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Abstract

This article examines the distribution of antidumping (AD) disputes across countries and industries, and examines which AD cases reach the dispute settlement system of the WTO. Our general finding is that neither the country nor the industry distribution of AD cases remains constant across the different levels of disputes, as cases proceed from notifications to requests for consultations and third party adjudication at the WTO.

The US is the main user of AD measures, as well as the main target for complaints at the WTO's Dispute Settlement Body. However, emerging markets have increasingly started using AD law to protect their domestic firms. We find that the typical AD notification is submitted by an upper middle-income country, and it focuses on a medium low-technology industry with differentiated products, but low relationship-specificity. The most typical complainant at the WTO is also an upper middle-income country, challenging a high-income country (most likely the US) that is allegedly giving unfair protection to an industry producing differentiated goods that are not very relationship-specific, using medium-low technologies.

The analysis also reveals that when lower middle-income countries are challenged at the WTO, disputes are often resolved before third party adjudication is needed.

Key words: Trade conflict; Antidumping; WTO; Dispute settlement
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1. Introduction

The multilateral trade negotiations carried out under the auspices of the GATT and the WTO has contributed to a substantial liberalization of international trade over the past decades. Import tariffs have been reduced, agriculture has been included in the WTO framework, and regulations in areas such as trade-related intellectual property rights, sanitary and phytosanitary measures, rules of origin, and the use of safeguards have been refined and made more transparent (Bagwell and Staiger 2002; Bagwell et al. 2002).

Yet, the regulatory framework for world trade remains complex, and disagreements and disputes regarding the interpretation of rules are common. It has therefore been argued that the strengthening of GATT's Dispute Settlement Body (DSB) was one of the main achievements of the Uruguay Round negotiations that resulted in the establishment of the WTO in 1995 (Hoekman and Mavroidis 2000; Torres 2012). Relatively few trade disputes were taken to the GATT's DSB before 1995, and many of the disputes that did find their way to the DSB were not resolved. The main problem was that decisions required full consensus among the GATT members – a party to a dispute could block the whole dispute settlement process. In the WTO's more legalized structure, this is not possible. The time schedule for dispute settlement is stricter, to encourage progress from bilateral consultation to third party adjudication (by an expert panel), panel report, and adoption of panel recommendations. The possibility to make a formal appeal has been added. If the disputing parties cannot agree about the formation of a panel, the Director-General of the WTO can appoint one, and panel rulings (or, if relevant, rulings by the Appellate Body) are automatically adopted unless there is a consensus among the WTO members against adoption (see e.g. Elsig et al. 2012)

One consequence of these reforms is that the number of cases brought before the DSB has increased notably – the dispute settlement mechanism is used more often because WTO members seem to believe that formal complaints to the DSB may actually help resolve disputes. Between 1947 and 1994, a total of 254 trade disputes were reported to the GATT (Bown 2002). The WTO reached this number already during the first half of 2002, less than eight years after the establishment of the new DSB. Over 500 trade disputes had been reported to the WTO by the end of 2015.

A positive side effect of the growing number of formal disputes is that our understanding of the patterns and causes of trade conflict has improved.[1] The WTO publishes regular reviews of the trade policies of member countries, as well as detailed data on each dispute brought to the DSB. This information constitutes an important resource for academic research on trade conflicts. A more detailed summary of relevant literature will follow in the next section, but it can be noted already here that numerous studies have shown that disputes are not randomly distributed across countries and industries. However, a potential problem with these analyses is that only a small share of all trade conflicts ends up at the DSB. It is likely that many of the non-reported conflicts influence prices and trade flows in the same way as those conflicts that eventually reach WTO (Prusa 1991, 1992). This means that analyses focusing on formal disputes may yield biased results if there are differences in how reported and non-reported conflicts are distributed across countries and industries.

The main purpose of this article is to examine how trade disputes are distributed across countries and industries, and how the disputes reported to WTO's DSB reflect the underlying non-reported set of trade conflicts. In particular, we focus on how formal disputes and pre-DSB conflicts regarding dumping and antidumping measures are distributed across countries and industries. An obvious problem in this context concerns the availability of data on non-reported conflicts. However, antidumping is one of the few areas where pre-DSB data on conflicts are carefully recorded. Member countries are obliged to report changes in antidumping legislation, including new antidumping duties, to the WTO Committee on Anti-Dumping Practices. Both the traded goods involved and (in case of a country specific action) the exporting country towards which the action is directed are specified in these notifications. The notification can be seen as one of the first formal (pre-DSB) phases of a trade conflict between countries. The country that submits the notification has determined that a foreign country is dumping goods on its market, and has taken action in the form of an antidumping duty.[2]

If the exporting country opposes the antidumping ruling, it has the option to file a request for consultations to the DSB. Only a small share of antidumping notifications (according to our

[1] It is less clear whether the increasing number of formal disputes has also led to a more efficient dispute settlement process. See e.g. Chua (1998) and Hsiang and Nyarko (2016) on the (non-systematic) use of precedents in international trade law.

[2] Alternatively, if the partner country is actually not engaged in any unfair trade practices, the antidumping notification itself can constitute the first step of a trade conflict.

data set, about 4 percent) results in such requests. The first formal step in solving the dispute, once the request for consultations has been filed, is bilateral consultation. If an agreement has not been reached within 60 days, the parties may request third party adjudication by an expert panel (although the countries involved still have the possibility to find a mutual agreement even after an expert panel has been established). Many of the trade disputes brought to the WTO are concluded at the consultation stage.[3] However, antidumping cases appear more complex: more than 60 percent of the antidumping cases reaching the WTO have resulted in the establishment of a panel.

Earlier research has noted that not all countries are equally visible in antidumping cases (e.g. Blonigen and Prusa 2016). It is not surprising that large actors like the US and China appear regularly in AD disputes, but some other economies, such as Argentina, South Africa, South Korea, Taiwan, and Turkey, register more AD notifications and appear more often in WTO disputes than what their share of world trade would suggest. At the same time, it is notable that most developing countries have never notified any AD measures to the WTO nor do they ever appear in the cases that reach the DSB. The uneven industry distribution of trade disputes has also been observed in earlier studies (Vandebussche and Zanardi 2010; Blonigen and Prusa 2016), and it has been suggested that differences in "conflict intensity" may influence the risk perceptions of exporters – this, in turn, is likely to have an impact on e.g. trade volumes and the duration of trade spells (Kokko et al. 2014). While some of the cross-country differences in the likelihood that countries will participate in WTO dispute settlement are analyzed in the literature (Bown 2004a, 2005a; Bown and Hoekman 2005), extant studies do not focus on AD cases, and there are, to the best of our knowledge, no earlier analyses of whether disputes involving certain industries are more likely to escalate from the notification phase to a formal WTO dispute.

The remainder of this article has the following structure. Section two surveys the relevant literature, with some focus on the reasons why countries engage in AD actions, the effects of AD actions, what earlier research has to say about the country and industry distribution of AD, and why countries may decide not to take trade disputes to the WTO. Section three describes the data used, section four examines how the country and industry distribution of AD disputes change moving from notifications to consultations and third party adjudication,

[3] See http://www.wto.org/english/tratop_e/dispu_e/disp_settlement_cbt_e/c6s2p1_e.htm.

and section five examines some more aggregated country-industry groupings to highlight some of the patterns in the data. Section six concludes.

2. Antidumping: Causes, Consequences, and Distribution of AD Cases

The academic literature on antidumping (AD) is extensive, with a large number of studies on issues ranging from theories of protectionism and lobbying to analyses of the determinants of AD actions, effects of AD duties, and patterns of dispute resolution (see e.g. Elsig et al. 2012; Blonigen and Prusa 2003; Blonigen and Prusa 2016 and Nelson 2006 for surveys). For the present purposes, it is particularly relevant to briefly summarize work focusing on the following questions: Why do firms and countries engage in AD actions? What are the consequences of AD? How are AD actions distributed across countries and industries? Why do so few antidumping disputes reach the WTO? These questions will guide us to the empirical part of the paper, where we look closer at the country and industry distribution of AD actions and examine to what extent the AD disputes that have reached the WTO reflect the underlying trade disputes.

2.1 Why do firms and countries engage in antidumping actions?

Although AD measures are formally intended as responses to foreign dumping and predatory pricing that cause material injury to domestic industry, there is broad agreement in the literature that current AD policy has little to do with maintaining "fair" trade. The main reason is that the legal foundations for AD policy (in the national legislation of many countries as well as in the GATT and WTO) have been revised frequently, gradually reducing the need to prove discriminatory pricing and injury, so that the legal standards are only weakly linked to any economically meaningful understanding of dumping. For example, in AD actions, "dumping" is often interpreted as sales below average cost—however, already basic microeconomic theory shows that it may be optimal in the short run for firms to sell below average total costs, as long as they cover average variable cost (Blonigen and Prusa 2016). Similarly, to determine "injury", it may be enough to show a negative correlation (rather than causality) between market shares of foreign firms and the performance of domestic industry (Blonigen and Prusa 2016).

The result is that the national agencies responsible for AD policy have a high degree of discretion regarding AD decisions. This is well known by domestic firms, who also realize

that they have good chances to reduce the competition from imports by filing AD complaints and by lobbying AD agencies to accept their arguments. Empirical evidence suggests that the likelihood that AD agencies will rule in favor of domestic firms is high. For example, in the US, AD investigations almost always find that dumping has occurred, even when the foreign firms involved are making reasonable profits on every export sale to the US (Miyagiwa et al. 2016). Consequently, Prusa (2005: 683) notes that "the link between dumping and anti-dumping duties is tenuous". Blonigen and Prusa (2001:3) argue directly that "AD has nothing to do with moral right or wrong, it is simply another tool to improve the competitive position of the complainant against other companies." Nelson (2006: 254) asserts that "The antidumping mechanism… is really about neither fairness nor predation. It is, instead, about protection". Finger and Fung (1993) conclude that "antidumping is just ordinary protection with a good public relations program".[4]

The filing of AD complaints and rulings about AD duties are related both to macroeconomic factors and industry-level variables. Firms file complaints not only when foreign exporters actually engage in dumping, but also when they perceive foreign competition to be "too high" and when they expect the relevant authorities to act on their behalf. AD agencies respond both to predicable economic arguments and to the lobbying and political pressure that industry is able to generate.

Several empirical studies have examined the role of macroeconomic factors at the country level as determinants of firms' demand for protection (or their motives to seek AD actions). Takacs (1981) studied how aggregate filing behavior in the US was related to output, unemployment or capacity utilization, and the overall trade balance or the degree of import penetration. The results showed that both weak macroeconomic conditions in the US and high pressure from imports were driving the demand for protection. Other studies have replicated the result for weak macroeconomic development (Feigenbaum et al. 1985, Feigenbaum and Willet 1985, Coughlin et al. 1989) and added important evidence regarding the effects of exchange rate valuation: high real exchange rates or an appreciating currency tend to result in a higher number of filings (Leidy 1997, Knetter and Prusa 2003, Feinberg 2005). The outcomes, in the form of decisions about AD duties, seem to vary in a similar way with macroeconomic conditions (Feinberg 2005, Magee and Young 1987, Mah 2000a, 2000b). In

[4] In a similar vein, Finger (1993: 27) notes that "dumping is anything you could get the government to act against under the antidumping law".

addition, Bown and McCulloch (2009) point to the savings-investment imbalances in the US as a possible cause for trade disputes with countries recording large bilateral surpluses with the US (e.g. Japan and China). In these cases, AD actions against Japanese and Chinese firms may in fact be motivated by the desire to pressure China and Japan to open up their markets for US exports.

