment and total exports. The improved performance of the surviving exporters seems to be driven by investments in R&D, which allow exporters to improve productivity and overcome the rise in trade costs induced by the AD measures.

The overall effect of these policies is perverse. First, we find the general impact on the French economy to be mixed. The imposition of the AD measures leads to a deterioration in the productivity of import-dependent firms, although it increases that of import-competing firms. However, the costs in terms of productivity appear to be experienced mainly by highly productive import-

[4]Table A1 in Appendix A compares the industries protected by these cases, the firms in protected industries and the products targeted between France and the EU. Table A1 shows that industries protected by AD duties are very similar between France and the EU in terms of their size and economic relevance. Firms in these protected industries are, on average, slightly larger in France but have similar labor productivity with firms in the same industries in the EU. Finally, the shares of targeted products in total imports and imports from China are also very similar between France and the EU. Further information on the 36 cases can be found in Table A2 in Appendix A.

dependent firms, while the benefits are captured by less productive import-competing ones. The overall protection effect in terms of employment is negative: the larger negative impact on a few import-dependent firms causes the loss of almost 13,000 jobs, much more than the almost 1,400 new jobs created by protected import-competing firms. Moreover, by increasing the cost of sourcing inputs from China, the AD policy reduces the exports of import-dependent firms by almost 9 billion euros. If we take into account of all potential users of targeted Chinese products and extend our calculations to the overall French economy, the net loss is of almost 81,000 jobs and 42 billion euros in terms of exports, which accounts for almost 2.2% of the overall employment in and 13% of the overall exports from French manufacturing industries. Finally, by improving the performance of surviving Chinese exporters, the EU AD policy leads to a perverse long-run effect that widens the productivity gap between French firms and competing Chinese exporters.

These findings have important economic and policy implications. First, we demonstrate the inefficiency of AD duties as an instrument of trade protection. The imposition of AD tariffs manages to protect the "good" import-competing firms only in the short run, while the upscaling of the surviving "bad" Chinese exporters leads to even tougher competitive pressures in the long run. Second, amid growing concern about the protectionist abuse of these measures, governments in developed countries should take into account the likely negative impact of AD duties on "ugly" import-dependent firms. These firms are highly productive and fully integrated in the global value chains of production. They import intermediate inputs from China because of their higher "value-for-money" ratio to produce better and high-end products, generating growth in value added and local employment.

This paper contributes to several strands of the literature, especially the literatures on the implications of trade defense instruments and access to imported inputs for firm-level performance. The theoretical literature on AD predicts, in general, that AD policies are, in most cases, welfare reducing. In terms of welfare, the gains for protected producers are more than offset by the costs in terms of consumers welfare and loss of comparative advantage (Gallaway et al., 1999; Blonigen and Park, 2004; Bown and Crowley, 2007; Ruhl, 2014; Wu et al., 2014). From an empirical standpoint, several studies have shown that AD measures have a negative impact on trade volumes, due to the effects associated with trade destruction, diversion and deflection (Bown and Crowley, 2006; Durling and Prusa, 2006; Vandenbussche and Zanardi, 2010; Egger and Nelson, 2011; Besedes and Prusa, 2017).[5]

Despite using different methods and data sources, existing micro-level empirical studies find similar results to our own on import-competing firms. For instance, previous firm-level analyses have congruently shown that protection through AD measures results in an improvement in the markup of protected firms (Konings and Vandenbussche, 2005; Pierce, 2011), consistent with the theoretical prediction of a pro-competitive effect of trade, where trade induces greater competition that leads to a fall in the prices and markups of domestic firms (Melitz and Ottaviano, 2008; Chen

[5]For a comprehensive survey of the literature on AD, see Nelson (2006), Zanardi (2006) and Blonigen and Prusa (2016).

et al., 2009; Edmond et al., 2015; Arkolakis et al., 2018). In terms of productivity, Konings and Vandenbussche (2008), using a revenue-based measure of productivity, find a positive effect on the productivity of protected firms. Pierce (2011) instead, measuring productivity based on physical output and getting rid of the output price bias, provides evidence of a negative productivity effect for U.S. firms. However, in line with our results, both studies show how the effects of AD measures are heterogeneous across firms and tend to benefit laggard import-competing firms. Similarly, in line with our results, evidence by Lu et al. (2013) on the effect of U.S. AD duties against Chinese products on the performance of affected Chinese exporters, show that such protectionist measures make the surviving exporters more productive. In turn, this will increase the competitive pressures faced by protected firms in developed countries once the AD duties are lifted, sowing doubts about the efficiency of these measures to protect threatened industries. We contribute to this literature by analyzing the combined impact of the same AD measures on the two competing groups of firms, the "good" European domestic producers and the "bad" Chinese exporters.

So far, however, only few papers have considered the implications of AD measures on import-dependent firms, which are increasingly prominent in today's world of vertical specialization and production fragmentation across borders. Anecdotal evidence documented by Isakson (2007) and Eckhardt (2011) shows how import-dependent firms lose from the imposition of AD duties and often oppose their implementation.[6] The reason is that access to imported inputs can enhance the productivity of domestic firms by increasing the range of available intermediate inputs, by improving the quality of available inputs and through learning-by-importing effects (Ethier, 1982; Markusen, 1989; Grossman and Helpman, 1991; Kasahara and Rodrigue, 2008).[7] Moreover, access to imports from low-cost countries can improve the competitiveness of firms by reducing production costs and generating savings that may allow firms to expand their domestic activities (Grossman and Rossi-Hansberg, 2008). In an attempt to take these firms into consideration, Konings and Vandenbussche (2013) build a model where AD duties are imposed on intermediate goods and show that the overall effect of these duties on the output of an importer depends on the elasticity of demand. A higher elasticity of demand will lead to larger losses from protection. Although Konings and Vandenbussche (2013) are unable to identify importers, they consider exporting firms instead and assume that exporters of a product are more likely to be importers as well. They also assume that exporters face tougher competition in international markets; therefore, compared with domestic sales, the foreign sales of an exporting firm will be more strongly affected by protectionism. Their results show that AD policies harm exporters while benefiting domestic producers.

The closest paper to our study is by Vandenbussche and Viegelahn (2018), who look at the within-firm reallocation of inputs as a result of AD policy in India. Firms using products affected

[6] The press has also reported on the negative impact of AD duties. See for example: http://www.nytimes.com/2008/01/13/business/worldbusiness/13iht-trade.4.9181765.html. and http://www.thehindubusinessline.com/todays-paper/tp-corporate/article1000942.ece.

[7] Several recent studies have documented substantial productivity gains from imports for developing countries, including Indonesia (Amiti and Konings, 2007), Chile (Kasahara and Rodrigue, 2008), India (Topalova and Khandelwal, 2011), Hungary (Halpern et al., 2015), and China (Elliott et al., 2016). For instance, Goldberg et al. (2010) show that access to imported inputs results in an increase in the product scope of Indian firms.

by AD measures readjust their input mix and reduce the use of protected inputs. As a result, import-dependent firms reallocate their sales away from outputs made of protected inputs and experience a reduction in their markups. Vandenbussche and Viegelahn (2018) identify users of protected inputs but are unable to distinguish between firms that import those inputs from targeted countries and those that source the protected inputs domestically or from unaffected foreign locations. By using detailed transaction-level data on imports, our paper is the first to identify precisely import-dependent firms. We track French firms that have imported from China the products affected by EU AD measures against China before and after the imposition of these measures. In addition, we further contribute to the literature by exploring the heterogeneity of the response of import-dependent firms to the imposition of AD measures by considering different categories of "ugly" firms in several robustness tests.

The rest of the paper is organized as follows. Section 2 describes the data sources and presents descriptive statistics. Section 3 details the methodology and section 4 presents and discusses the empirical findings and policy implications. Finally, section 5 concludes.

2 Data and Summary Statistics

For this study, we combine data from several sources. First, we rely on the Global Anti-dumping Database (GAD), from the World Bank, to provide information on all AD proceedings carried out by the EU against China during the period 1999 to 2007 (Bown, 2015).[8] This dataset records all the AD measures adopted in the world since 1980, and provides detailed information on product classification at the Harmonized System (HS) 8-digit level, the dates of initiation and conclusion, the outcomes of the investigations, the values of AD duties imposed, and the length of the measures. We aggregate the AD data to the HS 6-digit level to maintain consistency across the EU and Chinese HS classifications.[9] We focus on this sample period to be consistent with the time frame of the firm-level data and to exclude from the analysis any possible statistical disturbance associated with the surge in trade protectionism experienced after the beginning of the global economic crisis in 2008 (Vandenbussche and Viegelahn, 2011; Bown and Crowley, 2013). We complement this dataset by collecting additional information on trade flows and affected industries from the Eurostat database on bilateral trade in goods (COMEXT) at the HS 6-digit level and from the Eurostat Structural Business Statistics database on industry-level data, at the NACE 4-digit rev.1.1 level, for European manufacturing sectors.

In the EU, the European Commission is the institution designed to investigate AD cases initiated by European producers representing at least 25% of the output of the import-competing

[8] Over the period of analysis, the EU went through two enlargements, in 2004 and 2007. In our data, the EU consists of 15 countries up to 2004, 25 countries between 2004 and 2007 and 27 countries in 2007.

[9] The customs data for France and China use the World Customs Organization's Harmonized System to define products. Since the 6-digit codes are the most detailed definitions that are used as the common standard across all countries, we have aggregated the French and Chinese HS 8-digit classifications to the HS 6-digit level for precise identification of the same products in the French and Chinese datasets.

EU industry. The European Commission investigation carries out inquiries of exporters in the countries concerned, import-competing firms in the EU and import-dependent firms and users in the EU. The European Commission may also inspect records at companies' premises to compare and verify the data provided by all the participating parties. Although the European Commission seeks the views of importers and users, recent evidence has shown that producer groups are more successful in lobbying their governments toward the support of AD measures for the protection of domestic industries, while importers, retailers, outsourcers and consumers have less political weight in lobbying national and EU authorities.[10] During the period of our analysis, the EU Council of Member States voted, on the basis of the European Commission investigation, with simple majority for the adoption of AD measures imposed on all import flows of the affected products from the designated countries. AD measures usually take the form of ad-valorem duties, but could also be specific duties or price undertakings. These measures are generally imposed for five years but may be subject to revision if the circumstances of the exporters change, or the measures can be extended beyond the five-year period if the dumping strategy has not been terminated.[11]

China, as the largest source of imports for the EU, has become the main target of the EU AD measures, and the EU is now the world's main initiator of AD cases against China (Cheong, 2007; Rovegno and Vandenbussche, 2012). Figure 1 shows that despite a decline in the number of varieties, defined at the product-country level, investigated for dumping by the EU during the period 1999 to 2007, the share of Chinese products investigated increased continuously, particularly after China's accession to the WTO in 2001. In this study, we focus on 36 approved EU AD cases against Chinese imports between 1999 and 2007. These cases affected 67 targeted products at the HS 6-digit level, that are linked to 36 EU industries at the NACE 4-digit level.[12]

[Figure 1 about here]

At the firm level, we use detailed data for France and China to analyze the performance of the "good," the "bad" and the "ugly." For France, we rely on two datasets: the Annual French Business Survey (ABS), provided by the National Institute of Statistics and Economic Studies, and international trade transaction-level data collected by the French Customs Agency. The French Customs Agency provides information on the origin-destination countries of trade flows, HS 8-digit product-level categorization and value of manufacturing imports and exports.[13] The ABS dataset provides detailed balance sheet information for all French firms with more than 20 employees,

[10] For a review of the political economy literature on this topic, please refer to De Bievre and Eckhardt (2011) and Eckhardt (2011, 2013).

[11] The EU AD regulations have undergone several reforms. For a comprehensive review of EU AD regulations, please refer to the Regulation (EU) 2016/1036 of the European Parliament and of the Council of the 8th June 2016 (L 176/21).

[12] On average we identify four cases per year, with a minimum of one case in 1999 and a maximum of nine cases in 2005.

[13] This dataset includes all intra-EU shipments greater than 100,000 euros and all shipments to countries outside the EU over 1,000 euros, covering more than 90% of French total manufactured goods imported (Ottaviano and Mayer, 2007).

including total output, domestic and foreign sales, number of employees and R&D expenditure.[14] Merging the exhaustive transaction-level trade dataset with the GAD dataset allows us to identify all French firms that have imported the targeted products from China and/or other trade partners. Specifically, the French "ugly" import-dependent firms are identified as firms that have imported, in the year before the imposition of AD measures, targeted products from China. We identify the "good" protected import-competing firms as French firms belonging to the same NACE 4-digit sector as products targeted by EU AD measures on Chinese imports (Konings and Vandenbussche, 2008).[15]

For China, we rely on the China Customs dataset provided by the China Data Center at Tsinghua University, Beijing. This data set covers all export transactions of Chinese exporters, including product classification at the HS 6-digit level, trade volume, trade value and export destinations for the period 2000 to 2006. We identify the "bad" exporters as Chinese firms that have exported to the EU the products targeted by EU AD duties in the year before the imposition of AD measures. We merge the China customs data with the Annual Survey of Industrial Firms (ASIF) conducted by the National Bureau of Statistics of China, which includes information on firm characteristics (e.g., industry, firm name, employment and firm size) and many financial variables from firm balance sheets, income statements and cash-flow statements (e.g., input, output, R&D and value added).[16]

Figure 2 presents the distribution of import-competing, import-dependent and exporting firms affected by AD measures across NACE 2-digit industries and the market share of the targeted Chinese products to the EU in each of these industries.[17] Import-dependent firms are evenly distributed across sectors, with the highest dependency in the textile and consumer goods industries. French import-competing and Chinese exporters are concentrated in the same sectors, mainly in the chemicals, machinery and equipment industries.