Several contributions have also pointed out that the links between macroeconomics and AD protection are not specific to the US, but apply also for the EU and other developed countries (Becker and Theuringer 2001, Bown 2008, Knetter and Prusa 2003). In an extensive study of 99 countries during the period 1980-2000, Aggarwal (2004) confirmed the findings for developed countries in general, but found that the determinants of AD use in developing countries were different. Although balance-of-payments deficits and high import penetration were linked to AD actions also in developing countries, she stressed that they seemed to use AD as an instrument to facilitate broad trade liberalization (meaning shifts from inward oriented to more liberal trade regimes) and that domestic AD law also provides a way to respond to those (developed) countries that target them with AD investigations.

Even if these macroeconomic variables are related to the aggregate number of AD measures at the country level, they do not reflect AD activity at the industry level. Nelson (2006) argues that industries and sectors are heterogeneous in at least three ways that are likely to influence their AD filings. First, the conditions at the industry level may vary relative to the aggregate business cycle or other macroeconomic aggregates. Second, industries facing similar macroeconomic shocks may have different motivations for engaging in lobbying for protection, because of e.g. differences in market structure and their ability to organize for collective action. Third, the ability of industries to get support for their complaints varies depending on their financial resources, employment, political connections, and other factors. All three sets of industry level determinants have been recognized in empirical studies on AD.

One of the first authors to include industry-specific conditions as determinants of AD filings was Finger (1981), whose empirical estimations on US data included measures of the level of economic activity and import competition, as well as proxies for the industry's political influence, capacity to engage in collective action against foreign exporters, and expected payoff from successful AD actions. Import penetration was found to have a significant effect on filings, but economic activity did not seem to matter much. Many later studies have

confirmed that the level or increase of import penetration matters (Chung 1999, Feinberg and Hirsch 1989, Gilligan 1997, Herander and Schwartz, Krupp 1994, Lenway and Rehbein 1989, Lenway and Schuler 1991, Lichtenberg and Tan 1994, Sabry 2000, Staiger and Wolak 1994) and many of these have also found that capacity utilization or some other measures of economic activity are important. Industries facing more foreign competition (possibly as a result of trade liberalization), low growth rates, and low capacity utilization are more likely to file for AD protection, and more likely to be protected by AD duties.

The proxies for political influence and capacity for collective action used by Finger (1981) were industry employment and the industry's concentration ratio. Neither of these had the expected positive effects in Finger's analysis, but later studies have often found that employment, unionization, and concentration are significant predictors of AD filing (Feinberg and Hirsch 1989, Herander and Schwartz 1984, Lichtenberg and Tan 1994, Staiger and Wolak 1994). In other words, monopolistic industries with many employees (meaning many voters) seem to find it easier to agree about AD filings and are more likely to get support for their cause from the relevant authorities (Baldwin 1985). Several studies have also found that industries with production facilities in the home states of key politicians are more likely achieve their goals (Hansen and Prusa 1996, 1997, Moore 1992), and that financial contributions for the re-election of politicians raise the odds of successful AD filing (Hansen and Prusa 1996, 1997). In an early study of US AD investigations, Finger et al. (1982) argued that the impact of the political variables was focused particularly on the injury determination (which was carried out by the International Trade Commission), whereas the analysis of whether dumping had occurred, which was carried out by the Treasury Department, was driven primarily by the economic variables. Overall, Finger et al (1980) argued that this did not generate any large protectionist bias. In 1980, the responsibility for injury determination was shifted from the Treasury to the Department of Commerce, with the result that the likelihood that investigations would find dumping increased notably (Irwin 2005). It can be noted that most of the evidence on the importance of political variables uses data for the period after 1980.[5]

[5] Vandenbussche and Zanardi (2008) also note a political variable that may reduce AD activity, in particular in developing countries: the inflow of foreign direct investment. They argue that FDI lowers the probability that the host country adopts AD law, because multinational enterprises typically source a large share of their intermediate inputs from abroad and do not want to see their supply chains disturbed by AD investigations.

To capture the payoff from AD actions, Finger (1981) included measures of total output and capital stocks, with the hypothesis that larger industries would have more to gain from AD duties. Both industry output and capital stock had the expected effects, and the finding that size (typically measured in terms of capital stocks) is important has been reproduced in later studies (Herander and Schwartz 1984, Feinberg and Hirsch 1989, Lichtenberg and Tan 1994). The bulk of empirical evidence on the importance of industry-level variables stems from the US, but Blonigen and Prusa (2003) refer to a number of studies that have found similar patterns also in the EU (Eymann and Schuknecht 1996, Tharakan 1991, Tharakan and Waelbroeck 1994). In addition, Morck et al. (2001) and Blonigen (2006) suggest that there is a learning effect whereby some firms and industries become more proficient at AD actions over time, accounting for the fact that the bulk of AD measures is concentrated to a small number of industries, despite the general nature of the factors that seem to drive AD filing.

2.2 What are the consequences of antidumping?

The effects of AD legislation have been studied at several different levels, with theoretical as well as empirical contributions, analyses employing computable general equilibrium models as well as econometric techniques, focusing at direct as well as indirect effects, and considering impacts of various stages of the AD process, ranging from the introduction of AD law to investigations and implementation of AD duties, and further to AD disputes that reach the GATT or the WTO. The short summary of effects is that AD matters: imports from targeted countries fall and import prices increase as a result of AD actions. The effects occur already before AD duties are actually imposed, and are felt not only for the specific goods and countries that are targeted by the actions, but also for related products and other exporters.

The computable general equilibrium studies typically find that domestic production will substitute for imports blocked by AD duties, and that domestic employment and profits will increase while overall welfare falls (Murray and Rousslang 1989, DeVault 1996, Kelly and Morkre 1998, Gallaway et al. 1999). Although the results depend on specific assumptions about demand characteristics, the nature of competition, and cost structures, Blonigen and Prusa (2016: 133) see the models as useful tools for demonstrating the wide range of effects of the interventions, and note that the findings suggest that "AD imposes as large (or larger) welfare costs than any other current commercial policy".

Econometric studies also systematically find that imports decline as a result of AD action, but that the impact varies depending on how far the AD complaints are driven (Bown and Crowley 2006, Brenton 2001, Durling and Prusa 2007, Krupp 1994, Krupp and Pollard 1996). In a study of US trade, Prusa (2001) notes that the initiation of an AD investigation has substantial effects on imports, even if less than half of investigations in the US before 2000 resulted in the imposition of AD duties. Similarly, Staiger and Wolak (1994) also find that imports tend to fall dramatically during the investigation period, regardless of the case's ultimate outcome. In the cases where AD duties were imposed, exports from named countries fell by 50-60 percent on average (Prusa 2001). In the many AD cases that were settled in some way (e.g. via an agreement about voluntary export restraint), trade fell by almost as much. Besedes and Prusa (2017) add evidence on the impact at the firm level. Given the high AD duties imposed in the US – in one-quarter of cases, the ad valorem duties have exceeded 100 percent – many foreign exporters are forced entirely out of the US market already at the investigation stage. Moreover, firms from countries affected by AD are less likely to return to the US market even after the AD measures are removed. Hence, AD has a long-run deterrence effect on the behavior of affected foreign exporters. Taking into account the relatively large number of investigations that do not lead to duties, Prusa (1992: 7) concludes that "all in all, considering that it is the domestic firms who initiate the petition and given the variety of ways a settlement can be achieved, it is plausible that a number of antidumping petitions are filed explicitly with the intent of obtaining a settlement offer."

Vandenbussche and Zanardi (2010) stress that the impact of AD actions is not limited to the specific product category that is identified in the AD filing, but is likely to spill over to a more aggregate level of bilateral trade flows. They note that although AD measures typically only cover a few percent of the product lines in most countries that use AD law, they are still a more general concern because of the spillovers to the broad sectors where these products are found.[6] These broad sectors together represent over 25 percent of total aggregate trade. It is also possible that these externalities will affect other countries than those explicitly targeted by AD duties: if AD duties are imposed against exporters from one country, then exporters in

[6] Bown (2011) reports that 1.5-3 percent of the imports of developing countries were subject to technical trade barriers (mainly AD) in 2007. For the main emerging economies, the share was somewhat higher, at about 4 percent. Looking at the cumulative coverage of trade barriers over time, Bown (2011) estimates that about 10 percent of the 6-digit HS import products in the EU, and about 13 percent of those in the US had been subject to at least one technical trade barrier (primarily AD duty) at some time during the period 1990–2009.

other countries may interpret it as a sign of the political influence of domestic firms, and hence the risk of additional AD measures in the future.

To summarize the various externalities from AD, Vandenbussche and Zanardi (2010) point to six indirect types of trade effects that may occur in addition to the direct negative effect on the product/country combinations named in AD duties (which they call the "trade destruction effect"). The "trade diversion effect", which has also been found by e.g. Prusa (1997) and Konings et al. (2001), occurs when some of the imports restricted by an AD duty are replaced by imports from other trade partners that are not subject to AD. The "downstream effect" comes into play when AD actions target upstream intermediate products. It is not clear *ex ante* how this influences the trade in downstream products, and Vandenbussche and Zanardi (2010) note that the net effect may actually be an increase in aggregate imports. This could occur e.g. if AD restrictions on imports of intermediates raise the costs and reduce the competitiveness of domestic producers of final goods, who lose market shares to imports. In case AD duties target imports of raw materials (e.g. raw shrimps), the targeted foreign firms may instead be encouraged to increase their production and exports of more highly processed goods (e.g. breaded shrimps) with higher value added.

The "deterrent effect" focuses on situations where the frequent use of AD laws is noted by the country's trade partners, who become more cautious in their exporting strategies. To avoid being targeted by AD investigations, the trade partners may decide to act strategically, shipping smaller quantities of goods, at higher prices, than would otherwise have been optimal (Reitzes 1993, Staiger and Wolak 1994). Hence, the mere threat of AD duties can lead to significant responses among the country's potential trade partners.

The "collusive device effect" illustrates another type of strategic response among trade partners: an international cartel. As noted in several studies (Messerlin 1990, Staiger and Wolak 1992, Prusa 1992, Veugelers and Vandenbussche 1999, Zanardi 2004), it is possible that the threat of AD actions will encourage foreign exporters to agree about market sharing arrangements. These will typically result in lower volumes and higher prices, both of which reduce the risk of being targeted for AD duties. "FDI effects" take place when trade barriers motivate foreign producers to engage in AD-jumping FDI in the country that introduces AD duties. Empirical evidence from the US (Blonigen 2002) and the UK (Girma et al. 2002) suggests that this type of AD-jumping FDI motives have been connected mainly with

Japanese multinational enterprises. While the short run impact on trade may be negative, several different outcomes are possible in the long run, depending on how the market shares of the foreign-invested firms develop, how much intermediates they import for their local production, and whether they will support further protection or free trade when they have become insiders in their new host country.

Several papers have also found evidence of "retaliation effects" that occur when countries that have earlier been subject to AD measures introduce their own AD laws in order to retaliate (Aggarwal 2004, Blonigen and Bown 2003, Bown 2004b, Bown 2005b, Prusa and Skeath 2005, Vandenbussche and Zanardi 2008). Neither national legislation in countries using AD nor WTO rules provide any compensation for firms that are wrongfully targeted by AD duties, so the threat of retaliation may be one of few factors restricting the use of AD in countries where domestic firms hold substantial political power and are able to garner political support for this type of protection. These trends are consistent with Finger's (1993) conjecture that many countries adopt AD not only to protect against unfair imports, but also to defend their exporters against abuse of AD law abroad.

In addition, Durling and Prusa (2006) and Bown and Crowley (2007) identify a "trade deflection" effect, which refers to the possibility that goods blocked from entering country X because of AD measures are instead deflected to country Y. An interesting consequence of this type of "trade deflection" could be an "AD diffusion" effect as the surge of imports in country Y could disturb the market equilibrium and lead domestic producers to lobby for AD protection. Together with the learning effects identified by Morck et al. (2001) and Blonigen (2006), this type of "AD diffusion" could help explain why AD actions are concentrated to relatively few industries.

Taking into account all these different effects, it may be difficult to make a precise calculation of the net impact of AD measures on trade. While most effects suggest reduced trade flows, it is theoretically possible that some others may result in increased trade. The net effect is ultimately an empirical question: in their own empirical analysis, Vandenbussche and Zanardi (2010) conclude that it is unambiguously negative.

2.3 How are antidumping actions distributed across countries and industries?

The first AD laws were established in Canada and Australia in the early 20th century, with the US and some European countries introducing similar legislation during and after World War I. Although only a handful of countries had adopted AD law when the GATT was established in 1947, the agreement included rules for the use of AD duties, largely at the insistence of the US (Blonigen and Prusa 2003). Many GATT members introduced AD laws in the 1950s and 1960s, so that the total number of countries with AD legislation grew to over 40 by 1970. However, until the late 1970s, only six countries used AD (the US, the EU, Australia, Canada, South Africa, and New Zealand), and even these were relatively cautious users (with the possible exception of South Africa). Blonigen and Prusa (2003) mean that AD had a very limited impact on international trade until the late 1970s.

The use of AD legislation accelerated after 1979, when the Tokyo Round negotiations resulted in revisions of GATT's AD statutes. The requirement to show price discrimination was relaxed to include "sales below cost", and regulations regarding "material injury" were loosened. These amendments resulted in a rapid increase in the use of AD legislation by the traditional users – the US, the EU, Australia, and Canada, and the number new AD filings at least doubled from the 1970s to the 1980s.

Since the mid-1980s, the number of countries adopting AD law has increased rapidly; by 2008, over 120 countries had introduced formal AD legislation (Blonigen and Prusa 2016, Vandenbussche and Zanardi 2008). Patterns of use have also changed dramatically. While the four traditional users accounted for at least 95 percent of all AD actions until the mid-1980s, their share has gradually fallen (Blonigen and Prusa 2016). Since 1995, new users have continuously accounted for more than half, and most years over 70 percent, of all new AD actions. Vandenbussche and Zanardi (2010) identify 41 countries that adopted AD law between 1980 and 2000, and distinguish five of these as "New Tough Users" – Brazil, India, Mexico, Taiwan, and Turkey. Among other emerging economies, Argentina and China have also become major users of AD. Bown (2008:285) shows that the determinants of AD use in many developing countries are similar to those among the traditional AD users: the industries that are protected by AD measures "are larger, they face substantial import competition and more rapidly declining industry output, and they are more likely to have been confronted with negative exchange rate and real GDP shocks". However, Prusa and Skeath (2002) find that

the "new users" are more likely than traditional users to be influenced by political and strategic arguments in their implementation of AD policy.

Turning to the countries targeted by AD measures, developing and emerging economies have a dominant position. In the top-ten list of countries targeted by AD measures 1995-2013, eight countries belong to the developing and emerging economy list (Blonigen and Prusa 2016): of these, China is the dominant target, with more hits than the next four countries together (South Korea, Taiwan, the US, and Japan). According to Bown (2011:1957), 2.6 percent of China's exports to developing economies and 1.6 percent of the exports to developed economies (in terms of product lines) were subject to AD in 2009.

Developing countries are not only the major AD targets for the OECD countries, where imports from low-cost locations have for a long time raised concerns about de-industrialization (Saeger 1997, Kucera and Milberg 2003, Rowthorn and Coutts 2004), but also for other developing economies (Bown et al. 2003, Blonigen and Prusa 2016, Finger and Zlate 2003). Possible explanations include the arguments that developing countries have comparative advantages in "sensitive products", that the labor intensive industries where developing country firms export are often well organized and relatively concentrated, that these industries have been subject to intense international competition and/or technological change for long periods of time, that developing home markets have high rates of protection (which allows firms to charge high prices at home), that developing countries lack the capacity to retaliate when they are subject to AD actions, and that they also lack the expertise and resources needed to take their complaints to the WTO (Blonigen and Bown 2003, Bown et al. 2003, Hoekman and Mavroidis 1996). Bown and Reynolds (2015) also note that developing countries and emerging economies figure prominently among AD targets, but are not equally well represented among those countries that complain about AD issues to the WTO.

The contributions looking at how AD cases are distributed across industries are fewer, despite the fact that most econometric studies have focused on explaining the industry-level determinants of AD. Vandenbussche and Zanardi (2010) show how all AD initiations in 1995-2002 were distributed across eight broad industry groups, and highlight the fact that two of these – Industrial Chemicals with 40 percent and Iron and Steel with 30 percent – accounted for the great majority of all cases. Machinery and Textile and Apparel recorded 5-6

percent each, while Food Products, Paper and Paper Products, and Rubber Products came in at 3-4 percent each. The remaining nine percent of AD initiations were found in the category Other Industries. Using a longer data set (1996-2013), Blonigen and Prusa (2016) note that three broad sectors – Base Metals and Metal Products, Chemicals and Allied Products, and Plastics and Rubber Products – account for most of the AD cases (and that the share of these sectors in AD is much larger than their share of world trade). They also note that the variation across countries is relatively small, even distinguishing between developed and developing countries. Miagawa et al. (2016) and Niels (2000) suggest that AD occurs more often in R&D-intensive industries than in industries with no or little R&D, although it should be noted that the specific products from the Industrial Chemicals and Iron and Steel sectors that are targeted in AD initiations are rarely the most R&D-intensive.

2.4 Why do so few antidumping cases reach the WTO?

Prusa (1992) asks why so many antidumping petitions are withdrawn or voluntarily terminated, and concludes that a major reason is that the firms filing the petitions do not necessarily need a ruling on an antidumping duty. The foreign firms targeted by the initiation of the AD case often reduce their exports even before a final AD duty is imposed: they realize that the home firms filing for AD protection are often able to lobby their national authorities for a positive ruling, and that final AD margins in these cases are likely to be very high. Indeed, the average AD duties imposed in the US 1980-2005 exceeded 40 percent (with many peaks exceeding 100 percent), and some other major AD users, such as Mexico, have recorded even higher average rates (Blonigen and Prusa 2016). It is clear that the imposition of such a high AD duty will often force the foreign firm to exit the market. The odds that a complaint to the WTO will be successful are not necessarily high, and the long time required to win a case that goes through the whole system would also result in lost market shares.[7] A voluntary export restraint agreement is often more attractive, since it allows the firm to keep a share of a market where the overall price level is likely to rise. Prusa (1992) sees this type of "nuisance" suit as a way to initiate collusion between domestic and foreign firms, to the benefit of both types of firms. Hence, withdrawn or voluntarily terminated cases will not be subject to dispute resolution because the parties do not have a dispute, either because they are

[7] The loss of market shares is almost inevitable, since most countries require importers to pay a preliminary AD duty as soon as an affirmative preliminary AD determination has been made (Blonigen and Prusa 2016). These preliminary duties remain in force during the dispute settlement process. The preliminary duties are reimbursed if the final determination is negative, but most importers will raise prices already when preliminary duties are imposed.

happy with the market sharing agreement or because there is nothing to dispute – the AD filing has never resulted in a formal AD duty.

However, not all firms are in a position to reach market sharing agreements. For example, the number of firms targeted by AD actions can be so large that it is hard to coordinate a voluntary export restraint agreement, the export restraint expected by the domestic industry may be unreasonably large, demand elasticities can be so high that higher market prices cannot compensate the foreign exporters for lost sales volumes, or the foreign firms may simply regard the AD claims as incorrect and inappropriate. Yet, even many AD cases of this type result in outcomes that are not challenged by the foreign firms who lose market shares or are forced to exit from the market altogether.

One reason for this lack of resistance against AD actions is related to the weak capacity of many WTO members to follow through with a formal WTO complaint. Bown et al. (2003: 363) point out that the WTO dispute settlement process is complex and costly, with multiple stages and alternative outcomes that require attention: "a report by a panel established to consider the case, a decision by the Appellate Body if aspects of the panel report are called into question by a party to the case, withdrawal following a settlement between the disputing parties, or a decision by an Arbiter on the magnitude of permitted retaliation if a respondent fails to implement a panel or Appellate Body decision". Without the capacity to handle these different challenges, small developing countries are not likely to pursue complaints even in cases where they have a reasonable cause.[8]

In addition to capacity, there are several other factors that contribute to the limited use of the WTO's dispute settlement system. The perceived benefits from dispute cases could be low for many small developing countries that have alternative markets for the exports that are blocked by AD measures in a specific destination. If the amount of exports to the specific destination is small, it is likely that potential benefits of initiating a dispute will be small in relation to the costs. The developing country may worry about potential negative spillover effects of a trade dispute on other dimensions of the bilateral relationship, such as development aid, FDI, or military collaboration. The lack of any credible threat to retaliate may lead small developing

[8] Bown and Reynolds (2015: 158) report that "the minimum private sector legal fees for litigating even a relatively simple dispute through to the basic Panel Report stage are likely to range from $250,000 to $750,000, depending on the law firm involved."

countries to doubt whether their larger and more powerful trade partners would comply even if the DSB were to rule in their favor (Bown et al. 2003). At the same time, Bown (2005b) notes that the ability to retaliate may also reduce the incentives for targeted foreign industries to convince their governments to take their case to the WTO: "an adversely affected foreign industry may resort to a reciprocal (and retaliatory) antidumping measure against the protected U.S. industry if it has the capacity to do so" (Bown 2005b: 551).

These concerns are important, and they motivate a closer analysis of how the AD cases that reach the WTO are distributed in comparison with the underlying population of AD notifications: otherwise, there is a risk that results will be biased by the lack of information on those cases that have not been taken to the DSB (Bown et al. 2003, Elsig et al. 2016). The arguments above suggest that the "missing" WTO disputes primarily involve developing target countries (Bown and Hoekman 2005), but it is less clear how these cases are distributed across industries. In the following sections, we will therefore focus on comparing the distribution of these two sets of trade disputes, with particular emphasis on a characterization on the industry distribution of AD disputes.

3. Data

The data on antidumping used in this study are primarily based on notifications and trade disputes registered in two WTO data sets. The first data set covers AD notifications that have been reported to the WTO by member governments, while the second data set summarizes the various steps taken during the dispute settlement process at the WTO. The two data sets have been aggregated to the industry level by two-digit HS codes and merged. This aggregation is motivated both by a wish to provide a reasonable overview of the data, and the conclusions from Vandebussche and Zanardi (2010), that the impact of AD measures is felt outside the narrow product category that is targeted by an AD measure. Hence, each two-digit HS code is associated with a specific number of notifications, requests for consultations, and dispute settlement panels.

In the notifications data set, information regarding source country, HS codes, dates and document numbers are collected from the WTO's notification documents.[9] The data set includes information from 599 notification documents, covering the period from November

[9] See https://docs.wto.org.

20, 1995 to February 3, 2014. Since a notification document can involve measures against more than one industry in more than one country, we consider each unique four-digit HS code specified in a notification as one observation. This leads to a total of 12,064 observations. Out of these 12,064 notifications, 5,503 are targeted toward a specific country, and make up our data set on AD notifications. The data set does not include complete information about final outcomes – i.e. whether the notifications result in actual AD duties, or if the preliminary duties are rejected, withdrawn, or dropped as a result of agreements with foreign exporters – and we have therefore added some data from Blonigen and Prusa (2016) on applied AD measures by country of origin and target country.[10]

The trade dispute data set consists of 109 separately filed requests for consultations to WTO's DSB citing AD legislation. This data set is based on a more extensive data set containing all requests for consultations until July 2011, compiled by Horn et al. (2011), from which we have extracted all cases related to AD issues. We have also added all requests for consultations regarding AD issues filed between August 2011 and June 2014 from the WTO.[11] Each request for consultations may specify several unique four-digit HS codes: in these cases, we consider each HS code as one observation, which gives us a data set with 222 observations in total. Like the notifications data set, this data set is aggregated to the two-digit HS code level for the analysis.