[Figure 2 about here]

Table 1 presents summary statistics on the performance of French import-dependent firms, French import-competing firms and Chinese exporters. For each group of firms, we compare the averages of the treated and (unmatched) untreated calculated over a window of up to three years before and after the imposition of EU AD measures on Chinese products. For the sample of

[14] The ABS data and the international trade transaction-level data are confidential data sets and available upon requests from the relevant French statistical authorities.

[15] We identify protected sectors by using the correspondence tables between the HS products classification and the SIC industrial classifications provided by Pierce and Schott (2009).

[16] The China Customs data and the ASIF data are confidential datasets and available upon requests from the relevant Chinese statistical authorities.

[17] For import-dependent and import-competing industries, market share is measured as the share of imports from China over total imports of the targeted products at the HS 6-digit level averaged at the industry level. For exporting industries, market share is measured as the share of exports to the EU over total exports of the targeted products at the HS 6-digit level averaged at the industry level.

French firms, we consider as untreated all firms that have not been affected by AD protection as import-competing or import-dependent during our time period.[18] For the sample of Chinese firms, we consider as untreated the remaining Chinese exporters within the same HS 4-digit industry as affected exporters. For treated firms, Table 1 presents average values over a period of up to three years before and after the imposition of EU AD measures. For unaffected firms, we compare the average values before and after the median year.

Only slightly fewer than 700 French direct importers are affected by AD measures, while almost 2,000 French producers are protected by these measures. However, import-dependent firms are on average larger and more productive compared with the import-competing firms in our sample. Import-dependent firms also invest more in R&D activities and are more active exporters. Table 1 shows that, after the imposition of AD measures, the number of import-dependent firms is significantly reduced. Protected import-competing firms register a steady level of employment and an increase in exports after being protected; however, the increase in exports is weaker in comparison with the sample of untreated producers. Table 1 also indicates a sharp decline in the number of Chinese exporters after the introduction of EU AD measures on Chinese products. However, the surviving Chinese exporters report an improved level of productivity, higher level of investment in R&D activities and higher values of total exports. EU AD measures on Chinese products seem to protect import-competing firms that are characterized by low levels of productivity, while imposing duties on the import of Chinese products that are used by more productive import-dependent firms.

[Table 1 about here]

3 Methodology

The analysis of AD protection on firm-level outcomes is subject to two potential sources of bias: self-selection by firms that initiate AD cases and selection by governments (or the EU in this case) if decisions to approve AD cases are based on factors that are correlated with firm-level outcomes (e.g., productivity, employment growth and other macroeconomic trends) (Konings and Vandenbussche, 2008; Pierce, 2011). Although import-dependent firms are invited by the European Commission to contribute to the investigation process, arguably these sources of bias are less relevant in the case of these firms, since they are less likely to influence the European Commission's decision. However, in order to rule out the possibility that the decision to protect may be based on variables that are correlated with the dependent variables in our analysis, our approach to assess the impact of AD measures on the performance of affected firms consists of applying a DID approach with PSM at the firm level (Konings and Vandenbussche, 2008; Pierce, 2011; Lu et al., 2013). This approach allows us to assess the average treatment effect on the treated (ATT), the difference in the outcome variable between firms in the treatment group, firms that have been

[18] More precisely, we drop from the sample all firms in NACE 4-digit industries that are associated with the production of HS 6-digit-level products that have been targeted by EU AD duties toward countries other than China. We also drop from our sample importers of targeted products from the targeted country(ies).

affected by the imposition of AD measures on Chinese products (the treatment), and a control group of similar firms that have not been treated before and after the imposition of AD measures (Lechner, 2002; Leuven and Sianesi, 2003). The average effect that treated observations would have experienced if they had not been affected by AD measures can be expressed as:

$$\tau_{ATT} = E\left(y^1_{t+n} - y^0_{t+n} \mid S_t = 1\right) = E\left(y^1_{t+n} \mid S_t = 1\right) - E\left(y^0_{t+n} \mid S_t = 1\right) \quad (1)$$

where τ represents the expected effect on outcome y of the AD treatment in the post-treatment period, relative to the effect of no treatment for the same observation. The fundamental problem is that only one of the two possible outcomes in Equation (1) is identifiable, whether the observation has been treated or not, and the counterfactual for the same observation cannot be observed. Since $E\left(y^0_{t+n} \mid S_t = 1\right)$ is not observable, we apply PSM to construct suitable control groups by considering instead the effect of no treatment on similar observations that have not been affected by AD measures, $E\left(y^0_{t+n} \mid S_t = 0\right)$. The validity of the DID approach relies on the assumption that, in the absence of treatment, the average change in outcomes $(y^1 - y^0)$ would have been the same for the treated and controls. This assumption may be too stringent if the distribution of certain observables that are related to the dynamics of the outcome variable is unbalanced between the treatment and control groups. In this case, a conditional identification restriction of the DID approach is necessary, where a vector of variables that are believed to be related to the outcome dynamics is introduced into the DID estimator (Abadie, 2005). Heckman et al. (1997) show that combining PSM with DID is effective in eliminating selection bias and accommodating covariates into a DID framework. The matching estimator controls for the selection bias based on observable covariates by comparing treated firms with comparable untreated firms, while the DID approach controls for the bias associated with unobserved heterogeneity (Imbens, 2004).

We consider several outcome variables that reflect the performance of affected firms, such as TFP, total employment, investment in R&D and total exports. We estimate TFP following the methodology developed by De Loecker (2007), which is an extension of the standard Olley and Pakes (1996) methodology, which takes into consideration the heterogeneity in terms of productivity between exporters and domestic firms. In the TFP estimation, we use value added as a proxy for output, total employment as a measure for labor and total costs of intermediate input as costs of production. We also include in the estimation a dummy for exporters and total investment in tangible and intangible assets. Since our TFP measure is based on revenue and not on physical output, due to increases in prices it could capture markup effects instead of changes in the efficiency of firms (De Loecker and Van Biesebroeck, 2018). Therefore, all monetary values in our analysis are deflated using OECD production price indexes at the 2-digit industry level, using 2000 as the baseline for France; for China Producer Price Index deflators at the industry level are taken from Yang (2015) and constructed according to Brandt et al. (2012) using 1998 as the baseline.[19]

The PSM technique allows us to select from the sample of untreated observations a suitable control group for which the distribution of observables is as similar as possible to the distribution

[19] Once estimated and logged, we remove the top and bottom percentiles without any significant loss of observations, following the ISGEP (2008) approach to mitigate the effect of outliers on the analysis.

of observables for the treated group before the imposition of the AD measures (Rosenbaum and Rubin, 1983; Heckman et al., 1997; Becker and Ichino, 2002). The first step is to estimate the probability of being affected (treated) by the introduction of AD measures $Pr(AD = 1)_{it}$, the so-called propensity score, based on a set of observable characteristics:

$$Pr(AD = 1)_{it} = \beta_0 + \beta_1 Prod_{it-1} + \beta_2 Ind_{it-1} + \beta_3 Firm_{it-1} + k_i + k_t + \xi_{it} \quad (2)$$

We use a logit model to estimate the propensity score of being treated and control for product-level ($Prod_{it-1}$) and industry-level (Ind_{it-1}) characteristics that have been shown in the literature to affect the probability of AD treatment. We also add a set of firm-level variables ($Firm_{it-1}$) that ensure that the treated and control groups of firms have similar distributions of covariates that are linked to outcome variables and associated with the likelihood of a firm being treated by AD measures. More specifically, at the imported product level, we control for lagged import penetration from China, the cumulative number of previous EU AD investigations from 1987 onward (Blonigen and Park, 2004; Konings and Vandenbussche, 2008; Pierce, 2011) and the lagged import price from China.[20] We control for the size of the industry producing the product by including the lagged employment level of the EU industry at the NACE 4-digit level. Industry size is a proxy for the significance of the industry for the EU economy and EU policy makers (Blonigen and Park, 2004; Konings and Vandenbussche, 2008; Pierce, 2011). At the level of the industry of the product, we also control for the lagged growth rate of employment and lagged level of productivity.[21] A growing industry may be perceived as faring well in the face of import competition and will perhaps be less likely to receive protection. Finally we add the lagged GDP growth rate in the EU to account for overall economic shocks at the EU level. At the firm level, we include lagged size measured by the number of employees, lagged TFP, lagged value of total imports and an exporter dummy.[22] Table B1 in Appendix B presents the results of the propensity score estimation for the three categories of firms. It shows that higher levels of import penetration from China and lower Chinese prices are associated with a greater probability of AD measures. Negative shocks to the EU economy are also associated with a greater probability of treatment. The experience of firms that initiate AD cases, as proxied by the number of previous AD cases at the product level, is also positively linked to the probability of treatment.

[20] We define import penetration as the share of imports from China over total imports of the EU at the HS 6-digit level. Import price is measured as the ratio of the value over volume of imports from China into the EU at the HS 6-digit level. Both variables are based on the COMTRADE dataset. Previous AD investigations are calculated using the World Bank's GAD database. All product-level variables are averaged at the level of the firm over the set of products imported by each firm.

[21] Productivity at the industry level is measured as value added per employee. All product and industry variables are extracted from the EUROSTAT Structural Business Statistics database and measured at the EU level for each NACE 4-digit industry. These variables are averaged at the level of each importing firm across the range of NACE 4-digit industries from which each firm imports.

[22] We estimate three separate PSM equations, one for each type of firms. We adopt a similar set of variables at the product, industry and firm levels to estimate the probability of treatment for the "good" import-competing firms, the "bad" Chinese exporters and the "ugly" import-dependent firms. In the propensity score estimation for Chinese exporters, we omit the exporter dummy, as all firms are exporters, and include an additional control variable that measures the total value of intermediate inputs at the firm level.

We match the "good" import-competing firms to firms within the same NACE 2-digit industry and match the "ugly" import-dependent firms to similar importers that do not directly import any products that have been subject to any EU AD duties at time t-1. We restrict the pool of matched controls to firms that import products within the same HS 4-digit classification as targeted HS 6-digit products. In the case of Chinese exporters, we match these targeted exporters to Chinese exporters of other products within the same HS 4-digit classification as the HS 6-digit targeted products. After identifying the pool of treated and control groups, we maintain a cross-section of the data where we observe the treated firms in the year of treatment (t=0) and each control observation in its median year.

We match treated and control observations by applying a kernel algorithm with a strict bandwidth of 0.05. We impose a common support condition and drop the treated observations whose propensity scores are larger or smaller than the maximum or minimum of those never affected. The kernel matching estimator associates to the outcome y_{it} of treated firm i a matched outcome given by a kernel-weighted average of the outcomes of comparable non-treated firms, where the weight given to non-treated c is proportional to the closeness between i and c (Leuven and Sianesi, 2003; Caliendo and Kopeinig, 2008). We estimate standard errors using bootstrapping, with 500 repetitions, to alleviate heteroskedasticity concerns related to additional sources of variability introduced by the estimation of the propensity score and the kernel matching process (Heckman et al., 1997; Abadie and Imbens, 2011). Tables B2, B3, and B4 in Appendix B present balancing tests of variables used in the matching procedures and confirm the quality and validity of the matching. More precisely, these tests indicate that for none of the variables does the absolute standardized bias exceed the 25% threshold required for a valid matching (Rosenbaum and Rubin, 1985; Caliendo and Kopeinig, 2008). The variance ratios of the treated over the non-treated indicate a good balance for most of the covariates. For all the firm-level variables, the balancing tests indicate that treated and controls did not significantly differ prior to the treatment.

4 Results

Before discussing the firm-level analysis, we present a preliminary discussion on the impact of AD measures on total trade between the EU and China at the product level. This discussion provides an overview of the aggregate effects of AD measures on the trade flows and prices of affected products and sets the firm-level analysis in context. Table C1 in Appendix C presents the results of a DID analysis at the product level for Chinese exports to the EU. It shows that AD measures are successful in reducing China's total exports of targeted products toward the EU market. However, this drop in exports is driven by a significant reduction in the number of exporting firms. Further firm-product-level analysis reveals that the surviving exporters do not experience a decrease in exports of the affected products or a change in the (FoB) price of these products.[23] Table C2

[23]Unreported results at the product and the firm-product levels show that after the imposition of AD measures by the EU, total exports toward non-EU destinations increased, indicating that Chinese exporters engaged in trade diversion as a result of the AD measures. These results are available from the authors upon request.

in Appendix C presents an equivalent analysis at the product level from the perspective of the EU. It explores the effects of AD measures on the price (FoB) of the imported targeted products across several source countries: China, intra-EU and the rest of the world. Table C2 shows that AD measures lead to an increase in the price of imported products from China and the rest of the world. However, internal prices, within the boundaries of the Single Market, are not significantly affected by these measures. These findings are consistent with the results of Prusa (1997) who reports an increase in foreign prices, from targeted and non-targeted countries, as a consequence of AD measures in the U.S., and the results of Liebman (2006) and Konings and Vandenbussche (2008), who find a limited effect of AD measures on domestic prices in the U.S. and the EU, respectively.[24]

4.1 The Ugly

We map the AD measures to product-level imports at the firm level to investigate precisely the effects of AD policy on the "ugly" import-dependent firms. Table 2 reports the results of the DID analysis of EU AD measures for up to two years after the treatment. The main specification is based on the sample of "direct importers," which are identified as firms importing products targeted by EU AD measures directly from China in the year before the treatment (t-1). We also differentiate the effect of the AD measures depending on whether the firms continue to import from China. We therefore split the sample of "direct importers" into two subsamples: "surviving importers," defined as firms that import the targeted products directly from China in the year before the treatment (t-1) and in the year of the treatment (t), and "exiting importers," defined as the firms that import the targeted products directly from China in the year before the treatment (t-1) but not after the treatment, as a consequence of the imposition of AD duties.

Table 2 shows that the AD measures have a negative impact on the productivity, employment and total exports of firms importing the targeted products from China.[25] These negative effects start in the year of application of the protective measures and persist in the subsequent year. Relative to matched controls, treated importers experience a reduction of 3 to 7 percentage points in their productivity growth in the year of treatment and the following year, and a reduction of 2 to 5 percentage points in their employment growth up to two years after the treatment. In addition, the

[24]Before the imposition of the AD duties, the prices of imported products from China were, on average, higher than the prices of the same products imported from the rest of the world (209 euros and 168 euros, respectively, at time t-1). The imposition of AD duties leads to an increase in prices from rest of the world. This may be explained by an increased demand for imports from these countries of origin. An alterative explanation is that exporters from non-targeted countries may increase their prices to avoid being the subject of future AD investigations. Although rest of the world prices increase at a faster rate than Chinese prices, in comparison with the control group, these prices remain, on average, below the prices of the same products imported from China (179 euros and 229 euros, respectively, in t+2).

[25]In all results tables, the reported number of observations corresponds to the number of treated firms and available controls. In Table 2, when we split the sample of treated between surviving and exiting importers, the pool of available controls remains relatively similar across the two subsamples and similar to the overall sample of controls available for the total sample of direct importers.

worsening of importers' performance affects the growth of their total exports, which is reduced by almost 30 percentage points in the two years following the treatment. The negative effects of the AD duties are observed in both subsamples: firms that continue to import the product from China (surviving importers) and those that cease importing the targeted products from China (exiting importers). However, the effects are stronger in the case of exiting importers. While surviving importers experience a reduction in productivity growth between 4 and 7 percentage points, the drop in productivity is between 7 and 8 percentage points in the case of exiting importers. Similarly, surviving importers suffer a drop in employment growth between 2 and 4 percentage points, while the decline is between 1.8 and 5 percentage points for importers that cease importing from China.

[Table 2 about here]

These results are consistent with the assumption that access to cheap imports from China helps firms to generate savings that improve their productivity and competitiveness (Grossman and Rossi-Hansberg, 2008) and corroborate the findings of Bloom et al. (2016) and Mion and Zhu (2013) of a positive effect of offshoring to China on the productivity and skill upgrading of European firms. However, the results suggest that imports from China are not associated with an increase in R&D effort. We find no difference between treated and control firms in terms of R&D investment. This evidence is also in line with Bloom et al. (2016), who find that measures of offshoring to China have no significant impact on the patenting activities of European firms. Our results seem also to suggest that firms that are forced to switch to alternative suppliers, in other foreign countries or domestically, incur an increase in costs that translates into a stronger negative impact on productivity, employment growth and international competitiveness.

We further explore the heterogeneity of the effect of the AD duties on importers by estimating the ATTs across the productivity distribution. Table 3 presents the results where we split the sample of import-dependent firms into four quartiles of productivity measured in t-1. The first quartile corresponds to the lowest productivity and the fourth quartile to the highest. Table 3 shows that the AD measures mostly affect the most productive importers. In the first two quartiles of productivity, we find no significant differences between the treated firms and the matched controls. In the third quartile of productivity, we observe negative effects of the AD measures on TFP, employment and total exports of treated direct importers, but these effects are limited to the year of the treatment. However, in the case of the most productive direct importers, we find negative and persistent effects of the AD measures over the three-year period except for R&D investment. Given the self-selection of firms into importing (Elliott et al., 2016), the results in Table 3 may be driven by the fact that more productive firms are more reliant on imports and, therefore, more affected by protectionist measures.

We explore this idea by conditioning the effect of the AD measures on the dependence of importers on the targeted products. To do so, we split the sample of import-dependent firms into quartiles of import intensity at time t-1, measuring import intensity as the share of imports from China of the targeted product over the firm's total imports. We expect firms that rely more on the

direct imports of the product from China to be more affected by these measures. The first quartile corresponds to the lowest import intensity and the fourth quartile corresponds to the highest. The results presented in Table 4 confirm our conjecture. The negative effects of the AD measures on productivity, employment and total exports are only observed in the third and fourth quartiles and are stronger in magnitude in the fourth quartile of import intensity. Import-dependent firms in the first two quartiles are not affected by the AD measures; if anything, firms in the first quartile seem to experience some growth in their employment, perhaps because they benefit from the loss of competitiveness experienced by firms with higher dependency on direct imports of the affected products from China.

[Tables 3 and 4 about here]

The definition of the "ugly" as firms that import the affected products directly from China may be too restrictive, as other firms may use the products without importing them directly and hence could be indirectly affected by the AD measures. If the AD measures lead to an increase in the prices of imports from other countries of origin or within the domestic market, then we would expect importers from other origins and users of domestically procured targeted products to be affected as well. Table C2 shows that after the imposition of the AD measures, the prices of the targeted products increased not only from China, but also from other non-EU countries. However, the imposition of the AD measures does not seem to affect prices within the Single Market. Therefore, we expect importers from non-EU origins to be affected by the AD measures even if they do not necessarily import the products directly from China.

Hence, we widen the definition of import-dependent firms to include all importers of the targeted products at the HS 6-digit level from outside EU countries and we compare these to firms that procure these products only within the EU Single Market (importers from EU countries). This distinction allows us to identify whether the effects of the AD protection vary across countries of origin, particularly within and outside the EU Single Market. Unfortunately, since the data do not report the use of domestic inputs at the firm level, we cannot identify firms that use the targeted products acquired from the domestic market. In addition, to capture the effects of AD on the wider group of users of the targeted products, we assume that within an NACE 4-digit industry, all firms use a similar set of products. We identify users as all firms within the same NACE 4-digit industry as firms importing the targeted products directly from China (our main definition of import-dependent firms).

The results reported in Table 5 indicate that only importers from non-EU countries are negatively affected by the AD measures. Importers within the EU experience an increase in the rate of employment growth in the two years following the imposition of the AD measures. These results echo the findings presented in Table 4, where firms that are less affected by the protective measures seem to benefit from the loss of performance suffered by competitors that are more directly affected by the AD measures. When we consider the effect of the AD duties on users of the targeted products defined at the industry 4-digit level, we find negative effects on TFP and total exports in the

year of the treatment. We also find that employment and R&D investment experience negative growth in comparison with non-affected firms. This finding seems to suggest that the increase in the prices of Chinese targeted products and the possible reduction in the number of available varieties resulting from the imposition of the AD measures hurts the users of the targeted products even when they do not import the products directly, which is consistent with similar results in the literature (Halpern et al., 2015; Vandenbussche and Viegelahn, 2018).

[Table 5 about here]

Overall the results indicate that the EU AD measures on Chinese products have negative effects on the "ugly" import-dependent firms, particularly the most productive importers and importers that rely intensively on the use of the targeted products, with negative externalities also for other firms that do not import the affected products directly from China.

4.2 The Good

We turn now to the impact of the AD measures on French import-competing firms. We follow Konings and Vandenbussche (2008) and Pierce (2011) and identify import-competing firms at the industry level. It can be argued that the industry classification at the 4-digit level is not sufficiently disaggregated to capture import competition at the product (HS 6-digit) level. However, the data only provide a 4-digit industry classification and do not list the products produced by each firm at a more disaggregated level. To test the robustness of our findings, we rely on the French customs data and identify import-competing firms as exporters of the targeted products at the HS 6-digit level. The export data allow us to identify a sample of firms that produce and export the targeted products. We distinguish between exporters to the EU Single Market, as these firms enjoy the protection of the AD measures across all the EU countries, and firms that export instead to destinations outside the EU, as these firms are not protected from Chinese competition outside the Single Market.[26]

The results reported in Table 6 show that the EU AD measures are successful in providing protection to import-competing firms. After an initial negative shock to TFP and employment, protected import-competing firms enjoy an increase in productivity and employment two years after the application of the AD measures. These improvements in productivity are translated into enhanced international competitiveness, as signaled by the positive effect on total exports in the second year after the treatment. Our results also show that AD protection does not significantly affect firms' propensity to invest in R&D, despite the opportunity given by these measures to dedicate more resources to industrial and production re-organization while being protected. There is a lack of consensus in the theoretical literature on how competition affects innovation. Increased

[26]Firms are associated with a 4-digit industry on the basis of their main activity. Therefore, exporters of targeted products are not necessarily associated with the 4-digit industry matched to an HS 6-digit product and the two samples of exporters are not two subsamples of the producers NACE 4-digit sample.

product market competition may discourage innovation by reducing profits, but may also encourage innovation by increasing the incremental profits from investments in R&D (Aghion and Howitt, 1992; Aghion et al., 2005). The empirical literature on the effects of trade liberalization on the innovation of import-competing firms is also inconclusive (Bloom et al., 2016; Autor et al., 2016). Looking specifically at AD protection, Crowley (2006) shows that these measures could accelerate technology adoption by domestic import-competing firms.

[Table 6 about here]

The implications of the AD measures on the productivity and employment of import-competing firms are robust to the definition of import-competing firms as exporters of the targeted products to destinations within the EU. Exporters to destinations outside the EU continue to face international competition outside the Single Market and therefore do not fully enjoy the benefits of AD protection. Although exporters may not be representative of all import-competing firms, given the self-selection of the largest and most productive firms into exporting (Melitz, 2003; Ottaviano and Mayer, 2007), the consistency of the findings across both samples suggests that we are able to capture the effects of AD protection on import-competing firms. In addition, our findings are generally consistent with the results of Konings and Vandenbussche (2008) for European firms.

In Table C3 in Appendix C, we explore the heterogeneity of the impact of AD measures across the productivity distribution of import-competing firms (defined as firms within the same NACE 4-digit industry as a treated product). We split the sample of import-competing firms into four quartiles of TFP, measured in t-1, and find that protectionist measures benefit only the least productive firms (in the first quartile). These firms experience positive growth in productivity and employment compared with matched controls after the imposition of the AD measures. In the second and third quartiles of TFP, we observe limited differences between the treated and control firms. However, for the most productive firms (fourth quartile), we find that reduced import competition resulting from the AD measures leads to a negative effect on protected producers in terms of productivity, employment and total exports. These results corroborate the findings of Konings and Vandenbussche (2008) and are consistent with the theoretical predictions of Lileeva and Trefler (2010), where low-productivity firms engage in productivity-improving investments and experience an increase in productivity as a result of an increase in the size of the market. In the context of AD measures, trade protection, by reducing import competition, results in an increase in the market size of domestic firms, which benefits the least productive firms, which otherwise may not survive. As previously discussed, our measure of productivity is based on revenue and not physical output. As highlighted by De Loecker and Van Biesebroeck (2018), revenue-based measures of productivity may capture markup effects instead of changes in the efficiency of the firm. However, as indicated in Table C2, internal prices within the Single Market do not increase as a result of the AD measures. Therefore, we can consider that the effects of the AD measures on TFP capture changes in the efficiency of import-competing firms.[27]

[27] Konings and Vandenbussche (2008) provide an extensive discussion of this issue and conclude that the estimated effects of AD measures on productivity are unlikely to be driven by price effects.

4.3 The Bad

Finally, we explore the implications for the "bad" Chinese exporters after the imposition of the AD measures by the EU. First, we identify treated exporters as firms that exported targeted products to the EU in the year before the treatment. Second, we also differentiate between surviving and exiting exporters. Surviving exporters are Chinese firms that exported the targeted products to the EU in the year before and the year of the treatment; exiting firms are instead Chinese exporters of the targeted products to the EU in the year before the treatment but not afterward. We match treated to untreated exporters within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table 7 shows that the impact of EU AD duties on Chinese exporters is generally positive. The imposition of the AD measures by the EU results in an increase in TFP, employment and total exports over a period spanning two years after the treatment. The imposition of the AD treatment corresponds to an increase in trade cost, and these measures are expected to increase the cutoff productivity above which firms can export to the EU Single Market (Melitz, 2003). Chinese exporters seem to respond to these protectionist measures by investing in R&D for the purpose of enhancing their productivity and improving their international competitiveness. Investing in R&D may also be a means to avoid the product-specific restrictions imposed by the EU, as suggested by Kaz et al. (2016).

[Table 7 about here]

The improvements in terms of R&D and total exports are mainly driven by surviving exporters. Moreover, the effects of the AD measures on productivity are also larger in the case of surviving exporters. These results suggest that some firms react to the AD measures by investing in productivity enhancement measures and, as a result, are able to expand in terms of employment and exports, while other firms that are faced with an increase in the costs of exporting react by exiting the EU market. We further explore the heterogenous response of Chinese exporters to the AD measures by splitting the sample into four quartiles of TFP, measured in t-1.The results, in Table C4 in Appendix C, show that the positive effects on productivity, employment and total exports are driven especially by the most productive Chinese exporters, which are more likely to survive after the imposition of the AD duties. This heterogeneous response of firms to changes in trade costs has been highlighted by the theoretical literature on trade liberalization and productivity (Lileeva and Trefler, 2010; Bustos, 2011). The EU AD measures seem to push the surviving Chinese exporters to rethink and improve their production and exporting behavior, with an industrial reallocation of resources from small to larger and more productive exporters and also within firms from low-skilled to more capital and skill-intensive activities. Our findings reflect the results of Lu et al. (2013), who find that more productive Chinese exporters had a lower probability of exiting the U.S. market after the imposition of AD duties and that surviving exporters tend to become larger and more productive as a consequence.