The trade dispute data set also comprises information about the disputes taken to the panel stage. Out of the 222 requests investigated in this paper, 136 moved on to the panel stage.[12]

Aside from the WTO data on AD, we use five additional data sources in the analysis. First, data on sectoral and country group shares of world trade are drawn from the NBER-UN Trade Data Base[13] constructed by Robert Feenstra and Robert Lipsey: all trade data used in the analysis refer to the year 2000. Second, data on income groups based on country-level GNI per capita from the World Bank are used to distinguish between high, middle and low-income countries.[14] Third, data on industry-level R&D-intensity from the OECD are used to

[10] The data on applied AD measures from Blonigen and Prusa (2016) cover the period 1995-2013.
[11] See http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement.
[12] These 136 cases were included in 64 separate decisions to establish a panel.
[13] See http://cid.econ.ucdavis.edu/data/undata/undata.html.
[14] See http://data.worldbank.org/about/country-and-lending-groups.

distinguish between high, medium, and low-technology sectors.[15] Fourth, the industry classification suggested by Rauch (1999) is used to group industries according to product differentiation and pricing practices. Fifth, we use definitions and data from Nunn (2007) to group industries on the basis of the relationship-specificity of investments and trade transactions.[16]

4. Notifications, Requests for Consultations, and Panels

4.1 Notifications

During the period of study (1995-2014), the WTO received notifications regarding antidumping from 41 countries. One reason for the relatively small number of reporters is that the EU is treated as a single country in this context, because of its common external trade policy. However, it also marks the fact that relatively few countries are active users of AD legislation. As noted in earlier studies, the main users of AD measures fall into two groups of countries: "Traditional Users", including the US, the EU, Australia, and Canada (Blonigen and Prusa 2010), and "New Tough Users", with Mexico, India, Brazil and Turkey at the helm (Vandenbussche and Zanardi 2010). This is confirmed in the present data set, where the top-five list of countries is led by the US (with 950 cases registered in the data set), followed by Mexico (812 cases), India (683 cases), Brazil (438 cases), and the EU (445 cases). Appendix Table A1 lists all countries that have submitted AD notifications to the WTO. In particular, the table shows that none of the least developed countries in Africa and Asia appear among the countries notifying AD measures to the WTO.[17] China is the main target of AD actions, far ahead of South Korea, Taiwan, the US, and Japan.

The industry distribution of AD notifications in the present data set is consistent with observations from earlier studies. Seventy of the 96 industries registered at the two-digit level of the HS system appear in the notifications data set. The most frequently quoted industry is HS 29 (Organic Chemicals), which is targeted in 587 notifications, or nearly 11 percent of all cases. The top-five list also features HS 72 (Iron and Steel), HS 73 (Articles of Iron and

[15] See https://www.oecd.org/sti/ind/48350231.pdf.
[16] See http://scholar.harvard.edu/nunn/pages/data-0.
[17] It should be noted that the coverage of the notification data set is not complete. For example, Appendix Table A1 shows that Guatemala and Venezuela are both respondents in AD cases that have reached the WTO, which means that they have evidently introduced some AD measures. However, they do not appear among the countries submitting notifications.

Steel), HS 39 (Plastics), and HS 85 (Electrical Machinery and Equipment), each with between six and nine percent of notifications. Appendix Table A2 provides the full list of industries. Some of the industries with a large share of notifications also have a relatively large share of world trade. In particular, HS 84 (Machinery and Mechanical Appliances) and HS 85 (Electrical Machinery and Equipment), which jointly account for 9.4 percent of notifications, represent nearly 30 percent of world trade. However, most of the other industries with a large number of notifications have lower world trade shares. For example, HS 72 and HS 73 (Iron and Steel; Articles of Iron and Steel) have 16.3 percent of notifications, but only 3.3 percent of world trade: similarly, HS 39 (Plastics), HS 28 (Inorganic Chemicals), and HS 55 (Synthetic Fibers), with 13.9 percent of notifications, have a combined world trade share of only 3.2 percent.

At this level of aggregation, it is not possible to see how political influence, import penetration, or other factors operating at the country-industry level influence the demand for AD protection, but some earlier findings regarding industry specific determinants of AD use appear to be confirmed. For example, the heavy emphasis on process manufacturing (e.g. chemicals, plastics, base metals, and paper and pulp) is consistent with the conclusion from Finger's (1981) study of US AD, that large fixed costs and scale add to the pay-off from AD action (or alternatively, that these characteristics make industries vulnerable to foreign competition, which motivates them to lobby for AD action). However, even taking into account fixed costs and scale effects, it is difficult to explain e.g. why the iron and steel sectors (HS 72 and 73) are so much more prominent in AD notifications than other areas of process manufacturing. One possibility, following Morck et al. (2001) and Blonigen (2006), is that these are industries where firms have learned, for whatever reason, to use AD as a strategic tool; at the same time, it is possible that AD measures have been diffused across countries as a result of trade deflection (Durling and Prusa 2006, Bown and Crowley 2007) and retaliation (Aggarwal 2004; Blonigen and Bown 2003, Prusa and Sleath 2005, Vandenbussche and Zanardi 2008).

4.2 Which Cases Reach the WTO: Request for Consultations

Only a small share of the AD measures notified to the WTO during the period under study resulted in trade conflicts involving the DSB. The great majority of the AD actions announced in the notifications were either withdrawn, overturned by national courts, settled through some type of agreement with the foreign exporters, or accepted more or less reluctantly by the

targeted firms and countries (although we do not have exact information on the outcome for each specific notification). However, in 222 of the 5,503 cases, the country targeted by a foreign AD duty submitted a request for consultations to the WTO's DSB: these are cases where the targeted exporters refuted the claim that they were dumping, and where they also managed to convince their home country government to bring the case to the DSB for consultations with the country implementing the AD measures.

The requests for consultations were filed by the governments of 27 countries, on behalf of their exporting firms. The EU leads the list of complainants, with 53 requests for consultations, followed by China (50 cases), Korea (21 cases), India (14 cases), and Mexico and the US (11 cases each) (see Appendix Table A1). An immediate observation is that there is only a weak correlation between the list of countries requesting consultations and the list of countries facing AD actions. While China's position near the top of the complainant list is understandable, given that it is by far the leading target for AD actions, it can be noted that only a small share of the AD actions directed at China make their way to the WTO. A possible reason is that China's WTO accession negotiations resulted in an agreement that its trade partners were allowed to treat China as a "non-market economy" for 15 years after its entry into the WTO in 2001. One of the main consequences of "non-market economy" status is that China's trade partners reserved the right to use data on costs and prices in third countries to assess whether Chinese firms are engaged in dumping (Polouektov 2002; Bown 2010). This has widened the scope for AD actions targeting China, and also made it more difficult for China to challenge these actions.

Another notable point is that that the leader of the complainant list, the EU, does not even appear on the top-ten list of countries targeted by AD measures. Evidently, EU authorities believe that their firms are not engaging in dumping and that complaints to the DSB may be effective in eliminating unfair trade restrictions in export markets – in addition, the EU arguably has the administrative resources needed to pursue negotiations at the DSB. This stands in contrast to countries like Thailand, Indonesia, Russia, and Japan, which have frequently been targeted by AD actions, but rarely request consultations at the WTO. While Thailand and Indonesia are probably typical examples of developing countries that are cautious to initiate consultations because of limited resources in terms of expertise and administrative capacity, other arguments are likely to explain the low presence of Russia and Japan in the data set. Russia's small number of complaints is primarily due to the fact that it

did not join the WTO until 2012. In the case of Japan, the reasons are likely to be found in relatively successful negotiations before cases reach the WTO: for example, Japanese companies e.g. in the auto sector were prepared in the past to accept voluntary export restraints (VERs) rather than increased tariffs, since they realized that they would achieve higher profits with the VER than if they had to face a corresponding tariff (Rosendorff 1996). The US also records a relatively small number of requests for consultations, but the reasons are not likely to be related to soft negotiations. On the contrary, with its large market and frequent use of its own AD law (making retaliation both likely and costly for its trade partners), the US has substantial bargaining power and may therefore be in a position to convince most of its trade destinations to remove allegedly unfair AD measures without recourse to formal consultations at the WTO.

Twenty-four countries appear as respondents to the requests for consultations. The US is most frequently the respondent, accounting for 120 of the 222 observations. India is the second largest respondent, with 32 observations, followed by the EU (15 observations), Mexico (10 observations), and Argentina (8 observations). The dominance of the US among respondents is probably due to the large size and strategic importance of the US market: many foreign exporters may be unable to find alternative destinations for the products intended for the US market, which means that they are prepared to invest substantially in efforts to remove what they see as unfair US trade barriers (Bown 2005b). It is also possible that the tough implementation of AD measures in the US – with ad valorem duties that often exceed 100 percent (Besedes and Prusa 2017) – sets it apart from the equally large and strategically important EU market, where average AD duties are lower (Blonigen and Prusa 2015, Table 5) and where negotiated outcomes are more common and the propensity to initiate AD processes seems somewhat lower (Adni Jallab et al. 2008).

Turning to the industry distribution of requests for consultations, we see a pattern that is slightly different from that in the notification data set. This is illustrated in Figure 1, which shows the share of notifications and request for consultations across two-digit HS industries, sorted from highest to lowest notification share (see also Appendix Table A2). As noted earlier, the highest notification shares are found in HS 29 (Organic Chemicals), HS 72 (Iron and Steel), HS 73 (Articles of Iron and Steel), HS 39 (Plastics) and HS 85 (Electrical Machinery).

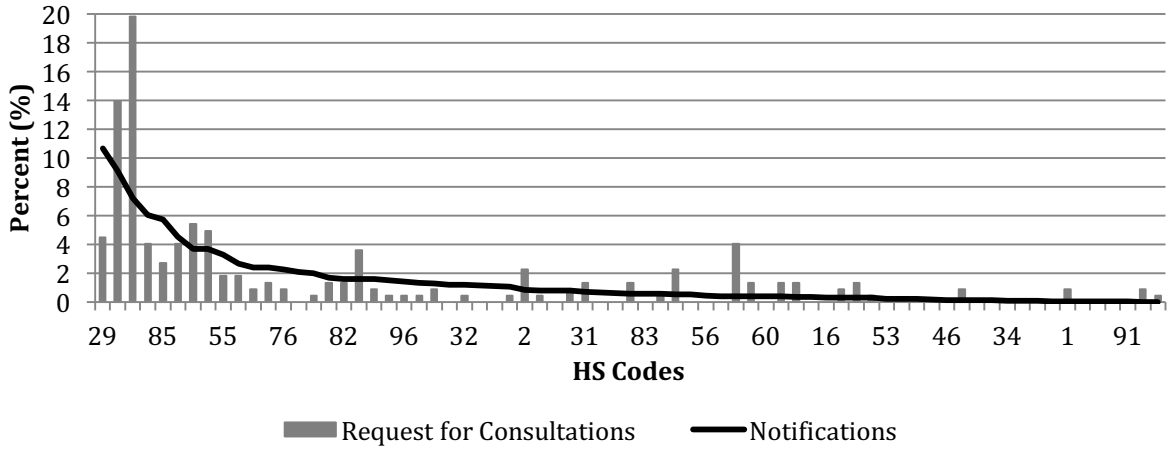

Figure 1 *Notifications and request for consultations, by HS codes*

Notes: The two-digit HS codes on the x-axis are sorted by their notification share, from the highest to the lowest share. The line represents the distribution of notifications (in percent), while the bars indicate the corresponding distribution of request for consultations (in percent). For data on notifications, see (https://docs.wto.org); for data on trade disputes in the WTO, see (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement)

In the requests for consultations data set, the iron and steel industries (HS 72 and HS 73) are even more prominent, whereas plastics and chemicals have lower shares. Moreover, several product groups belonging to the food products industries have relatively high shares. The question is whether these differences are so large that we can conclude that notifications and consultations are drawn from different distributions.