4.4 Robustness Checks

We test the robustness of our main findings by performing several checks and estimating alternative specifications. We test alternative matching techniques and apply a one-to-one matching based on the same propensity score estimation presented in Table B1. We also test an alternative estimation of the propensity score based on a panel data logit estimator with fixed effects on the panel structure of the data. After estimating the propensity score, we maintain a cross section of the data, where treated firms are observed in the year of the treatment and controls are observed in the median year, and apply kernel matching on the basis of this propensity score estimation. Tables C5, C6, and C7 in Appendix C present the results of these robustness checks for the main specifications of import-dependent, import-competing and Chinese exporting firms. The tables show that our main findings are robust to the method of matching and to controlling for firm-level fixed effects at the propensity score level.[28]

In our main specifications, we consider as treated firms those that directly import, produce, or export from China to the EU the targeted products in the year prior to the imposition of the AD measures. We test the robustness of our findings to a more stringent definition of being treated. Thus, we define treated import-dependent, import-competing (at the NACE 4-digit level), and Chinese exporters as those firms that have imported, produced and exported the targeted products for at least three consecutive years before the treatment. The results presented in Table C8 are consistent with our main findings.

We also try to split the sample of exiting importers into two subsamples: firms that continue to import the input from a different country, and firms that stop importing the product. However, the number of treated firms in each of these subsamples is not large enough to draw meaningful conclusions, but the results are overall consistent.

4.5 Aggregate Effects of the Anti-Dumping Policy

Unfortunately, a comprehensive welfare analysis of the EU AD policy on Chinese imports is beyond the scope of this paper for various reasons. First, although we consider the effects of the AD duties on both users and producers of the targeted products, we only focus on four firm-level outcomes: productivity, employment, R&D investment and total exports. Second, we do not consider the implications on upstream and downstream related industries. Finally, we do not estimate a structural model of the welfare effects on the economy through prices and wages. Instead, our analysis uses data from France and while we consider it a representative case study, a formal welfare analysis at the EU level would require access to detailed firm-level data from various EU countries. However, despite these limitations, in this section we present back-of-the-envelope calculations of the aggregate effects in terms of employment and total exports for the different groups of affected French firms in our sample. From the calculations at the firm level, we estimate the overall impact

[28]The results of the propensity score based on the fixed effects logit estimation and balancing tests for all the robustness check estimations are available from the authors upon request.

at the industry level for France and, assuming that the firms in our data are representative of European firms, we also provide some estimates of the impact for affected industries at the EU level.[29]

As indicated in Tables 2 and 6, AD duties have opposite effects on import-competing and import-dependent firms. The results from our main definition of import-competing firms (first panel in Table 6) indicate that after an initial negative impact on the growth of employment and total exports, AD protection leads to a higher growth rate two years after the application of the AD duties. These effects translate into the creation of almost 1,400 jobs and an increase in total exports of almost 7.8 billion euros. Looking at the sample of French exporters of the targeted products within the Single Market (second panel in Table 6), we find that these producers create approximately between 20,000 and 24,000 jobs in the year of treatment and the year after. These producers also expand their exports by almost 15 billion euros.

If we compare these approximative effects with the losses incurred by the direct importers of the targeted Chinese products (first panel of Table 2), we find that these firms lose almost 13,000 jobs and 9 billion euros in terms of exports as a consequence of the AD duties. If we extend our definition of import-dependent firms to include importers from non-EU countries (second panel of Table 5), we find that this wider group of importers experiences a loss of approximately 20,000 to 25,000 jobs in the two years after treatment and a decline in total exports of almost 24 billion euros.

The net effects in terms of employment and total exports depend on which groups of import-competing and import-dependent firms we compare, but overall these tend to be negative. If we compare our main samples of import-competing (producers NACE 4-digit) and import-dependent firms (direct importers) we find a negative net effect of almost 12,000 jobs and approximately 1.2 billion euros in terms of exports. If we compare the sample of exporters to the EU with the wider sample of importers from non-EU countries, we find that the jobs created by EU exporters due to AD protection are cancelled out by job losses by importers of the targeted products and a net loss of approximately 9 billion euros in terms of exports.

Our sample of producers represents 62% of the total employment in these French 4-digit sectors, while our sample of users at the industry level (users NACE 4-digit) represents 12% of the overall employment of these 4-digit sectors in France.[30] Assuming that the ATTs that we estimate for these samples are generalizable across the sectors of import-competing firms and users, we estimate a gain of almost 2,200 jobs in French import-competing sectors and a loss of almost 83,000 jobs in sectors that rely on targeted imports in their production process. The net effect in terms of employment corresponds to 2.2% of the overall employment in manufacturing industries in France. In terms of exports, we estimate a gain of approximately 12 billion euros by French import-competing sectors that is more than offset by a loss of almost 54 billion euros in sectors

[29] Details of these calculations are available in Appendix D.

[30] The estimated total employment, at t-1, in our sample of producers is 324,342.88, and the overall employment in these 4-digit sectors in France is 523,316.16. The estimated total employment, at t-1, in our sample of users at the NACE 4-digit level is 384,404.28, and the overall level of employment in France for these industries is 3,135,124.55. Data on overall employment in French industries is from the Eurostat Structural Business Statistics database.

where firms are users of the targeted Chinese products. The net loss in terms of exports represents almost 13% of the total exports of manufacturing industries in France.

If we were to extend these calculations to the whole of the EU and assume that the ATTs estimated in our sample are a good approximation of the effects on similar import-competing and user sectors across the EU, we find that the AD policy leads to the creation of almost 21,000 jobs and an increase in exports of approximately 44 billion euros in EU import-competing sectors and a loss of approximately 688,000 jobs and 160 billion euros of exports in EU sectors where firms are users of targeted products. The net losses in terms of employment and exports represent, respectively, 2.26% and 13.27% of total employment and total exports in manufacturing industries in the EU. [31]

These estimations, particularly at the level of France and the EU, should be considered as broad approximations of the aggregate effects, since they rely on the assumption that firms in our samples of producers and users capture the behavior of firms in the same sectors across France and the EU. The sample of users is defined as the sample of firms in the same 4-digit industry as direct importers from China. Therefore, this sample excludes firms that import from other source countries and firms in the same sectors as indirect importers. However, as indicated in Table 5, indirect importers, particularly from non-EU sources, experience negative outcomes that are not captured by our calculations of aggregate effects at the level of France and the EU.

5 Conclusions

Using French and Chinese firm-level and international trade transaction-level data, this paper analyzes the comprehensive effects of the European Union's anti-dumping measures against Chinese products on the performance of all categories of affected firms, the "good" European import-competing firms, the "bad" Chinese exporters and with a particular focus on the "ugly" European import-dependent firms.

Using a difference-in-differences methodology combined with propensity score matching, we find that the European Union's anti-dumping measures hurt the productivity, employment and international competitiveness of the "ugly" import-dependent firms. These effects are stronger for firms that import the products directly from China, but importers from other countries outside the European Single Market are also negatively affected. We also find that the effects of the anti-dumping duties are heterogeneous across firms and depend on the productivity of the import-dependent firms and the significance of the targeted products in the total imports of these firms. The negative effects of the anti-dumping measures are concentrated among the most productive import-dependent firms and firms that rely most significantly on the direct imports of the targeted

[31] According to the Eurostat Structural Business Statistics database, total employment in French manufacturing industry was, on average, 3,664,889 over the period 1999 to 2007. In the EU this figure was 29,512,934 on average over the same period. For total exports, over the period 1999 to 2007, in France the average value was 308,810,579,968, and in the EU the average value was 869,993,545,728.

products.

Our paper provides a comprehensive analysis of the anti-dumping trade-defense instrument by also considering the impacts on the performance of the "good" import-competing firms and the "bad" Chinese exporters. Our findings show that anti-dumping protection can provide some benefits to import-competing firms; however, these effects are confined to the least productive firms and to firms that are active within the limits of the Single Market. Import-competing firms facing international competition on export markets outside the European Union do not experience any improvements in performance after the implementation of anti-dumping protection. We also find that anti-dumping measures on Chinese products have positive effects on the performance of the surviving Chinese exporters. Targeted Chinese exporters present a heterogeneous response to these measures. On the one hand, some exporters increase R&D investment as a reaction to these measures and, as a consequence, survive and experience improvement in productivity, employment growth and international competitiveness. On the other hand, some firms fail to invest in R&D activity and, as a result of the higher trade costs induced by the anti-dumping measures, exit the European Union market.

The general impact of the anti-dumping measures on the French economy is mixed. The overall protection effect in terms of employment is negative. The net effect on employment for import-competing and import-dependent firms in our sample is a loss of almost 12,000 jobs. Moreover, anti-dumping duties result in a net loss of approximately 1.2 billion euros of exports for import-competing and import-dependent firms in our sample. On the contrary, the EU AD measures seem to improve the performance of targeted Chinese exporters. These effects lead to a perverse long-run effect, which widens the productivity gap between French firms and their international competitors in China.

These findings highlight the inefficiency of anti-dumping duties as a trade defense instrument. The temporary protection offered to the "good" import-competing firms translates into minimal gains in terms of productivity, employment and total exports that are limited to the least productive producers. These gains are largely offset by the damage caused by the anti-dumping policy to import-competing firms, mostly the most productive. While the imposition of anti-dumping measures succeed in limiting exports by Chinese firms to the European Union, it results in an improved productivity and competitiveness of the surviving exporters leading to tougher competitive pressure in the long run.

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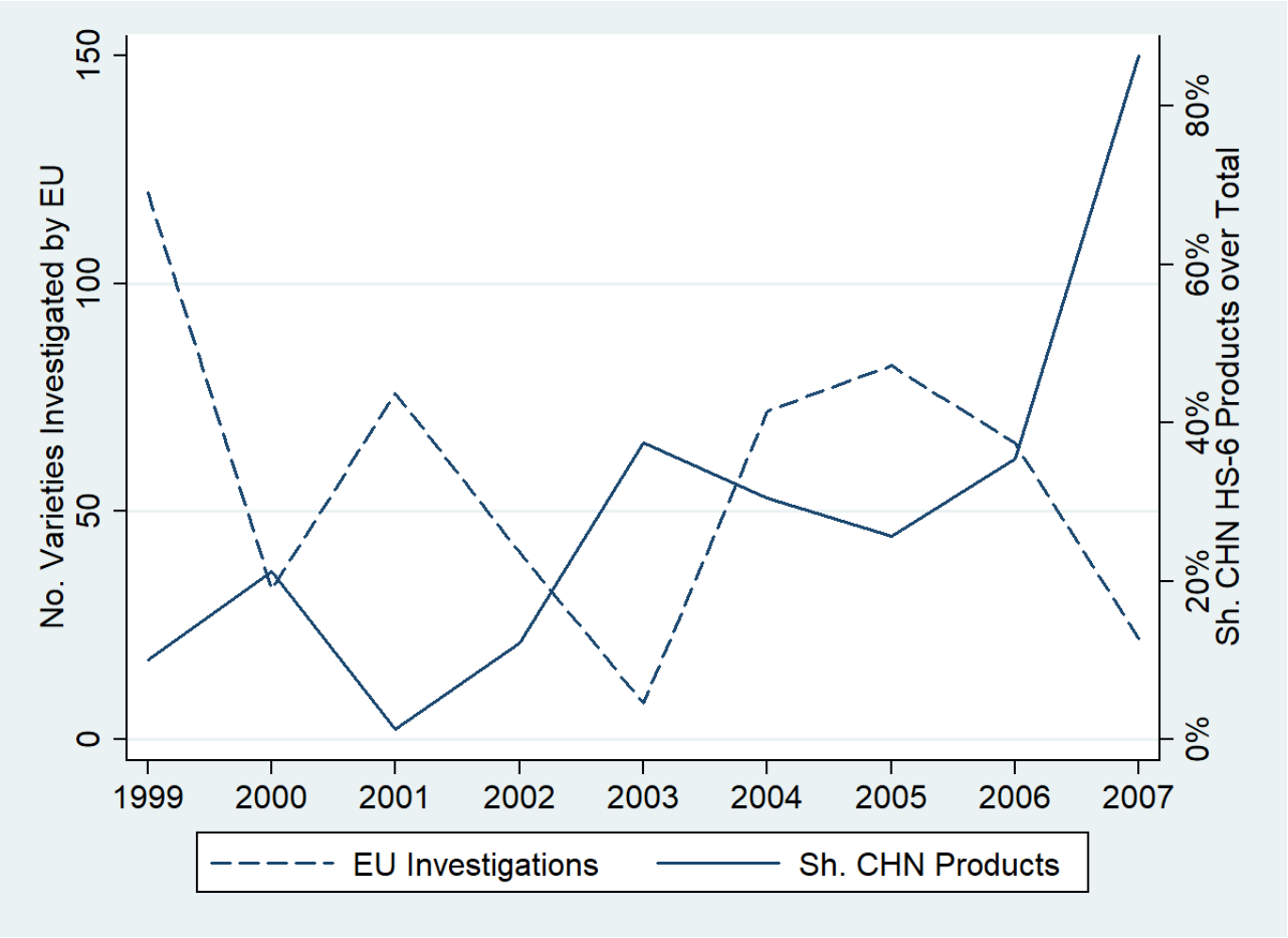
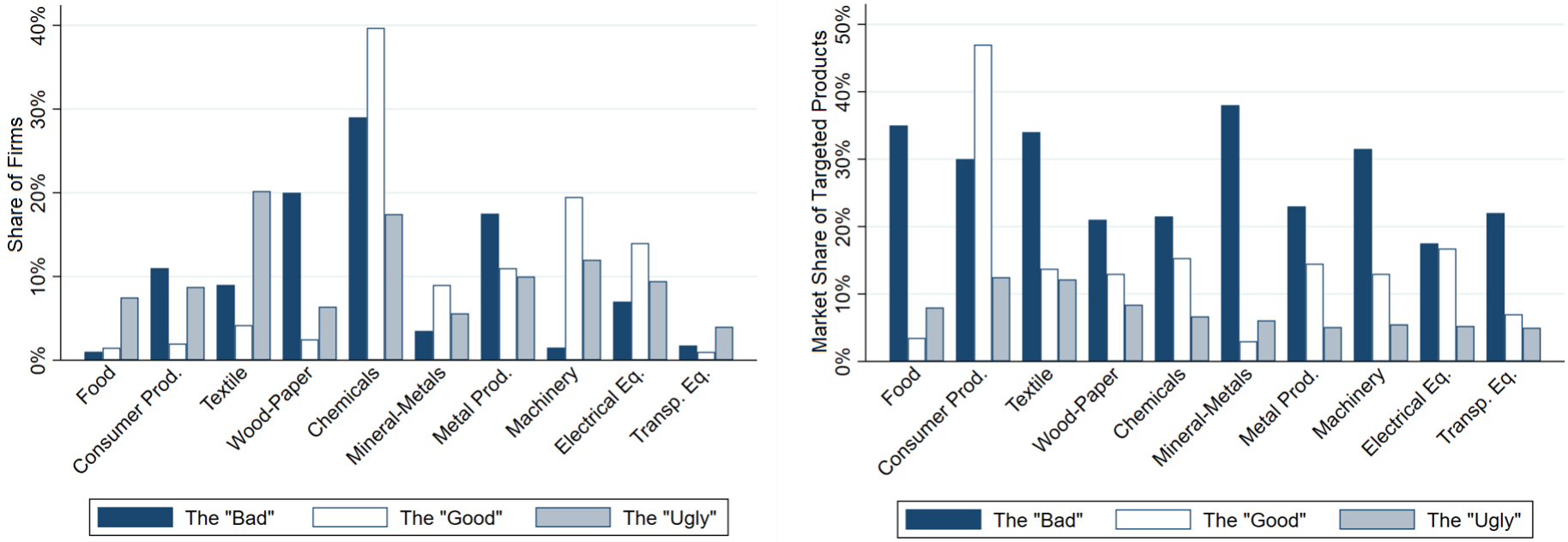
Figures and Tables