The simple correlation between the two industry distributions is 0.73, which is significant at all conventional confidence levels. To more formally test the similarities in distributions of notifications and consultations, we have also performed a Wilcoxon signed-rank test, a non-parametrical distributional test for matched pairs. The null hypothesis is that both distributions are the same (Wilcoxon 1945). The signed-rank test suggests that notifications and consultations are not drawn from the same distribution, although the test statistic is only significant at the 10 percent level.[18] In other words, although correlated, the distributions of notification and consultation do not exhibit any robust one-to-one match. This can be taken as an indication of a selection process where some industries are more prone than others to take antidumping disputes to the DSB for consultations. However, it is not easy to distinguish any

[18] The p-value from the Wilcoxon signed-rank test is 0.0977.

simple selection rules that distinguish the industries involved in notifications from those in consultations. We will return to this question in section 5, where we simultaneously try to account for both country and industry characteristics.

4.3 From bilateral consultations to third party adjudication: panels

If the trade dispute is not resolved through bilateral consultations under the auspices of the DSB, either country may request third party adjudication. This involves the establishment of an expert panel, which examines the facts of the case and presents a report with recommendations to the General Assembly of the WTO. Out of the 222 antidumping cases that were subject to bilateral consultations, 136 moved on to the panel stage. China is the complainant country that appears most frequently in the cases reaching the panel stage (with 48 observations). In fact, only two of the 50 antidumping complaints submitted by China to the WTO were resolved at the consultation stage. A similar pattern can be seen for the disputes where South Korea is the complainant: 18 of 21 cases have progressed from consultations to panels. Not even the US, which could be expected to be in a strong bargaining position in any kind of negotiations, has been very successful in bilateral consultations when it acts as a complainant: 8 of 11 disputes have been taken to the panel stage. It can also be noted that all consultations where Japan (6 cases) and Russia (3 cases) were the complainants have progressed to the panel stage. A tentative conclusion is that many of the cases reaching the DSB are complicated, and that the scope for bilaterally negotiated solutions has often been exhausted already before the case reaches the WTO.

The complaints initiated by the EU make up a possible exception, since these are relatively often resolved at the bilateral consultation stage: only 12 out of 53 cases progressed from consultations to third party adjudications. A comparison between the US and the EU as targets for AD actions and complainants in WTO consultations and third party adjudication is interesting, and suggests that the US is relatively more successful in its bilateral negotiations for market access before the WTO is involved. This is perhaps not surprising, taking into account the strong bargaining power of the US. However, the bargaining strength of the US does not appear to result in equally favorable outcomes when the US is accused of using unfair AD measures. The US is by far the dominant respondent among the disputes taken from consultations to panels, with 98 of the 136 cases, followed by the EU (with 12 cases), China (7 cases), and Mexico (3 cases). Overall, the pattern is similar to that for consultations, suggesting that complaints are made and brought forward to the panel stage primarily in those

cases where the intended destination is sufficiently large and strategically important to justify the costs of formal negotiations at the WTO.

Figure 2 compares the industry distribution of cases at the consultation and third party panel stages. The dotted line represents the requests for consultations, sorted from the lowest to the highest share by two-digit HS codes, while the bars represent the corresponding share of each two-digit industry in cases reaching the panel stage. There is a close fit between the two distributions, and a simple correlation coefficient of 0.97. Moreover, a signed-rank test suggests that two sets of data are drawn from the same distribution.[19] Hence, the industry distribution of trade conflicts involved in consultations is not significantly different from conflicts taken one step further to the panel phase.

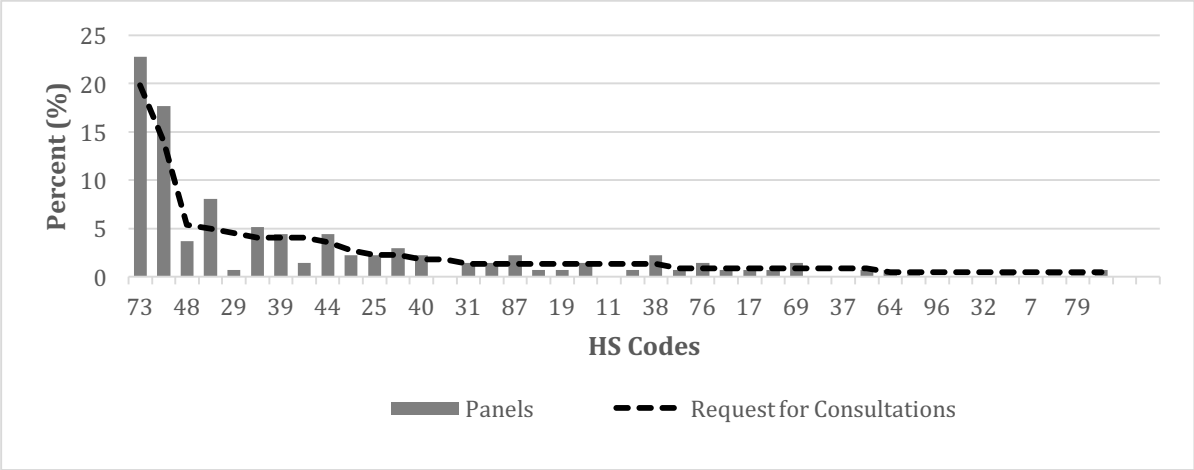

Figure 2 *Requests for consultations and third party panels, by HS codes*

Notes: The two-digit HS codes on the x-axis are sorted by their share in requests for consultations, from the highest to the lowest share. The dotted line represents the distribution of request for consultations across industries (in percent), while the bars indicate the corresponding distribution of panels (in percent). For data, see (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement)

Summarizing this description of how trade disputes related to AD measures progress from unilateral notifications to requests for consultations and third party panels at the WTO, two patterns emerge. First, the cross-country distribution of cases varies notably between the different stages of disputes. In particular, there is a substantial difference between the set of countries filing notifications and appearing as respondents in requests for consultations and

[19] The p-value from the Wilcoxon signed-rank test is 0.9266.

panels. There are apparently strong motives to challenge the questionable AD duties established by large and strategically important economies such as the US, whereas AD measures introduced by smaller countries are more frequently left without opposition. There are also clear differences between the country group targeted by AD actions and the group of complainants in requests for consultations: in relative terms, China files fewer complaints and the EU files more complaints than what the list of AD targets would imply. Second, while the cross-industry distribution of AD cases exhibits some differences between the notification and requests for consultations stages, there are few differences between requests for consultations and panel cases. In fact, given the relatively large differences in the country distribution of AD disputes, it can be argued that the industry distribution is remarkably stable. In other words, most countries seem to focus on roughly the same industries when they introduce AD protection and when they are concerned about unfair AD measures abroad.

5. Extensions

The previous section provided a detailed summary of the AD cases progressing from AD notifications to requests for consultations and third party adjudication at the WTO. However, at that highly disaggregated level of analysis, it may be difficult to distinguish patterns across countries and industries. In this section, we therefore extend our analysis to cover differences across high- and low income country groups and different industry groups characterized by technology levels and product characteristics.

5.1 Income groups and technology levels

The discussion so far has suggested that rich and poor countries are likely to behave differently in AD conflicts. However, the "Rich-Poor" or "North-South" divide can be seen either as a distinction driven by differences in income and wealth (where rich countries have more resources to handle possible trade conflicts) or as a distinction between countries with different industry structures (where some industries may be more likely to be involved in AD disputes). The propensity to get involved in trade disputes may differ across high and low-income countries in general, at the same time as there are differences across industrial sectors with different capabilities, product characteristics, and competitive conditions.

To analyze potential differences in the structure of trade disputes across these dimensions, we begin by dividing countries into four income classes and industries into four categories based

on the complexity of production technologies. For the income groups, we use the World Bank definitions of low-income economies (USD 1,045 or less), lower-middle-income economies (USD 1,046-4,125), upper-middle-income economies (USD 4,126-12,745), and high-income economies (above USD 12,746).[20] The limits specified within the parentheses refer to GNI per capita in US dollars. To distinguish between industry categories, we start by using the OECD's grouping of industries according to technological sophistication, which is based on the R&D intensity of the industry. The level of technology is likely to matter, either because it reflects the strategic importance of industries – with high R&D intensity distinguishing industries with high growth potential and strong knowledge spillovers (see e.g. Dietzenbacher and Los 2002, Los 2004) – or because it is related to the competitive conditions in the world market, with a larger number of potential competitors in less advanced industries. The four OECD categories are labeled High-technology (e.g. aircraft, pharmaceuticals, and telecommunications equipment), Medium high-technology (e.g. motor vehicles, some machinery and equipment industries, and chemicals), Medium low-technology (e.g. basic metals, metal products, rubber and plastics, and petroleum products), and Low-technology (e.g. pulp and paper, paper products, food products, textiles and garments, and footwear).

Table 1 illustrates how AD notifications are distributed across these country groups and technology categories. Several observations are noteworthy. The dominance of the Upper middle-income group, which accounted for 59 percent of AD notifications during the period in question, illustrates the emergence of "New Tough Users" as the main AD users globally. To put their AD activity in perspective, it can be noted that the Upper middle-income group's share of world trade in 2000 was only 19 percent. The small share of Lower middle-income countries and the lack of Low-income countries in Table 1 are also conspicuous. Even though some Low-income countries have introduced AD legislation, they do not use it actively. As we will see momentarily, they do not challenge the AD laws of other countries either, although they are sometimes targeted by AD measures. We have therefore dropped the Low-income group from the following tables.[21] For reference, it should be noted that Low-income countries accounted for less than one percent of world trade in the year 2000, and that their

[20] See http://data.worldbank.org/about/country-and-lending-groups.
[21] Bangladesh is an exception, with one request for consultations in a case involving the export of lead acid batteries to India: to save space, this single case, which was resolved in bilateral consultations, has been dropped from the subsequent tables.

regular import tariffs are higher than those in other country groups[22], which suggests that the motives for AD protection are not strong.

Table 1 *Antidumping notifications by income group and technology category*

Technology category	Income group				
	High income	***Upper middle Income***	***Lower middle income***	***Share of tech category***	***Ref: Share of world trade***
High tech	1	2	3	2	*6*
Medium high technology	25	36	27	33	*49*
Medium low technology	45	33	41	38	*19*
Low technology	29	29	29	29	*26*
Share per income group	**36**	**59**	**5**	**100**	
Ref: Share of world trade	**78**	**19**	**3**		**100**

Note: All values in percent. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). The industry classification is based on the OECD ISIC rev.3 technology-intensity definition (https://www.oecd.org/sti/ind/48350231.pdf). Data on antidumping notifications are from (https://docs.wto.org)

Turning to the industry distribution of AD notifications, it can be seen that very few notifications are found in the High-technology category. About six percent of world trade is made up of goods from high-tech industries, but only two percent of notifications are found in this category. Instead, notifications are relatively equally divided across the other technology categories: here, medium high-technology industries have a higher share in notifications than in world trade, while the opposite is true for medium low and low-technology industries. This pattern contradicts the assumptions of Miagawa et al. (2016) and Niels (2000), who argued that AD is more common in more R&D-intensive industries. The prominence of the medium low and low-technology categories should not be surprising if AD actions to some extent are initiated to protect industries under pressure (and not only to combat foreign dumping). These categories include many industries where international competition is particularly tough: medium and low-technology industries in high-income countries are likely to struggle to stay competitive despite high wage costs, while their competitors in middle-income countries have entered these sectors at a large scale and are aiming to capture a larger share of the international market. At this level of aggregation, it is also notable that the pattern of

[22] See e.g. http://data.worldbank.org/indicator/TM.TAX.MRCH.WM.AR.ZS.

notifications across country groups is rather similar: the three income groups seem to target the same industry categories in their AD notifications.

Table 2 looks at the distribution of requests for consultations and third party panels across country groups and technology categories, distinguishing complainants from respondents. The complainant is the country that believes it has been unfairly injured by changes in another country's AD measures (typically reflected in their notifications), whereas the respondent is the country that has introduced the AD measures.

Table 2 *AD disputes at the WTO, by income group and technology category (OECD)*

Technology category	**Requests for consultations: Respondents**			**Requests for consultations: Complainants**			
	High income	***Upper middle income***	***Lower middle income***	***High income***	***Upper middle income***	***Lower middle income***	***Share per category***
High tech	0	5	3	2	0	4	1
Medium high tech	18	8	52	30	13	16	22
Medium low tech	55	32	24	40	56	36	46
Low tech	27	55	21	28	31	44	31
Share per grp.	**65**	**18**	**17**	**50**	**39**	**11**	
	Panels: Respondents			**Panels: Complainants**			
	High income	***Upper middle income***	***Lower middle income***	***High income***	***Upper middle income***	***Lower middle income***	***Share per category***
High tech	0	5	0	2	0	0	1
Medium high tech	22	5	25	25	15	19	19
Medium low tech	55	37	75	46	61	44	53
Low tech	23	53	0	27	24	37	27
Share per grp.	**83**	**14**	**3**	**40**	**48**	**12**	

Note: All values in percent. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). The industry classification is based on the OECD ISIC rev.3 technology-intensity definition (https://www.oecd.org/sti/ind/48350231.pdf). Data on trade disputes are from (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement).

The country distribution among the respondents in requests for consultations is distinctly different from the distribution of notifications (although both refer to the countries that initiated antidumping actions). Middle-income countries file most notifications, but they are far from dominant among the respondents in cases that reach the WTO. Instead, in two-thirds of the cases reaching the consultation stage, high-income countries (primarily the US, as noted in the previous section) are responsible for the allegedly unfair AD measures. The majority of these cases concern medium low-technology industries. The explanation for the dominance of high-income countries as respondents is the larger size and higher profitability

of their markets. It is costly, both politically and economically, to enter into consultations at the WTO, and most countries will hesitate to do so if the stakes are not high enough – it may be more difficult to win a dispute against one of the high-income countries, but the potential losses caused by an unfair AD decision may be even higher. The reason for the prominence of medium-low technology industries is probably that this is where protectionist pressures in respondent countries are relatively strong, at the same time as the competitiveness of complainants is relatively strong. When upper middle-income countries are challenged at the DSB, the focus is on low-technology industries, probably for the same reasons: these are sectors where their international competitiveness is diminishing, and where AD measures may be protectionism in disguise. However, when AD measures in lower middle-income countries are challenged, the targets are predominately found in the medium-tech industries. It is less likely that these cases are linked to protectionist pressures in industries with diminishing competitiveness. Instead, if these cases are not pure responses to foreign dumping, it is possible that they reflect strategies linked to infant industry protection. The same arguments apply for the few cases where middle-income countries are alleged to apply unfair antidumping barriers in high-tech industries.

The complainants in requests for consultations are more equally distributed between high-income countries and upper middle-income countries (with lower middle-income countries recording fewer complaints). The industry distributions of complaints are also relatively similar for the three country groups. This suggests that the "income effect", i.e. the lower propensity for poorer countries to engage in formal dispute resolution procedures at the WTO, mainly applies for cases where they are respondents. Even the middle-income countries seem to be prepared to push their complaints to the WTO; in most of these cases, they target trade barriers in respondent countries with large and strategically important markets. (At the same time, it is appropriate to note once again that there are no low-income countries in the data set.)

Table 2 also shows the corresponding information for those cases that proceed to the panel stage. Notable here is an even stronger dominance of high-income countries (i.e. the US) among respondents, where they account for 83 percent of cases, and corresponding reductions in the shares of middle income countries. Among the complainants, upper-middle income countries make up the largest group, underlining earlier arguments about their willingness to challenge richer countries when they believe that their companies are unfairly excluded from

strategically important markets. The industry distribution of cases is similar to that for the requests for consultations, with one exception: there are no lower middle-income countries as respondents in cases involving low-tech industries. This is possibly a reflection of their small markets and the relatively strong competitiveness of local firms in these labor intensive industries – a foreign firm facing a trade barrier does not have very much to win from pushing the case from the consultation stage to third party adjudication. The disaggregated data discussed in section 4.3 suggests that the complainant selecting not to pursue their case to the panel stage has often been the EU.

5.2 Income groups, product differentiation, and pricing

The grouping of industries depending on technology levels is not the only possible industry or product categorization that can be expected to influence trade and AD decisions. An alternative grouping is suggested by Rauch (1999), who distinguishes between homogenous goods that can be sold anonymously in standardized markets, homogenous goods that have reference prices published in trade journals, and differentiated goods, the prices of which are influenced by a multitude of factors including production cost, competition, and preferences at each individual location. Rauch (1999) argues that this categorization is important, because it determines how much effort buyers and sellers need to invest in order to find a suitable match, but the same product characteristics are also potentially important for AD cases. The scope for dumping (as well as the scope for initiating AD actions) is arguably larger in industries with differentiated products. In industries producing homogenous goods that are traded in organized markets or where a reference price is published, exporters should be aware of the risks involved in selling below established price levels. In addition, it could be expected that AD authorities in the importing countries would not easily be able to argue that foreign firms are dumping if their prices are in line with world market prices or reference prices.

Table 3 shows how notifications are distributed across the World Bank income groups and the three product categories defined by Rauch (1999). Over 60 percent of the notifications are found in industries with differentiated goods, while industries with reference prices record only half as many notifications, and industries with organized exchanges account for only six percent of total, in line with expectations. Comparing the share of notifications and the share of world trade per product/industry group gives the same picture: differentiated goods have a higher share and both categories of homogenous goods have lower shares of notifications than

world trade. High-income and Upper middle-income countries exhibit the same pattern, but Lower middle-income countries have relatively many notifications in industries with reference prices. A possible reason is that these are industries where technological requirements are lower, and where Lower middle-income countries have substantial investments and many companies that are trying to seek protection from foreign competition.

Table 3 *Antidumping notifications by income group and product category (Rauch 1999)*

Product category	**Income group**				
	High income	***Upper middle income***	***Lower middle income***	***Share per category***	***Ref: Share of world trade***
Differentiated products	65	61	47	62	*48*
Products with reference prices	30	32	44	32	*40*
Products traded in organized exchanges	5	7	9	6	*12*
Share per income group	**36**	**59**	**5**	**100**	
Ref: Share of world trade	**78**	**19**	**3**		**100**

Note: All values in percent. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). The industry classification is based on Rauch (1999). Data on notifications are from (https://docs.wto.org).

Table 4 includes information about how the request for consultations and panels are distributed across the three Rauch (1999) groups. On the respondent side, it is not surprising that High-income countries dominate the differentiated goods group, but it is not entirely clear why Upper middle-income countries have the largest number of cases in industries with organized exchanges, and why Lower middle-income countries stand out in industries using reference prices: this pattern applies both for requests for consultations and panels. On the complainant side, the most notable observations are that Upper middle-income countries have relatively few complaints in industries with organized exchanges, while Lower middle-income countries have relatively many complaints in precisely these industries. Although the overall pattern across industries is as expected, it is still somewhat surprising that a relatively large share of the AD actions and AD disputes, particularly those involving middle-income countries, are found in industries where "fair prices" should be easy to establish. It is also surprising that share of "products traded in organized exchanges" is larger among the disputes reaching the WTO than among the notifications.

Table 4 *AD disputes at the WTO, by income group and product category (Rauch 1999)*

Product category	**Requests for consultations: Respondents**			**Requests for consultations: Complainants**			
	High income	***Upper middle income***	***Lower middle income***	***High income***	***Upper middle income***	***Lower middle income***	***Share per category***
Differentiated products	75	50	33	61	69	52	63
Products with ref. prices	17	15	61	23	27	20	24
Prods traded in organized exchanges	8	35	6	16	4	28	13
Share per income group	**65**	**18**	**17**	**50**	**39**	**11**	
	Panels: Respondents			**Panels: Complainants**			
	High income	***Upper middle income***	***Lower middle income***	***High income***	***Upper middle income***	***Lower middle income***	***Share per category***
Differentiated products	77	53	50	77	73	56	73
Products with ref. prices	16	5	50	3	25	19	15
Prods traded in organized exchanges	7	42	0	20	2	25	12
Share per income group	**83**	**14**	**3**	**40**	**48**	**12**	

Note: All values in percent. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). The industry classification is based on Rauch (1999). Data on trade disputes are from (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement).

5.3 Income groups and the relationship-specificity of goods

The industry grouping from Rauch (1999) has also been used by Nunn (2007) further developed to a more sophisticated categorization that distinguishes between industries on the basis of the relationship-specificity of transactions and investments. If all intermediate inputs needed in a production process are homogenous, i.e. if there are reference prices published in trade journals or if the intermediate goods are sold at organized exchanges, then the product will not require much relationship-specific investment: the intermediates can in principle be sources "off-the-shelf". However, if the final product is customized and requires differentiated intermediate inputs, there is arguably a larger need for relationship-specific investments. These relationships may involve both the firm's suppliers (to design the characteristics of intermediates) and customers (to determine what type of customization is needed). Nunn (2007) used these product distinctions to examine whether institutional quality and ability to enforce contracts have any impact on the comparative advantages of countries

and industries. It is also possible that the relationship-specificity of an industry's products will have some impact on the likelihood of AD disputes.

More specifically, it is reasonable to expect that industries that record more relationship-specific investment – and that engage in a larger degree of customization of their products – should face a lower risk of AD actions. One reason is the sunk cost invested by the foreign producer/exporter in adapting products to fit the preferences and requirements of the importer: in these industries, it would often be difficult to find an equally profitable alternative outlet for the differentiated products. Another reason could be that the buyer/importer – who has also invested time and resources into the relationship – may be seen as a representative of a domestic interest group that is opposed to import barriers. The suggestion by Vandenbussche and Zanardi (2008), that industries with large amounts of inward FDI are less likely to introduce AD measures because foreign multinational firms are highly dependent on imports, supports this assumption. The same should apply for industries with large amounts of outward FDI (in particular, vertical FDI), as well as for industries that are deeply embedded in global value chains: the costs of protection for domestic interest groups are presumably larger in these sectors.

Table 5 shows how notifications are distributed across the three World Bank income groups and four industry categories based on Nunn's (2007) relationship-specificity measures. The four categories are defined simply by arranging all HS2 industry groups according to the average value of their relationship-specificity index, and defining the one-fourth of HS2 industries with the lowest index values as the "Low RS" group", the following one-fourth of HS2 industries as the "Medium low RS" group, and so forth.[23] The overall pattern of AD notifications follows the theoretical assumptions relatively well, with fewer notifications in the High RS group than in the other three groups. The share of notifications in the High RS group is also low compared to its share of world trade.