Figure 1: EU AD Investigations toward China and the Rest of the World (1999-2007)



Note: Elaboration based on the World Bank Global Anti-dumping Database for the period 1999 to 2007 considering all AD investigations launched by the EU against third-country products. The left-hand side axis presents the number of varieties, measured at the product (HS 6-digit level)-country level, investigated by the EU per year. The right-hand side axis measures the share of Chinese products investigated by the EU over the total number of EU AD investigations against third-country imports.

Figure 2: Distribution of Import-Competing, Import-Dependent and Chinese Exporting Firms and Import Share of Targeted Products



Note: Elaboration based on the Annual Business Survey, the Chinese Annual Survey of Industrial Firms and the Customs Agency database over the period 1999 to 2007. The graph shows the share of each category of firms affected by AD measures over the total number of firms in each manufacturing industry at the NACE 2-digit level. For French industries, market share is measured as the share of imports from China over total imports of the targeted products at the HS 6-digit level averaged at the industry level, while for Chinese industries, market share is measured as the share of exports to the EU over total exports.

Table 1: Comparative Statistics between Treated and Untreated Firms

	French Import-Dependent Firms					
	Before			After		
	Treated	Untreated	t-test	Treated	Untreated	t-test
TFP	4.905	4.336	3.899	4.873	4.345	3.021
Employment	4.894	4.565	3.776	4.971	4.653	3.098
R&D	1.869	1.192	4.379	1.923	1.283	3.431
Total Exports	8.266	6.778	7.551	8.301	6.917	6.682
No. Firms	686	7,608		485	9,131	
	French Import-Competing Firms					
	Before			After		
	Treated	Untreated	t-test	Treated	Untreated	t-test
TFP	4.19	4.027	7.864	4.179	4.040	6.762
Employment	4.436	4.395	3.233	4.521	4.466	4.368
R&D	1.295	0.851	10.257	1.242	0.868	8.571
Total Exports	6.051	4.607	9.551	6.183	4.707	9.966
No. Firms	2,063	10,728		2,029	17,145	
	Chinese Exporters					
	Before			After		
	Treated	Untreated	t-test	Treated	Untreated	t-test
TFP	6.489	6.266	16.814	6.888	6.614	15.343
Employment	6.026	5.778	24.068	6.000	5.593	27.953
R&D	1.257	1.259	-0.066	1.742	1.772	-0.077
Total Exports	14.136	13.227	56.536	14.438	13.505	41.207
No.Firms	5,710	3,205		2,781	2,826	

Note: Statistics based on the Chinese Annual Survey of Industrial Firms for the period 2000 to 2006 and the Annual French Business Survey for the period 1999 to 2007. Exporters are identified as Chinese firms that have exported products to the EU targeted by AD measures at the HS 6-digit level according to the China Customs dataset. Producers are defined as all the French firms belonging to the sectors protected by EU AD measures on Chinese products at the NACE 4-digit level. Importers are identified as all French firms that have imported targeted products from China according to the transaction-level Customs Agency dataset at the HS 6-digit level. The table presents summary statistics, in the three-year periods before and after the imposition of the EU AD measures, on the average log of total employment, average firm productivity estimated as the log of TFP following the De Loecker (2007) approach, average log of total investment in R&D activities, average log of total exports and the number of treated and untreated firms in each category.

Table 2: Impact of EU AD Measures on Import-Dependent Firms

	Direct Importers			Surviving Importers			Exiting Importers		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP								
ATT	-0.071***	-0.035**	-0.038	-0.073**	-0.044*	-0.042	-0.069**	-0.081*	-0.037
b.s.e.	(0.026)	(0.015)	(0.046)	(0.031)	(0.026)	(0.053)	(0.027)	(0.046)	(0.033)
	Total Employment								
ATT	-0.021*	-0.052***	-0.048*	-0.024*	-0.045**	-0.040	-0.018	-0.050**	0.001
b.s.e.	(0.013)	(0.019)	(0.028)	(0.015)	(0.021)	(0.031)	(0.014)	(0.021)	(0.037)
	R&D Investment								
ATT	-0.200	-0.074	-0.047	-0.095	-0.111	0.018	-0.303	-0.020	0.150
b.s.e.	(0.145)	(0.162)	(0.226)	(0.172)	(0.193)	(0.270)	(0.160)	(0.179)	(0.270)
	Total Exports								
ATT	-0.298***	-0.301**	-0.075	-0.267**	-0.272*	0.243	-0.367***	-0.308**	-0.221
b.s.e.	(0.118)	(0.138)	(0.188)	(0.132)	(0.153)	(0.184)	(0.129)	(0.149)	(0.247)
No. Obs.	8,175	8,141	7,370	7,840	7,823	7,236	7,385	7,363	6,755

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample *Direct Importers* includes import-dependent firms importing directly from China the products targeted by EU AD measures in $(t-1)$. The sample *Surviving Importers* includes firms that import the targeted products directly from China in $(t-1)$ and in the year of the treatment (t). The sample *Exiting Importers* includes firms that import the targeted products directly from China in $(t-1)$ but not after the treatment. We match the treated import-dependent firms to similar importers that do not directly import any products that have been subject to any other EU AD measure in $(t-1)$ and we restrict the pool of controls to firms that import products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table 3: Heterogeneity of the Impact of EU AD Measures on Import-Dependent Firms: Analysis by Quartiles of TFP

	First Quartile			Second Quartile			Third Quartile			Fourth Quartile		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP											
ATT	-0.027	-0.017	-0.021	-0.017	-0.025	0.022	-0.084*	-0.080	-0.028	-0.435***	-0.402***	-0.401***
b.s.e.	(0.048)	(0.052)	(0.083)	(0.049)	(0.062)	(0.101)	(0.051)	(0.058)	(0.089)	(0.060)	(0.068)	(0.099)
	Total Employment											
ATT	-0.0035	-0.032	-0.049	0.055*	0.055	-0.005	-0.050**	-0.051	-0.025	-0.059**	-0.066*	0.040
b.s.e.	(0.025)	(0.039)	(0.064)	(0.032)	(0.039)	(0.073)	(0.029)	(0.039)	(0.047)	(0.027)	(0.037)	(0.058)
	R&D Investment											
ATT	-0.158	-0.083	-0.663	-0.536	-0.308	-0.031	-0.384	-0.214	0.149	-0.004	-0.302	0.087
b.s.e.	(0.285)	(0.318)	(0.451)	(0.332)	(0.351)	(0.464)	(0.343)	(0.383)	(0.459)	(0.232)	(0.274)	(0.388)
	Total Exports											
ATT	-0.365	-0.335	-0.170	-0.141	-0.215	-0.119	-0.448**	-0.349	0.210	-0.721***	-1.229***	-1.070***
b.s.e.	(0.232)	(0.277)	(0.444)	(0.275)	(0.294)	(0.405)	(0.220)	(0.253)	(0.348)	(0.257)	(0.314)	(0.401)
No. Obs.	2,169	2,165	1,962	2,067	2,055	1,879	1,964	1,796	1,967	1,862	1,847	1,631

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample includes import-dependent firms importing directly from China the products targeted by EU AD measures in $(t-1)$ and is divided into quartiles according to TFP distribution, in $(t-1)$, within each NACE 2-digit industry. We match the treated import-dependent firms to similar importers that do not directly import any products that have been subject to any other EU AD measure in $(t-1)$ according to their TFP distribution within each NACE 2-digit industry, and we restrict the pool of controls to firms that import products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table 4: Heterogeneity of the Impact of EU AD Measures on Import-Dependent Firms: Analysis by Quartiles of Import Share

	First Quartile			Second Quartile			Third Quartile			Fourth Quartile		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP											
ATT	-0.038	0.005	0.045	0.068	0.111*	0.088	0.003	-0.042	0.063	-0.116**	-0.077*	-0.139*
b.s.e.	(0.095)	(0.114)	(0.145)	(0.053)	(0.066)	(0.090)	(0.055)	(0.065)	(0.103)	(0.049)	(0.036)	(0.077)
	Total Employment											
ATT	0.154***	0.132**	0.273***	-0.019	-0.031	-0.065	-0.023	-0.049**	-0.075**	-0.029	-0.116***	-0.115**
b.s.e.	(0.049)	(0.068)	(0.099)	(0.027)	(0.035)	(0.061)	(0.024)	(0.024)	(0.034)	(0.029)	(0.042)	(0.045)
	R&D Investment											
ATT	0.620	-0.170	0.471	-0.289	-0.453	-1.178***	0.308	0.235	-0.666	-0.483*	-0.136	0.370
b.s.e.	(0.426)	(0.483)	(0.685)	(0.286)	(0.309)	(0.301)	(0.324)	(0.326)	(0.543)	(0.278)	(0.325)	(0.465)
	Total Exports											
ATT	-0.565	-0.084	-0.169	-0.194	0.064	0.274	-0.458**	-0.534**	0.638	-0.308*	-0.479**	-0.196
b.s.e.	(0.594)	(0.623)	(0.785)	(0.263)	(0.311)	(0.309)	(0.217)	(0.263)	(0.400)	(0.183)	(0.212)	(0.333)
No. Obs.	2,396	2,387	2,168	2,155	2,148	1,944	2,238	2,230	2,025	1,386	1,376	1,233

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample includes import-dependent firms importing directly from China the products targeted by EU AD measures in $(t-1)$ and is divided into quartiles of import intensity in $(t-1)$, measured as the share of imports from China of the targeted products over the total imports of the firm. We match the treated import-dependent firms to similar importers that do not directly import any products that have been subject to any other EU AD measure in $(t-1)$, according to import intensity measured as total imports over total sales and we restrict the pool of controls to firms that import products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table 5: Impact of EU AD Measures on Import-Dependent Firms: Alternative Definitions

	Importers from EU			Importers from non-EU			Users NACE 4-digit		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP								
ATT	-0.024	-0.043	-0.033	-0.045*	-0.057*	-0.009	-0.039***	-0.010	0.015
b.s.e.	(0.029)	(0.029)	(0.039)	(0.025)	(0.036)	(0.043)	(0.015)	(0.017)	(0.026)
	Total Employment								
ATT	0.009	0.040**	0.073***	-0.022	-0.042*	-0.068**	-0.026***	-0.022**	-0.016
b.s.e.	(0.012)	(0.017)	(0.024)	(0.019)	(0.022)	(0.030)	(0.009)	(0.011)	(0.019)
	R&D Investment								
ATT	-0.232*	-0.172	-0.146	0.101	0.287**	0.235	-0.177***	-0.158**	-0.074
b.s.e.	(0.122)	(0.140)	(0.187)	(0.123)	(0.137)	(0.158)	(0.064)	(0.074)	(0.121)
	Total Exports								
ATT	-0.141	-0.074	0.046	-0.294*	-0.453**	-0.185	-0.193**	0.017	0.089
b.s.e.	(0.102)	(0.116)	(0.150)	(0.164)	(0.195)	(0.234)	(0.076)	(0.089)	(0.149)
No. Obs.	3,742	3,667	2,910	3,362	3,316	2,867	19,044	17,396	12,015

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample *Importers from EU* includes import-dependent firms importing the targeted products at the HS 6-digit-level only from within the EU in $(t-1)$. The sample *Importers from non-EU* includes import-dependent firms importing the targeted products at the HS 6-digit-level from outside the EU in $(t-1)$. The sample *Users NACE 4-digit* includes all firms within the same 4-digit industries as direct importers. We match the treated importers from the EU to similar importers only from within the EU that do not directly import any products that have been subject to any other EU AD measure in $(t-1)$ and we restrict the pool of controls to firms that import products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products. Similarly, we match the treated importers from outside the EU to similar importers from outside the EU that do not directly import any products that have been subject to any other EU AD measure in $(t-1)$ and we restrict the pool of controls to firms that import products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products. Finally, we match firms included in the sample *Users NACE 4-digit* only with similar firms operating in other NACE 4-digit industries included within the same NACE 2-digit industries.

Table 6: Impact of EU AD Measures on Import-Competing Firms

	Producers NACE 4-digit			Exporters to EU			Exporters to non-EU		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP								
ATT	-0.040**	0.006	0.076**	0.006	0.098	0.021	-0.061**	-0.007	0.048
b.s.e.	(0.019)	(0.022)	(0.034)	(0.072)	(0.083)	(0.091)	(0.026)	(0.031)	(0.047)
	Total Employment								
ATT	-0.025**	-0.025*	0.004**	0.112***	0.097**	0.078	0.013	0.009	0.025
b.s.e.	(0.010)	(0.014)	(0.002)	(0.038)	(0.048)	(0.060)	(0.013)	(0.018)	(0.031)
	R&D Investment								
ATT	0.012	-0.066	-0.061	-0.288	-0.701**	-0.703	0.113	-0.190	-0.178
b.s.e.	(0.087)	(0.095)	(0.159)	(0.364)	(0.326)	(0.479)	(0.135)	(0.150)	(0.235)
	Total Exports								
ATT	-0.129	-0.019	0.249**	0.115	0.121	0.890***	0.050	-0.003	0.045
b.s.e.	(0.103)	(0.180)	(0.122)	(0.284)	(0.345)	(0.223)	(0.123)	(0.146)	(0.341)
No. Obs.	14,939	14,747	12,032	10,610	10,579	9,601	10,746	10,705	9,659

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample *Producers NACE 4* includes all firms in NACE 4-digit industries to which the targeted products protected by EU AD measures have been matched using the Pierce and Schott (2009) concordance table between HS and SIC codes. We match treated firms included in this sample to similar firms operating in other NACE 4-digit industries included within the same NACE 2-digit industries and that have not been protected by any other EU AD measure. The sample *Exporters to EU* includes all French firms that have exported the targeted products, at the HS 6-digit level at time $(t-1)$, only toward other EU countries. We match treated firms included in this sample to similar firms exporting, only within the EU Single Market, products within the same HS 4-digit classification as the affected HS 6-digit-level products and that have not been affected by other EU AD measures. The sample *Exporters to non-EU* includes all French firms that have exported the targeted products at the HS 6-digit level at time $(t-1)$ outside the EU Single Market. We match treated firms included in this sample with similar firms exporting, outside of the EU Single Market, products within the same HS 4-digit classification as the affected HS 6-digit products and that have not been affected by other EU AD measures.

Table 7: Impact of EU AD Measures on Chinese Exporters

	Exporters			Surviving Exporters			Exiting Exporters		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP								
ATT	0.220***	0.385***	0.291**	0.150***	0.334***	0.193	0.235***	-0.188	0.286**
b.s.e.	(0.042)	(0.069)	(0.134)	(0.053)	(0.082)	(0.135)	(0.057)	(0.383)	(0.123)
	Total Employment								
ATT	0.244***	0.403***	0.453***	0.177***	0.296***	0.348***	0.141***	0.041	0.784***
b.s.e.	(0.038)	(0.056)	(0.072)	(0.043)	(0.061)	(0.073)	(0.052)	(0.250)	(0.089)
	R&D Investment								
ATT	0.196***	0.430***	-0.008	0.142**	0.300*	-0.050	0.079	0.623	-0.622***
b.s.e.	(0.071)	(0.145)	(0.174)	(0.072)	(0.162)	(0.185)	(0.135)	(0.918)	(0.209)
	Total Exports								
ATT	0.658***	0.988***	1.066***	0.493***	0.735***	0.811***	0.462***	0.571	-0.945***
b.s.e.	(0.071)	(0.116)	(0.121)	(0.079)	(0.134)	(0.121)	(0.087)	(0.372)	(0.185)
No. Obs.	30,663	30,663	30,663	13,906	13,906	13,906	16,295	16,295	16,295

Note: The estimations are based on the Chinese Annual Survey of Industrial Firms and the Chinese Customs Data between 2000 and 2006. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample *Exporters* includes all Chinese firms exporting to the EU the products targeted by EU AD measures in $(t-1)$. The sample *Surviving Exporters* includes firms that export to the EU the targeted products in $(t-1)$ and in the year of the treatment (t). The sample *Exiting Exporters* includes Chinese firms that export to the EU the targeted products in the year before the treatment $(t-1)$ but not after the treatment. We match the treated exporting firms to similar exporters within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

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A EU Anti-Dumping Cases against China

Table A1: Comparison between France and the EU

Significance of AD Protected Industries				
	France		Europe	
	Mean	SD	Mean	SD
Av. Share Employment	0.006	0.008	0.007	0.007
Av. Share Firms	0.002	0.003	0.004	0.007
Av. Share Production	0.007	0.008	0.009	0.009
Av. Share Turnover	0.007	0.008	0.008	0.008
Characteristics of Firms in Protected Industries				
	France		Europe	
	Mean	SD	Mean	SD
Av. Size	50.63	32.26	39.83	26.37
Av. Labor Productivity	0.28	0.15	0.24	0.17
Av. Turnover	16.66	17.99	12.38	16.03
Av. Production	14.93	15.84	11.56	15.01
Relevance of Targeted Products				
	France		Europe	
	Mean	SD	Mean	SD
Sh. Total Imports	0.0003	0.0005	0.0003	0.0004
Sh. Total Imports from China	0.0007	0.0015	0.0007	0.0013

Note: The data are from Eurostat Structural Business Statistics and COMEXT dataset over the period 1999 to 2007. The first part of the table presents the shares of AD protected industries (4-digit level) in total employment, number of firms, production and turnover of manufacturing industries in France and the EU. The second part of the table presents the characteristics of firms in AD protected industries: size is measured as the number of full-time employees, labor productivity is measured as turnover per employee and turnover and production are measured in millions of euros. The last part of the table presents the share of imported targeted products from China in the total imports and total imports from China of France and the EU.

Table A2: List of Approved EU AD Cases against China Included in the Analysis (1999-2007).

No.	CASE GAD ID	EU OJ Ref.	PRODUCT	No. HS6	INITIATION	FINAL DECISION	REVOKE	HS6	NACE	SHARE TOT PRODUCT	SHARE TOT IMPORT
1	EUN-AD-413	1999-L217-1	Steel Wire Rope	1	05/20/1998	08/12/1999		731210	2874	2.97%	0.0012%
2	EUN-AD-443	2000-L202-21	Non-Alloy Steel Hot Rolled Flat Products	2	05/13/1999	08/09/2000	08/06/2005	720851	2710	4.68%	0.0057%
3	EUN-AD-449	2000-L208-8	Malleable Cast Iron Pipe Fittings	1	05/29/1999	08/11/2000	08/06/2005	730719	2751	8.01%	0.0011%
4	EUN-AD-473	2000-L316-30	Coke of Coal in Pieces	1	09/16/1999	12/14/2000	12/15/2005	270400	2310	22.35%	0.0146%
5	EUN-AD-476	2000-L301-42	Certain Electronic Weighing Scales	1	09/16/1999	11/30/2000	10/29/2005	842381	3320	9.30%	0.0006%
6	EUN-AD-493	2001-L134-67	Aluminium Foil	1	02/18/2000	05/17/2001	05/12/2006	760711	2742	2.16%	0.0009%
7	EUN-AD-505	2001-L195-8	Integrated Electronic Compact Fluorescent Lamps	1	05/17/2000	07/19/2001	10/10/2008	853931	3150	14.81%	0.0055%
8	EUN-AD-520	2002-L35-1	Ferro Molybdenum	1	11/09/2000	02/06/2002	01/21/2008	720270	2710	4.65%	0.0018%
9	EUN-AD-523	2002-L62-7	Certain Zinc Oxides	1	12/20/2000	03/05/2002	03/01/2007	281700	2412	6.91%	0.0006%
10	EUN-AD-538	2002-L196-11	Sulphanilic Acid	1	07/06/2001	07/25/2002		292142	2414	13.28%	0.0003%
11	EUN-AD-554	2003-L234-1	Para-Cresol	1	06/27/2002	09/20/2003	10/15/2008	290712	2414	5.98%	0.0002%
12	EUN-AD-561	2003-L283-1	Furfuryl Alcohol	1	08/09/2002	10/31/2003	12/10/2011	293213	2413	7.66%	0.0002%
13	EUN-AD-568	2004-L72-1	Sodium Cyclamate	1	12/19/2002	03/11/2004		292990	2466	10.62%	0.0002%
14	EUN-AD-572	2004-L271-1	Polyethylene Terephthalate (PET)	1	05/22/2003	08/19/2004		390760	2416	1.74%	0.0012%
15	EUN-AD-574	2004-L336-4	OkoumÃƒ Plywood	1	08/19/2003	11/12/2004		441213	2020	4.19%	0.0007%
16	EUN-AD-576	2005-L71-1	Polyester Staple Fibres	1	12/19/2003	03/17/2005		550320	2470	1.43%	0.0004%
17	EUN-AD-582	2005-L189-1	Hand Pallet Trucks and Their Essential Parts	2	04/29/2004	07/21/2005		842790	2922	12.51%	0.0011%
18	EUN-AD-583	2005-L189-15	Barium Carbonate	1	04/30/2004	07/21/2005		283660	2413	44.02%	0.0005%
19	EUN-AD-584	2005-L199-1	Certain Castings	1	04/30/2004	07/29/2005	09/02/2011	732510	2751	15.87%	0.0056%
20	EUN-AD-589	2005-L240-1	Certain Finished Polyester Filament Apparel Fabrics	5	06/17/2004	09/16/2005	09/15/2010	540761	1725	12.27%	0.0031%
21	EUN-AD-590	2005-L261-1	Trichloroisocyanuric Acid (TCCA)	2	07/10/2004	07/10/2005		293369	2414	12.85%	0.0015%
22	EUN-AD-591	2005-L267-1	Certain Magnesia Bricks	5	07/13/2004	12/10/2005	06/25/2011	681591	2626	7.22%	0.0002%
23	EUN-AD-594	2005-L302-1	Stainless Steel Fasteners and Parts Thereof	4	08/24/2004	11/19/2005		731815	2874	5.62%	0.0058%
24	EUN-AD-601	2005-L320-1	Granular Polytetrafluoroethylene (PTFE) Resin	1	09/09/2004	08/12/2005	12/08/2010	390461	2416	2.28%	0.0002%
25	EUN-AD-605	2006-L23-1	Tartaric Acid	1	10/30/2004	01/27/2006		291812	2414	9.50%	0.0002%
26	EUN-AD-611	2006-L205-1	Lever Arch Mechanisms	1	04/28/2005	07/27/2006		830510	2874	17.20%	0.0007%
27	EUN-AD-615	2006-L251-1	Chamois Leather	1	06/25/2005	09/14/2006		411410	1910	2.69%	0.0000%
28	EUN-AD-619	2006-L270-4	Certain Plastic Sacks and Bags	2	06/30/2005	09/29/2006	07/13/2012	392329	2522	6.11%	0.0018%
29	EUN-AD-622	2006-L275-1	Certain Footwear with Uppers of Leather	7	07/07/2005	10/06/2006	03/16/2011	640359	1930	1.24%	0.0006%
30	EUN-AD-630	2007-L72-1	Certain Tungsten Electrodes	2	12/17/2005	03/13/2007		810199	2745	4.59%	0.0001%
31	EUN-AD-640	2007-L100-1	Frozen Strawberries	1	01/19/2006	04/17/2007	04/17/2012	081110	1532	6.54%	0.0006%
32	EUN-AD-641	2007-L109-12	Ironing Boards	6	02/04/2006	04/26/2007		392490	2524	15.36%	0.0050%
33	EUN-AD-644	2007-L160-1	Certain Saddles	3	04/07/2006	06/21/2007	06/21/2012	871499	3542	9.32%	0.0029%
34	EUN-AD-649	2007-L265-1	Peroxosulphates	2	07/13/2006	10/11/2007	10/12/2012	284290	2412	2.88%	0.0000%
35	EUN-AD-651	2007-L296-1	Dicyandiamide	1	08/17/2006	11/15/2007	02/13/2014	292620	2414	20.00%	0.0002%
36	EUN-AD-652	2007-L317-5	Silico-Manganese	2	09/06/2006	12/05/2007	12/05/2012	720230	2415	12.91%	0.0011%

Note: Data obtained from the Global Antidumping Database (Bown, 2015) for the period 1999 to 2007. Only accepted cases have been considered. *GAD ID* is the case ID in the Global Antidumping Database. *EU OJ Ref* is the reference number of the final decision in the EU Official Journal. *PRODUCT* provides a brief description of the targeted product. *No. HS6* is the number of products at the HS-6 digit level included in the case. For cases where more than one HS-6 product is involved, we report the code for the product with highest import share from China (SHARE TOT PRODUCT). *INITIATION*, *FINAL* and *REVOKE* are the respective dates of the decision process. *HS6* and *NACE* correspond to the classification of the product at the HS6 and NACE 4-digit levels. *SHARE TOT PRODUCT* represents the share of imports from China of the targeted product over the total import of that product. *SHARE TOT IMPORT* represents the share of imports from China of the targeted product over the total import of manufacturing products.*SHARE TOT PRODUCT* and *SHARE TOT IMPORT* are based on the Customs Agency data for our sample.