[23] The Low RS category includes mainly homogenous products, e.g. base metals such as iron and steel, lead, tin, and zink, cereals and milling products, organic chemicals, fertilizers, and cotton. The Medium Low RS includes some food industries (cocoa, sugar, vegetables, meat), fabrics and textiles, paper pulp, plastics, explosives, and some other chemicals. Some of the products in the Medium High RS category are paper, rubber and rubber products, fruits and nuts, dairy products, fish, flowers, toys, tools and other articles of base metals. The High RS group is made up of electrical and mechanical machinery industries, road vehicles, ships, aircraft, garments and footwear, optical instruments, furniture, and clocks and watches. Most of the sectors where global value chains have emerged fall into the High RS group. See http://scholar.harvard.edu/nunn/pages/data-0.

Table 5 *Antidumping notifications by income group and relationship-specificity (Nunn 2007)*

Relationship-specificity	Income group				
	High income	***Upper middle income***	***Lower middle income***	***Share per RS category***	***Ref: Share of world trade***
High RS	17	25	11	21	*47*
Medium High RS	31	25	14	27	*18*
Medium Low RS	20	13	24	16	*12*
Low RS	32	37	51	36	*23*
Share per income group	**36**	**59**	**5**	**100**	
Ref: Share of world trade	**78**	**19**	**3**		**100**

Note: All values in percent. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). The RS measure is calculated from Nunn (2007): all HS2 industries have been divided into four groups, with the one-fourth recording the lowest RS-values defined as the "Low RS" group, and so forth. See (http://scholar.harvard.edu/nunn/pages/data-0). Data on notifications are from (https://docs.wto.org).

The distribution of requests for consultations and panels across the income groups and RS groups is shown in Table 6. In comparison with notifications, there are relatively fewer cases in the High RS group but more cases in the Medium-high RS group (for requests for consultations as well as for panels). This suggest that the existence of global value chains in the High RS industries may reduce both the likelihood that AD measures are introduced and the probability that notifications escalate into disputes reaching the WTO. Most of the disputes are found in the Medium-high and Low RS groups. In the Medium-high RS groups, complaints are directed mainly towards High-income and Upper middle-income countries, whereas the respondents in Low RS industries are primarily Lower middle-income countries. The main change in the distribution going from requests for consultations to panels is a fall in the share of disputes involving Lower middle-income countries, which also pulls down the share of the Low RS industry category. This reflects the results for the groupings based on the technology level of the industry, where few of the disputes involving Lower middle-income countries in Low-technology industries progress from consultations to panels.

Table 6 *AD disputes at the WTO, by income group and relationship-specificity (Nunn 2007)*

Relationship-specificity	**Requests for consultations: Respondents**			**Requests for consultations: Complainants**			
	High income	***Upper middle income***	***Lower middle income***	***High income***	***Upper middle income***	***Lower middle income***	***Share per category***
High RS	14	10	8	15	11	4	12
Medium High RS	47	40	21	34	51	44	41
Medium Low RS	10	25	11	6	22	12	13
Low RS	29	25	60	45	16	40	34
Share per income group	**65**	**18**	**17**	**50**	**39**	**11**	
	Panels: Respondents			**Panels: Complainants**			
	High income	***Upper middle income***	***Lower middle income***	***High income***	***Upper middle income***	***Lower middle income***	***Share per category***
High RS	17	10	0	24	12	0	16
Medium High RS	45	32	0	32	51	40	42
Medium Low RS	11	32	67	9	21	13	15
Low RS	27	26	33	35	16	47	27
Share per income group	**83**	**14**	**3**	**40**	**48**	**12**	

Note: All values in percent. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). The RS measure is calculated from Nunn (2007): all HS2 industries have been divided into four groups, with the one-fourth recording the lowest RS-values defined as the "Low RS" group, and so forth. See (http://scholar.harvard.edu/nunn/pages/data-0**).** Data on trade disputes are from (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement).

5.3 Bilateral pairs

The previous tables have not only shown which countries appear in AD disputes and how these disputes are distributed across industries. Indirectly, the tables have also included some information about the disputing country pairs – in a large share of cases, especially at the panel stage, the respondent is a High-income country while the complainant is either a High-income or Upper middle-income country. Table 7 looks more explicitly at the bilateral pairs involved in the AD disputes that have reached the WTO: unlike the previous tables, the figures here refer to the number of disputes rather than percentages.

Table 7 *AD disputes at the WTO, dispute pairs by income group*

	Requests for Consultations				**Panels**			
Respondent	**Complainant**				**Complainant**			
	High income	***Upper middle income***	***Lower middle income***	***Number of respondents***	***High income***	***Upper middle income***	***Lower middle income***	***Number of respondents***
High income	56	72	16	144	41	62	13	116
Upper middle income	22	11	7	40	15	2	2	19
Lower middle income	32	3	2	37	0	3	1	4
Number of complainants	*110*	*86*	*25*	*221*	*56*	*67*	*16*	*139*

Note: The figures refer to the number of disputes. One request for consultations from the low-income country Bangladesh is not included in the table. The income groups are based on definitions from the World Bank (http://data.worldbank.org/about/country-and-lending-groups). Data on trade disputes are from (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement).

The dominance of High-income countries as respondents in AD disputes is clear also from this table. The richest countries are respondents in 144 out of 221 requests for consultations. In most of these cases, the complainants are Upper middle-income countries (although disputes between High-income countries are also common). Upper and Lower middle-income countries are respondents in around 40 cases each. While the complaints faced by Upper middle-income countries come from all income groups, the Lower middle-income countries are challenged mainly by High-income countries.

Moving from consultations to panels, there are some notable changes in dispute pairs. Not a single one of the 32 cases involving a High-income complainant and a Lower middle-income respondent continues to the panel stage, which is encouraging, since it suggests that the bilateral consultations have been effective in resolving the disputes. The case for middle-income complainants and High-income respondents is almost the opposite: 75 out of 88 disputes proceed from bilateral consultations to panels. This is obviously more worrying, and reflects the fact that many of the disputes reaching the WTO are politically complex, presumably because they reflect protectionist interests in the respondent countries.

6. Conclusions

The purpose of this article has been to examine the distribution of AD disputes across countries and industries, and to determine which AD cases reach the dispute settlement

system of the WTO. These research questions are largely motivated by extant literature, where questions about "missing" cases (Bown and Hoekman 2005, Bowen 2005b) or "non-cases" (Elsig et al. 2012) have revealed a clear knowledge gap.

An overall finding is that neither the country nor the industry distribution of AD cases remains constant across the different levels of AD disputes, ranging from notifications to requests for consultations and third party adjudication at the WTO. The countries with the largest numbers of AD notifications and applied AD duties are high on the list of countries appearing as respondents in WTO disputes, but their order changes as cases proceed further and further along the dispute chain. The US records the highest number of notifications, the second highest number of applied AD actions, and it is by far the leading respondent in the cases reaching the WTO. Access to the US market is important for its trade partners, and many of them, including middle-income countries, seem prepared to bring their cases to the WTO when they feel unfairly treated. Hence, a large share of the disputes that go to third party adjudication at the WTO involve the US (and to a lesser extent, the EU) as respondents, and middle-income countries as complainants. Other large AD users, like India, Mexico, Brazil, and Argentina, also appear in WTO-level disputes, but less frequently. We have not been able to ascertain to what extent this is because their AD actions are less frequently seen as unfair, because they negotiate in such a way that disputes are more often resolved before they reach the WTO, because the cost-benefit assessments of the opposing parties conclude that bringing disputes to the WTO is not worthwhile, or a combination of all these reasons.

There are also clear differences between the country group targeted by AD actions and the group of complainants in the cases reaching the WTO: in relative terms, China files fewer complaints and the EU files more complaints than what the list of AD targets would imply. The likelihood that cases progress from bilateral consultations to panels also varies across countries: when acting as a complainant, the EU often seems to reach an agreement as a result of bilateral consultations, whereas countries like China, South Korea, and the US are more likely to press their cases to the panel stage.

AD notifications and conflicts are concentrated to relatively few industry groups, with iron and steel, articles of iron and steel, organic chemicals, plastics, and electrical machinery as the most prominent examples. There are some differences between the notification and requests for consultations stages – for example, conflicts regarding iron and steel and various food

products seem to be particularly hard to solve – but there are few differences between requests for consultations and panel cases. Overall, the industry distribution of AD disputes is relatively stable across the different conflict stages, although the list of countries involved in the conflicts is changing.

However, the overall patterns are to a large extent colored by the behavior of the largest AD actors. To be able to distinguish patterns across countries and industries, we have also examined the distribution of AD cases across high and low-income country groups and across different industry groups characterized by technology levels and product characteristics. Distinguishing between income groups clearly highlights the fact that countries in the upper middle-income range have been the main AD users in recent years. Yet, high-income countries remain the main actors in cases that reach the WTO, starring both as respondents and as complainants (although there are some country-industry-dispute level combinations where medium-income countries account for a larger share of cases).

Summarizing the results from the analysis of the different industry groups (defined according to technology level, degree of product differentiation, and relationship-specificity of the industry) and the country pairs involved in disputes, it is possible to sketch rough caricatures of some of the representative cases. The typical AD notification is submitted by an upper middle-income country, and it focuses on a medium low-technology industry with differentiated products, but low relationship-specificity (e.g. in basic metals or some chemical industries). Some of the notifications are eventually challenged by countries facing AD actions, who turn to the WTO and file a request for bilateral consultations. Half of the complainants are from high-income countries, but their cases are spread across several different types of industries and respondent countries. The most typical complainant is instead an upper middle-income country challenging a high-income country: the industry where the high-income country's AD measures are allegedly unfair produces differentiated goods that are not very relationship-specific using medium-low technologies. These are also by and large the cases that tend to proceed from bilateral consultations to third party adjudication at the WTO.

The analysis also reveals where AD disputes are not common. High-technology industries and industries characterized by high relationship-specificity rarely appear in disputes. In the former case, the likely reason is that firms in middle-income countries have not yet developed the capacity to challenge the market leaders in high-income countries. In the latter case, the

explanation is probably the presence of global value chains in precisely these industries, which makes protectionism costly for the participating domestic actors. Low-income countries have not appeared in formal disputes, with one exception (involving Bangladesh as the complainant and India as the respondent). When lower middle-income countries are challenged for their use of AD law, disputes are often resolved through bilateral consultations.

While the analysis has managed to highlight some of the features of AD disputes, there are others that have not been addressed, and that remain as important issues for further research. Data on production and trade volumes over time would make it possible to identify when AD disputes arise. Is it when new competitors enter the market, disturbing existing competitive relationships, or do AD measures also target foreign firms that have been present in the market for long periods of time? Information about the characteristics of the targeted foreign firms – size, market orientation, international experience, participation in networks – would allow further insights. The institutional characteristics and policy priorities of the countries introducing AD measures might also contribute to the analysis: for example, are AD measures more likely in countries with civil or common law, how does trade openness in general influence contingent protection measures, and does state-ownership of industries influence the likelihood that AD actions are chosen?

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Appendix

Table A1 *Summary of antidumping notifications, measures, requests for consultations and panels: 1995-2014*

Country	Notifications	Applied AD actions (top-ten only) *	Targeted by AD actions (top-10 only)*	RfC Complainant	RfC Respondent	Panel Complainant	Panel Respondent
United States	950	323	150	11	120	8	98
Mexico	812	..	..	11	10	6	7
India	683	519	103	14	32	8	0
EU	445	297	..	53	15	12	12
Brazil	438	165	86	6	4	3	2
Argentina	360	219	..	10	8	6	3
China	230	164	719	50	7	48	6
South Africa	179	131	..	0	5	0	0
Turkey	172	154	..	2	1	1	0
Canada	157	113	..	7	2	4	1
Australia	144	108	..	0	1	0	0
Peru	123	..	..	1	1	0	0
Pakistan	112	..	..	1	1	0	0
Colombia	97	..	..	0	0	0	0
Israel	96	..	..	0	0	0	0
Thailand	84	..	121	3	1	2	1
Korea	59	..	201	21	1	18	1
Indonesia	46	..	110	5	0	3	0
Ukraine	44	..	..	0	0	0	0
Taiwan	41	..	162	6	0	1	0
Costa Rica	35	..	..	2	0	0	0
Egypt	31	..	..	0	2	0	1
Malaysia	28	..	..	0	0	0	0
Russia	19	..	105	3	1	3	1
Morocco	16	..	..	0	0	0	0
New Zealand	15	..	..	0	0	0	0
Chile	14	..	..	0	1	0	0
Panama	13	..	..	0	0	0	0
Uruguay	9	..	..	0	0	0	0

Dom. Rep.	8	..	..	0	0	0	0
Japan	7	..	126	6	1	6	1
Honduras	6	..	..	0	0	0	0
Paraguay	6	..	..	0	0	0	0
Jamaica	5	..	..	0	0	0	0
Philippines	5	..	..	1	1	1	0
Croatia	3	..	..	0	0	0	0
Ecuador	3	..	..	1	2	1	0
Jordan	3	..	..	0	0	0	0
Armenia	2	..	..	0	0	0	0
Moldova	2	..	..	0	0	0	0
Trinidad & Tobago	1	..	..	0	2	0	0
Bangladesh	0	..	..	1	0	0	0
Guatemala	0	..	..	1	2	1	2
Norway	0	..	..	1	0	1	0
Poland	0	..	..	1	0	1	0
Sri Lanka	0	..	..	1	0	0	0
Switzerland	0	..	..	1	0	0	0
Vietnam	0	..	..	2	0	2	0
Venezuela	0	..	..	0	1	0	0

Note: Number of cases per country. Data on notifications are from (https://docs.wto.org) . The data on applied AD actions are from Blonigen and Prusa (2015) and cover the period 1995-2013. Data on trade disputes at the WTO are from (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement).

Table A2 *Summary: industries involved in antidumping notifications and WTO disputes: 1995-2014*

HS2	Notifications (#)	Notifications (%)	RfC (#)	RfC (%)	Panels (#)	Panels (%)	World Trade (%)
Section 1: Live animals; Animal products							
01 Live animals	2	0.04	2	0.90	1	0.74	0.09
02 Meat and edible meat offal	47	0.85	5	2.25	4	2.94	0.33
03 Fish, crustaceans, molluscs, etc	22	0.40	9	4.06	7	5.15	2.72
04 Dairy, eggs, honey, etc	11	0.20	0	0	0	0	0.21
05 Animal products nes	3	0.06	0	0	0	0	0.05
Section 2: Vegetable products							
06 Live trees, plants, cut flowers, etc	0	0	0	0	0	0	0.23
07 Edible vegetables, roots etc	45	0.82	1	0.45	0	0	1.07
08 Edible fruit and nuts	22	0.40	3	1.35	1	0.74	1.34
09 Coffee, tea, spices, etc	0	0	0	0	0	0	0.21
10 Cereals	1	0.02	2	0.90	1	0.74	0.32
11 Milling industry products	21	0.38	3	1.35	0	0	0.09
12 Oil seeds, medicinal plants, etc	0	0	0	0	0	0	0.20
13 Lac, gums, resins etc	0	0	0	0	0	0	0.04
14 Vegetables nes	0	0	0	0	0	0	0.01
Section 3: Animal and vegetable oils and fats							
15 Animal and vegetable oils and fats	20	0.36	3	1.35	1	0.74	0.84
Section 4: Prepared food stuffs, beverages, tobacco							
16 Preparations of meat, fish etc	18	0.33	0	0	0	0	0.68
17 Sugars / sugar confectionery	18	0.33	2	0.90	1	0.74	0.12
18 Cocoa and products thereof	0	0	0	0	0	0	0.09
19 Preparations of cereals, flour, etc	16	0.29	3	1.35	1	0.74	0.16
20 Preparations of vegetables, fruits, nuts	59	1.07	1	0.45	1	0.74	0.04
21 Miscellaneous edible preparations	12	0.22	0	0	0	0	0.16
22 Beverages, spirits, vinegars	10	0.18	0	0	0	0	0.44
23 Food residues/animal fodder	23	0.42	0	0	0	0	0.43
24 Tobacco etc	0	0	0	0	0	0	0.17
Section 5: Mineral products							

25 Salt, sulphur, stone, lime, cement	30	0.55	5	2.25	3	2.21	0.35
26 Ores, slag, ash	2	0.04	0	0	0	0	0.37
27 Mineral fuels and oils	20	0.36	0	0	0	0	5.48
Section 6: Chemicals							
28 Inorganic chemicals	249	4.53	9	4.06	2	1.47	0.81
29 Organic chemicals	587	10.67	10	4.51	1	0.74	6.78
30 Pharmaceuticals	7	0.13	2	0.90	0	0	1.21
31 Fertilisers	39	0.71	3	1.35	2	1.47	0.17
32 Tannins, pigments, paints etc	66	1.20	1	0.45	0	0	0.91
33 Perfumery, cosmetics	0	0	0	0	0	0	0.25
34 Soap, waxes etc	5	0.09	0	0	0	0	0.62
35 Starches, glues etc	0	0	0	0	0	0	0.11
36 Explosives, fireworks	16	0.29	1	0.45	0	0	0.03
37 Photographic goods	44	0.80	2	0.90	0	0	0.28
38 Miscellaneous chemicals	131	2.38	3	1.35	3	2.21	1.14
Section 7: Plastics and rubbers							
39 Plastics and articles thereof	333	6.05	9	4.06	6	4.41	1.92
40 Rubber and articles thereof	147	2.67	4	1.80	3	2.21	0.53
Section 8: Raw hides and skins, leather, furskins and articles thereof							
41 Raw hides, skins, leather	5	0.09	0	0	0	0	0.24
42 Articles of leather etc	0	0	0	0	0	0	0.27
43 Furskins, artificial fur	0	0	0	0	0	0	0.02
Section 9: Wood and articles of wood, cork, straw etc							
44 Wood, charcoal etc	88	1.60	8	3.60	6	4.41	0.61
45 Cork and articles of cork	0	0	0	0	0	0	0.01
46 Straw, basketware, wickerwork	8	0.15	0	0	0	0	0.15
Section 10: Pulp, paper, paperboard and articles thereof							
47 Pulp, recovered paper / paperboard	2	0.04	0	0	0	0	0.31
48 Paper and paperboard	204	3.71	12	5.41	5	3.68	2.14
49 Printed materials	0	0	0	0	0	0	0.34
Section 11: Textiles and textile articles							
50 Silk	7	0.13	0	0	0	0	0.06
51 Wool, animal hair	0	0	0	0	0	0	0.22
52 Cotton	87	1.58	2	0.90	1	0.74	0.69

53 Other vegetable fibres, yarns	13	0.24	0	0	0	0	0.01
54 Man-made filaments	82	1.49	1	0.45	1	0.74	0.79
55 Man-made staple fibres	182	3.31	4	1.80	0	0	0.43
56 Wadding, felt, nonwovens, etc	25	0.45	0	0	0	0	0.13
57 Carpets	5	0.09	0	0	0	0	0.10
58 Special woven fabrics, tapestries, etc	31	0.56	3	1.35	2	1.47	0.26
59 Impregnated / coated textile fabrics	34	0.62	0	0	0	0	0.45
60 Knitted fabrics	22	0.40	0	0	0	0	0.31
61 Apparel and clothing, knitted	67	1.22	0	0	0	0	1.63
62 Apparel and clothing, not knitted	62	1.13	0	0	0	0	1.29
63 Other textile articles	70	1.27	2	0.90	1	0.74	0.18
Section 12: Footwear, headgear, umbrellas, etc							
64 Footwear	111	2.02	1	0.45	1	0.74	0.38
65 Headgear	0	0	0	0	0	0	0.04
66 Umbrellas, walking sticks, etc	0	0	0	0	0	0	0.02
67 Art of feathers, down, human hair, etc	0	0	0	0	0	0	1.96
Section 13: Articles of stone, plaster, cement, ceramics, glass, etc							
68 Articles of stone, plaster, cement, etc	63	1.15	0	0	0	0	0.32
69 Ceramic products	132	2.40	2	0.90	2	1.47	0.42
70 Glass and glassware	116	2.11	0	0	0	0	0.50
Section 14: Pearls, precious stones/metals, jewellery							
71 Pearls, jewellery etc	0	0	0	0	0	0	3.22
Section 15: Base metals and articles thereof							
72 Iron and steel	502	9.12	31	13.96	24	17.65	1.78
73 Articles of iron and steel	397	7.21	44	19.81	31	22.79	1.56
74 Copper and articles thereof	45	0.82	0	0	0	0	1.20
75 Nickel and articles thereof	0	0	0	0	0	0	0.16
76 Aluminium and articles thereof	126	2.29	2	0.90	2	1.47	1.06
77 Reserved for special uses	*0*	*0*	*0*	*0*	*0*	*0*	*0*
78 Lead and articles thereof	0	0	0	0	0	0	0.06
79 Zinc and articles thereof	1	0.02	1	0.45	1	0.74	0.12
80 Tin and articles thereof	0	0	0	0	0	0	0.05
81 Other base metals and articles thereof	30	0.55	0	0	0	0	0.30
82 Tools, cutlery of base metal, etc	89	1.62	3	1.35	2	1.47	0.26

83 Miscellaneous articles of base metal	31	0.56	0	0	0	0	0.97
Section 16: Machinery and mechanical appliances, etc							
84 Machinery, mechanical appliances	202	3.67	11	4.96	11	8.09	14.06
85 Electrical machinery and equipment	315	5.72	6	2.70	3	2.21	15.90
Section 17: Vehicles, transport equipment							
86 Railway vehicles, equipment, etc	2	0.04	0	0	0	0	0.07
87 Other vehicles / road vehicles	93	1.69	3	1.35	3	2.21	4.70
88 Aircraft, spacecraft, etc	7	0.13	0	0	0	0	0.85
89 Ships, boats, etc	0	0	0	0	0	0	0.49
Section 18: Instruments and apparatus							
90 Optical, photographic, medical instruments, etc	73	1.33	1	0.45	1	0.74	3.63
91 Clocks and watches	2	0.04	0	0	0	0	0.15
92 Musical instruments	0	0	0	0	0	0	0.37
Section 19: Arms and ammunition							
93 Arms and ammunition	0	0	0	0	0	0	0.02
Section 20: Miscellanous manufactured articles							
94 Furniture, bedding, lighting, etc	31	0.56	1	0.45	1	0.74	1.03
95 Toys, sports requisites, etc	37	0.67	0	0	0	0	0.80
96 Miscellaneous manufactures	79	1.44	1	0.45	0	0	0.92
Section 21: Art, collectors' pieces, antiques							
97 Works of art, antiques, etc	0	0	0	0	0	0	0.09
98 Reserved for special uses	*0*	*0*	*0*	*0*	*0*	*0*	*0.00*
99 Reserved for special uses	*0*	*0*	*0*	*0*	*0*	*0*	*0.92*

Note: Data on notifications are from (https://docs.wto.org). Data on trade disputes at the WTO are from (http://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.htm?id=A6#selected_agreement). World trade shares are calculated from the NBER-UN Trade Data Base, see (http://cid.econ.ucdavis.edu/data/undata/undata.html).