B Quality of the Matching

Table B1: Probability of AD Treatment: Propensity Score Estimation

	Importers	Producers	Exporters
Import Penetration	4.248**	0.909***	0.219***
	(1.914)	(0.152)	(0.060)
Industry Employment (Growth)	-5.179	0.806***	-1.165***
	(4.573)	(0.300)	(0.104)
Industry Employment	-0.0563	0.502***	-0.055***
	(0.085)	(0.073)	(0.014)
Industry Productivity	-29.490***	16.130***	-1.146***
	(6.549)	(1.300)	(0.195)
Chinese Price	-0.003***	-0.0003***	-0.111***
	(0.0009)	(0.00005)	(0.010)
GDP EU (Growth)	-5.365***	-4.326***	-0.053***
	(0.507)	(0.227)	(0.015)
No. Investigations	0.048*	1.196***	0.007***
	(0.024)	(0.056)	(0.001)
Firm Size	0.222***	0.167***	0.012
	(0.078)	(0.053)	(0.016)
Firm TFP	0.106	0.127	-0.016
	(0.139)	(0.102)	(0.010)
Firm Exporter Dummy	0.181	0.822***	
	(0.328)	(0.113)	
Firm Total Imports	0.271***	0.041***	0.192***
	(0.056)	(0.007)	(0.008)
Firm Inputs			-0.140***
			(0.015)
Pseudo R^2	0.676	0.7492	0.081
No. Obs.	8,173	14,939	12,941

Note: The estimation model used is a logit with year and industry fixed effects. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In the first column, the dependent variable is a dummy equal to 1 if a French firm has imported one of the affected products from China at the HS 6-digit level during the period of analysis and 0 otherwise. In the second column, the dependent variable is a dummy equal to 1 if a French firm belongs to one of the protected sectors at the NACE 4-digit level and 0 otherwise. In the third column, the dependent variable is a dummy equal to 1 if a Chinese exporter has been affected by EU AD measures and 0 otherwise. At the imported product level we control for lagged import penetration from China defined as the share of imports from China over total imports of the EU at the HS 6-digit level, lagged import price from China measured as the ratio of the value over volume of imports from China into the EU at the HS 6-digit level (both based on the COMTRADE dataset) and the cumulative number of previous EU AD investigations from 1987 onward calculated using the GAD database. All product-level variables are averaged at the level of the firm over the set of products affecting each firm. At the level of the industry of the product we control for the lagged employment level of the EU industry at the NACE 4-digit level, lagged growth rate of employment and lagged level of productivity measured as value added per employee. We also control for the lagged level of GDP growth in the EU. All product-industry variables are extracted from the Structural Business Statistics database of EUROSTAT and are measured at the EU level for each NACE 4-digit industry. At the firm level, we include lagged size measured by the number of employees, lagged TFP, lagged value of total imports and an exporter dummy. In the sample of Chinese exporters we replace the exporter dummy with a variable measuring the lagged value of intermediate inputs. All firm level variables are based on the French Annual Business Survey and the Chinese Annual Survey of Industrial Firms.

Table B2: Matching Balancing Test for Import-Dependent Firms

	Treated	Control	%bias	t-test	V(T)/V(C)
Import Penetration	0.008	0.006	4.4	0.95	1.06
Industry Employment (Growth)	0.0007	0.0006	0.4	0.16	0.97
Industry Employment	8.753	8.818	5.3	1.06	0.93
Industry Productivity	0.008	0.010	8.5	2.6	1.23
Chinese Price	24.609	61.844	0.4	0.27	1
No. Investigations	0.806	1.195	16.7	2.62	0.96
GDP EU (Growth)	2.303	2.241	12.3	2.32	1.08
Firm Size	4.873	4.975	8.9	1.42	0.83
Firm TFP	4.932	4.921	1.6	0.27	1.07
Firm Exporter Dummy	0.973	0.976	1	0.34	.
Firm Total Imports	15.275	15.190	3.3	0.86	0.9

Note: Columns 2 and 3 present the mean value of each control variable for firms in the treated and control groups after the implementation of the matching technique. Column 4 displays the median standard bias across all the covariates included in the logit model after the application of the matching procedure. Column 5 reports the t-tests for the equality of the mean values of observations in the matched sample compared with those in the unmatched sample. Column 6 shows the ratio of variance of residuals orthogonal to the linear index of the propensity score in the treated group over the non-treated group.

Table B3: Matching Balancing Test for Import-Competing Firms

	Treated	Control	%bias	t-test	V(T)/V(C)
Import Penetration	0.273	0.175	16.2	2.71	0.92
Industry Employment (Growth)	0.093	0.075	10.4	3.45	1.1
Industry Employment	12.569	12.153	25.8	2.57	0.8
Industry Productivity	0.155	0.151	6.6	1.65	0.93
Chinese Price	1314.2	1633.5	4.7	1.48	0.91
No. Investigations	1.759	1.827	9.6	2.02	1.09
GDP EU (Growth)	2.389	2.339	6.6	1.32	1.04
Firm Size	4.163	4.129	3.5	1.18	0.99
Firm TFP	4.463	4.515	8.9	1.67	0.93
Firm Exporter Dummy	0.865	0.777	21.3	3.36	.
Firm Total Imports	9.357	9.332	0.4	0.14	1

Note: Columns 2 and 3 present the mean value of each control variable for firms in the treated and control groups after the implementation of the matching technique. Column 4 displays the median standard bias across all the covariates included in the logit model after the application of the matching procedure. Column 5 reports the t-tests for the equality of the mean values of observations in the matched sample compared with those in the unmatched sample. Column 6 shows the ratio of variance of residuals orthogonal to the linear index of the propensity score in the treated group over the non-treated group.

Table B4: Matching Balancing Test for Chinese Exporters

	Treated	Control	%bias	t-test	V(T)/V(C)
Import Penetration	0.250	0.253	-1.6	-1.03	0.92
Industry Employment (Growth)	0.013	0.012	1.3	1.07	1.27
Industry Employment	11.849	11.859	-1.0	-0.68	1.33
Industry Productivity	0.148	0.141	9.2	7.03	0.71
Chinese Price	1.609	1.599	0.8	0.66	1.01
No. Investigations	8.154	6.725	7.5	4.31	1.31
GDP EU (Growth)	2.383	2.383	-0.0	-0.02	1.36
Firm Size	5.763	5.716	5.716	2.69	1.05
Firm TFP	6.355	6.330	1.6	1.13	0.85
Firm Inputs	10.689	10.622	5.2	3.49	0.88
Firm Total Imports	12.243	12.179	3.1	2.23	1.19

Note: Columns 2 and 3 present the mean value of each control variable for firms in the treated and control groups after the implementation of the matching technique. Column 4 displays the median standard bias across all the covariates included in the logit model after the application of the matching procedure. Column 5 reports the t-tests for the equality of the mean values of observations in the matched sample compared with those in the unmatched sample. Column 6 shows the ratio of variance of residuals orthogonal to the linear index of the propensity score in the treated group over the non-treated group.

C Additional Results and Robustness Checks

Table C1: Impact of EU AD Measures on Chinese Exports of Targeted Products

	Product-Level Analysis					
	Export Volume			No of Exporters		
	t	t+1	t+2	t	t+1	t+2
ATT	-0.475***	-0.599***	-0.954***	-0.175***	-0.200**	-0.392***
s.e.	(0.179)	(0.251)	(0.284)	(0.089)	(0.083)	(0.123)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs.	1,950	1,950	1,950	1,950	1,950	1,950
	Firm-Product-Level Analysis: Surviving Exporters					
	Export Volume			Export Price (FoB)		
	t	t+1	t+2	t	t+1	t+2
ATT	0.001	-0.082	-0.223	-0.001	-0.047	-0.030
s.e.	(0.075)	(0.155)	(0.154)	(0.018)	(0.029)	(0.087)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs.	167,839	167,839	167,839	167,839	167,839	167,839

Note: The estimations are based on the Chinese Customs Data for the period of 2000 to 2006. The ATT effect is estimated using DID technique. *** p<0.01, ** p<0.05, * p<0.1. Following Lu et al. (2013); the treatment group is the HS 6-digit-level products affected by EU AD measures and the control group is the unaffected HS 6-digit-level products within the same HS 4-digit-level industry as the affected HS 6-digit-level products. The dependent variables for the product-level analysis are the annual export volumes and the number of exporters at the HS 6-digit level. The dependent variables for surviving exporters are export volume and export price at the firm-product level. Standard errors clustered at the product level are reported in parentheses.

Table C2: Impact of EU AD Measures on the Price of Imported Targeted Products

	Price (FoB)		
	t	t+1	t+2
	China		
ATT	0.062***	0.067**	0.098***
b.s.e.	(0.024)	(0.033)	(0.037)
	Intra-EU		
ATT	0.016	0.054	-0.029
b.s.e.	(0.043)	(0.047)	(0.083)
	Rest of the World		
ATT	0.128***	0.164***	0.137*
b.s.e.	(0.033)	(0.054)	(0.077)
No. Obs.	24,245	24,245	24,245

Note: The estimations are based on Eurostat COMEXT import data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The number of products included in the sample is reported. The dependent variables are the growth of the annual import prices from China to the EU, for intra-EU trade, and for imports from the rest of the world excluding China for targeted products at the HS 6-digit level in the following three years after the imposition of AD measures.

Table C3: Heterogeneity of the Impact of EU AD Measures on Import-Competing Firms: Analysis by Quartiles of TFP

	First Quartile			Second Quartile			Third Quartile			Fourth Quartile		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP											
ATT	-0.0172	0.062*	0.194**	0.018	0.0065	0.015	-0.045	-0.104**	-0.057	-0.146***	-0.061**	0.038
b.s.e.	(0.034)	(0.039)	(0.061)	(0.033)	(0.040)	(0.068)	(0.037)	(0.044)	(0.061)	(0.044)	(0.030)	(0.085)
	Total Employment											
ATT	-0.015	-0.019	0.084**	-0.0028	0.015	0.037	-0.054**	-0.012	-0.010	-0.029***	-0.068**	-0.065
b.s.e.	(0.017)	(0.025)	(0.044)	(0.020)	(0.027)	(0.049)	(0.024)	(0.034)	(0.050)	(0.011)	(0.028)	(0.052)
	R&D Investment											
ATT	-0.163	-0.081	-0.322	0.095	-0.092	-0.019	0.283	0.293	0.142	0.056	-0.210	0.230
b.s.e.	(0.191)	(0.208)	(0.342)	(0.178)	(0.194)	(0.358)	(0.187)	(0.195)	(0.291)	(0.142)	(0.167)	(0.300)
	Total Exports											
ATT	-0.157	-0.277	-0.067	0.025	-0.124	0.204	0.189	-0.184	-0.180	-0.277**	-0.0191	0.304
b.s.e.	(0.169)	(0.203)	(0.297)	(0.224)	(0.263)	(0.429)	(0.256)	(0.293)	(0.398)	(0.161)	(0.247)	(0.406)
No. Obs.	3,916	3,879	3,257	3,732	3,699	3,081	3,690	3,656	2,952	3,601	3,513	2,742

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample includes import-dependent firms defined as firms in the NACE 4-digit-level industries to which the targeted products protected by EU AD measures have been matched using the Pierce and Schott (2009) concordance table between HS and SIC codes. The sample is divided into quartiles of TFP in $(t-1)$. We match treated firms with similar firms, according to their TFP distribution, operating in other NACE 4-digit industries included within the same NACE 2-digit industries and that have not been protected by any other EU AD measure.

Table C4: Heterogeneity of the Impact of EU AD Measures on Chinese Exporters: Analysis by Quartiles of TFP

	First Quartile			Second Quartile			Third Quartile			Fourth Quartile		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP											
ATT	-0.224**	0.050	-0.648	0.008	0.011	0.004	0.016	0.020	0.066	0.150***	0.188**	0.060
b.s.e	(0.104)	(0.156)	(0.429)	(0.010)	(0.018)	(0.032)	(0.012)	(0.019)	(0.048)	(0.036)	(0.077)	(0.065)
	Total Employment											
ATT	0.128***	0.136**	0.245**	0.046	0.212***	0.076	-0.030	0.211**	0.325***	0.227***	0.287***	0.193
b.s.e	(0.034)	(0.059)	(0.119)	(0.04)	(0.063)	(0.109)	(0.048)	(0.084)	(0.122)	(0.069)	(0.097)	(0.132)
	R&D Investment											
ATT	0.073	-0.021	0.053	-0.181**	-0.240*	-0.027	0.058	0.402*	-0.817***	0.202	0.550*	-0.341
b.s.e	(0.072)	(0.152)	(0.206)	(0.081)	(0.131)	(0.276)	(0.128)	(0.225)	(0.272)	(0.137)	(0.314)	(0.411)
	Total Exports											
ATT	0.331***	0.546***	0.626*	0.308***	0.472***	0.661***	0.347***	0.480***	0.716**	0.626***	0.910***	0.431*
b.s.e	(0.113)	(0.182)	(0.325)	(0.080)	(0.145)	(0.174)	(0.081)	(0.150)	(0.268)	(0.175)	(0.324)	(0.221)
No. Obs.	9,051	9,051	9,051	7,939	7,939	7,939	7,179	7,179	7,179	6,578	6,578	6,578

Note: The estimations are based on the Chinese Annual Survey of Industrial Firms and the Chinese Customs Data between 2000 and 2006. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample includes all Chinese firms exporting to the EU the products targeted by EU AD measures in $(t-1)$. The sample is divided into quartiles of TFP in $(t-1)$. We match treated firms with similar exporters, according to their TFP distribution, within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table C5: Impact of EU AD Measures on Import-Dependent Firms: Robustness Checks

	One-to-One Matching			Kernel Matching: FE Logit		
	t	t+1	t+2	t	t+1	t+2
	TFP					
ATT	-0.130**	-0.077*	0.0006	-0.079***	-0.088***	-0.035
b.s.e.	(0.055)	(0.043)	(0.069)	(0.012)	(0.015)	(0.033)
	Total Employment					
ATT	-0.067***	-0.031*	-0.073	-0.015**	-0.025***	-0.016
b.s.e.	(0.020)	(0.026)	(0.058)	(0.006)	(0.009)	(0.018)
	R&D Investment					
ATT	-0.279	-0.156	-0.088	-0.122	0.042	0.052
b.s.e.	(0.180)	(0.184)	(0.268)	(0.081)	(0.092)	(0.150)
	Total Exports					
ATT	-0.280***	-0.378***	0.007	-0.023	-0.039	-0.218**
b.s.e.	(0.098)	(0.147)	(0.377)	(0.050)	(0.055)	(0.105)
No. Obs.	8,175	8,141	7,370	7,998	7,964	7,205

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique using a 1-to-1 nearest-neighbor matching based on propensity score estimation presented in Table B1 and kernel matching procedure based on a propensity score estimated using a panel logit with firm fixed-effects. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. Import-dependent firms are defined as firms importing directly from China the products targeted by EU AD measures in $(t-1)$. We match the treated import-dependent firms to similar importers that do not directly import any products that have been subject to any other EU AD measure at time $(t-1)$ and restrict the pool of controls to firms that import products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table C6: Impact of EU AD Measures on Import-Competing Firms: Robustness Checks

	One-to-One Matching			Kernel Matching: FE Logit		
	t	t+1	t+2	t	t+1	t+2
	TFP					
ATT	-0.032	0.073**	0.077*	0.021**	0.059***	0.017
b.s.e.	(0.046)	(0.032)	(0.050)	(0.008)	(0.010)	(0.013)
	Total Employment					
ATT	-0.010	-0.0046	0.056***	-0.017***	-0.004	0.023***
b.s.e.	(0.020)	(0.027)	(0.012)	(0.005)	(0.006)	(0.008)
	R&D Investment					
ATT	0.113	-0.023	0.041	-0.068	0.042	0.040
b.s.e.	(0.154)	(0.132)	(0.240)	(0.046)	(0.052)	(0.078)
	Total Exports					
ATT	-0.291	-0.614	0.040	-0.005	-0.0005	0.030
b.s.e.	(0.340)	(0.484)	(0.212)	(0.047)	(0.056)	(0.057)
No. Obs.	14,939	14,747	12,032	14,581	14,389	11,719

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT effect is estimated using a DID technique using a 1-to-1 nearest-neighbor matching and kernel matching procedure based on a propensity score estimated using a panel logit with firm fixed-effects. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. Import-competing firms are defined as all firms in the NACE 4-digit-level industries to which the targeted products protected by EU AD measures have been matched using the Pierce and Schott (2009) concordance table between HS and SIC codes. We match treated firms included in this sample with similar firms operating in other NACE 4-digit industries included within the same NACE 2-digit industries and which have not been protected by any other EU AD measure.

Table C7: Impact of EU AD Measures on Chinese Exporters: Robustness Checks

	One-to-One Matching			Kernel Matching: FE Logit		
	t	t+1	t+2	t	t+1	t+2
	TFP					
ATT	0.183***	0.404***	0.289**	0.273***	0.476***	0.353***
b.s.e.	(0.043)	(0.066)	(0.133)	(0.042)	(0.063)	(0.133)
	Total Employment					
ATT	0.256***	0.374***	0.409***	0.255***	0.427***	0.410***
b.s.e.	(0.034)	(0.055)	(0.069)	(0.038)	(0.057)	(0.064)
	R&D Investment					
ATT	0.202***	0.322**	-0.031	0.210***	0.563***	0.071
b.s.e.	(0.073)	(0.132)	(0.153)	(0.072)	(0.134)	(0.150)
	Total Exports					
ATT	0.742***	0.941***	1.139***	0.736***	1.070***	1.178***
b.s.e.	(0.064)	(0.117)	(0.116)	(0.080)	(0.122)	(0.122)
No. Obs.	28,023	28,023	28,023	30,017	30,017	30,017

Note: The estimations are based on the Chinese Annual Survey of Industrial Firms and the Chinese Customs Data between 2000 and 2006. The ATT effect is estimated using a DID technique using a 1-to-1 nearest-neighbor matching and kernel matching procedure based on a propensity score estimated using a panel logit with firm fixed-effects. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. We define exporters as all Chinese firms exporting to the EU the products targeted by EU AD measures in the year before the treatment $(t-1)$. We match the treated exporting firms to similar exporters that have not been affected by any other AD measure at time $(t-1)$ and we restrict the pool of controls to Chinese firms that export products within the same HS 4-digit-level classification as the targeted HS 6-digit-level products.

Table C8: Impact of EU AD Measures on Long-Term Import-Dependent Firms, Import-Competing Firms and Chinese Exporters

	Direct Importers			Producers NACE 4-digit			Chinese Exporters		
	t	t+1	t+2	t	t+1	t+2	t	t+1	t+2
	TFP								
ATT	-0.058**	-0.046**	-0.082*	0.236***	0.140***	0.112	0.264***	0.409***	0.341*
b.s.e.	(0.026)	(0.022)	(0.046)	(0.033)	(0.039)	(0.065)	(0.054)	(0.105)	(0.175)
	Total Employment								
ATT	-0.039**	-0.036**	-0.040	0.009	0.074***	0.084*	0.263***	0.474***	0.536***
b.s.e.	(0.017)	(0.014)	(0.034)	(0.016)	(0.023)	(0.044)	(0.047)	(0.089)	(0.110)
	R&D Investment								
ATT	-0.072	0.004	0.123	0.033	-0.359**	-0.258	0.213**	0.547***	0.284
b.s.e.	(0.193)	(0.212)	(0.277)	(0.159)	(0.172)	(0.314)	(0.094)	(0.209)	(0.255)
	Total Exports								
ATT	-0.272*	-0.208*	0.190	0.052	0.052	-0.081	0.720***	0.962***	1.188***
b.s.e.	(0.143)	(0.109)	(0.191)	(0.189)	(0.226)	(0.365)	(0.093)	(0.162)	(0.170)
No. Obs.	7,524	7,511	7,006	9,243	9,125	7,779	17,990	17,990	17,990

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007 for *Direct Importers* and *Producers NACE 4-digit* and the Chinese Annual Survey of Industrial Firms and the Chinese Customs Data between 2000 and 2006 for *Chinese Exporters*. The ATT effect is estimated using a DID technique with propensity score kernel matching procedure. Bootstrapped standard errors (b.s.e.) with 500 repetitions are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The outcome variables are the growth, relative to $(t-1)$, in firm-level TFP, number of full-time employees, R&D investment and exports value. The sample *Direct Importers* includes import-dependent firms importing directly from China the products targeted by EU AD measures for at least three years before t. The sample *Producers NACE 4-digit* includes all firms included, for at least three years before t, in the NACE 4-digit-level industries to which the targeted products protected by EU AD measures have been matched using the Pierce and Schott (2009) concordance table between HS and SIC codes. The sample *Chinese Exporters* includes firms that export to the EU the targeted products for at least three years before (t).

D Aggregate Effects Due to Anti-Dumpimg Policy

In an attempt to assess the aggregate effects of anti-dumping (AD) on the different groups of French firms affected by these measures, we translate the estimated average treatment effects on the treated (ATTs) into changes in the level of employment and exports compared with the period before the application of AD duties (t-1). These changes are the difference in growth compared with the counterfactual situation where AD duties are not applied (and captured by the growth rates of matched control groups). More precisely, we multiply the estimated ATTs by the level of outcome variables at time t-1 to calculate the growth, negative or positive, that is due to the AD policy.

In Table D1 we assess the effects of the EU AD policy toward Chinese imports on import-dependent and import-competing French firms in our sample. We only focus on the time periods for which the estimated ATTs are significant as reported in Tables 2, 5 and 6. For each sample of firms and each outcome variable, we measure the average value of that variable at time t-1 at the firm level, which we multiply by the number of treated firms to obtain an overall value at the sample level. For example, for the sample of direct importers (first row of Table D1), the average size of treated firms at t-1 is 352.08 and the number of treated firms at time t is 692 firms, which lead to a level of total employment of 243,643 at the sample level at t-1. The estimated ATT for that sample at time t is -0.021, which translates into a loss of 5,238 jobs compared with the counterfactual situation without AD measures.

To assess the aggregate net effects for France and the rest of the EU, for import-competing firms, we use the sample of producers NACE 4-digit and for import-dependent firms, we use the sample of users NACE 4-digit. These are the widest definitions of import-competing and import-dependent firms in our analysis and the two sets of firms for which we can collect data on employment and exports at the level of France and the EU. Therefore, in Table D2 we apply the ATTs estimated in Tables 5 and 6 for these two samples. For each sample of industries and each outcome variable, we measure the average value of the that variable at time t-1 at the industry level, which we multiply by the number of treated industries to obtain an overall value at the sample level.

Table D1: Effects of AD Measures on Employment and Total Exports

Sample	Time	Outcome	ATT	Average Level at t-1 (Firm Level)	No. of Treated	Level at t-1 (Sample Level)	Effect
Direct Importers	t	Total Employment	-0.021	352.08	692	243,643	-5,238
Direct Importers	t+1	Total Employment	-0.052	360.29	682	245,717	-12,900
Direct Importers	t	Total Exports	-0.298	44,444,400	692	30,755,524,800	-9,165,146,390
Direct Importers	t+1	Total Exports	-0.301	44,022,640	682	30,023,440,480	-9,037,055,584
Importers from non-EU	t+1	Total Employment	-0.042	399.26	1,168	466,335	-19,726
Importers from non-EU	t+2	Total Employment	-0.068	426.35	856	364,963	-24,926
Importers from non-EU	t+1	Total Exports	-0.453	44,775,560	1,168	52,297,854,080	-23,690,927,898
Producers Nace 4-digit	t+2	Total Employment	0.004	157.44	2,060	324,342	1,381
Producers Nace 4-digit	t+2	Total Exports	0.249	15,295,910	2,060	31,509,574,600	7,845,884,075
Exporters to EU	t	Total Employment	0.112	248.30	872	216,518	24,250
Exporters to EU	t+1	Total Employment	0.097	253.59	844	214,029	20,782
Exporters to EU	t+2	Total Exports	0.890	33,484,590	506	16,943,202,540	15,079,450,260

Note: The estimations are based on the Annual Business Survey and Customs Agency data between 1999 and 2007. The ATT are extracted from Tables 2, 5, and 6. The impact of AD measures is estimated as the growth in terms of employment and total exports from the t-1 level compared with the growth that would have occurred in the absence of AD duties.

Table D2: Aggregate Effects of AD Measures on Employment and Total Exports in France and the EU

Sample	Time	Outcome	ATT	Level at t-1	Effect
French Users Nace 4-digit	t	Total Employment	-0.026	3,135,124	-83,394
French Users Nace 4-digit	t	Total Exports	-0.193	283,650,000,000	-54,744,450,000
French Producers Nace 4-digit	t+2	Total Employment	0.004	523,316	2,229
French Producers Nace 4-digit	t+2	Total Exports	0.249	51,200,000,000	12,748,800,000
EU Users Nace 4-digit	t	Total Employment	-0.026	25,862,484	-687,942
EU Users Nace 4-digit	t	Total Exports	-0.193	828,960,000,000	-159,989,000,000
EU Producers Nace 4-digit	t+2	Total Employment	0.004	4,969,130	21,168
EU Producers Nace 4-digit	t+2	Total Exports	0.249	178,860,000,000	44,536,140,000

Note: The estimations are based on data from Eurostat Structural Business Statistics and COMEXT dataset data between 1999 and 2007. The ATT are extracted from Tables 5 and 6. The impact of AD measures is estimated as the growth in terms of employment and total exports from the t-1 level compared with the growth that would have occurred in the absence of AD duties.