Use and Abuse of Antidumping by Global Cartels

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Abstract

We analyse empirically the strategic use of antidumping protection in imperfectly competitive markets. Exploring a novel dataset that matches cartel products to harmonized classification and antidumping data, we find evidence that cartel industries use antidumping to maintain high prices globally and to induce the establishment of a cartel. We find that the imposition of antidumping measures by cartel-prone industries is associated with economically and statistically significantly higher world import prices, in particular when cases are initiated before and during the cartel period. A similar effect is present for import quantities, as cartels use antidumping to both depress trade and increase prices. In addition, industry-withdrawn antidumping investigations that are initiated during the cartel period are associated with a global price increase.

1 Introduction

It is a well known fact that private firms aim to establish and maintain cartels in order to gain the profits of successful collusion. But while antitrust authorities usually act domestically to detect and breakdown cartels, the reach of some cartels is known to be of international and sometimes even global nature. Moreover it remains unclear how cartels organise collusion. Historically, it is known that global cartels divided markets into geographic sections, such as "Europe", "North America" and "The Rest of the World" (Levenstein et al., 2015). Anecdotal evidence suggests that international trade policies, such as antidumping laws, may serve cartel members as an instrument to achieve and maintain market assignment. For instance, Evenett et al. (2001) refer to the Citric Acid cartel case where US cartel-firms successfully blocked the market entry of Chinese competitors during the cartel period. Likely unaware of the existence of the cartel at the same time, the USITC imposed antidumping duties against the Chinese firms after the US cartel-firms had filed petitions for antidumping investigations.

The case of the Citric Acid cartel is unlikely to be an exception. Dating back to the canonical contributions by Staiger and Wolak (1989) and Prusa (1992), cartel firms may very well have an incentive to use antidumping laws strategically in order to cartelise industries at a global level. But while several authors (Zanardi, 2004a; Rutkowski, 2007) have assessed whether withdrawn antidumping cases signal tacit collusion, there is - to the best of our knowledge - no empirical study of twin antidumping and antitrust cases ever since the earlier work of Messerlin (1990). In this paper we therefore conduct systematic empirical analyses of twin antidumping and antitrust cases. Matching the major databases for cartels and antidumping cases, we document 84 6-digit HS product codes that are both subject to at least one antidumping investigation and at least one global cartel case. We use this new dataset of twin cartel and antidumping cases to estimate the price effects of antidumping investigations before, during and after cartel periods.

A preview of our results is as follows: First, Global cartels increase prices worldwide by 9 to 12% during the cartel period. Second, Antidumping cases initiated and in force before the cartel period raise global prices additionally by 7 to 32%, and antidumping cases initiated and in force during the cartel period raise global prices by 6 to 18%. Third, industry-withdrawn antidumping cases during the cartel period are associated with a global price increase of 14 to 36%. Our results overall suggest that antidumping laws serve as a collusive device for global cartels.

This paper continues with Section 2, where we discuss the existing relevant literature. In Section 3 we identify mechanisms and motivations for the use of antidumping laws in cartelised industries. In Section 4 we provide descriptive statistics and in Section 5 we present our estimation strategy. Section 6 discusses the results in the light of the identified mechanisms and Section 7 concludes.

2 Background on Antidumping and Competition

Our research question is embedded in a substantial body of literature on the use of antidumping policy and the determinants of cartel success. The increasing number of countries using antidumping legislation since 1990 has motivated extensive research on the implications of antidumping laws (Bown, 2008). But while this research has produced the hypothesis that antidumping investigations may be linked to cartel behaviour, most of at least 125 years of research on the determinants of cartel success (Connor, 2014a, p. 252) has paid little attention to the role of antidumping investigations.

This observations is surprising since the link between antitrust and antidumping legislation dates back to the early 20th century, when a number of Western developed countries began to regulate large cartels and monopolies (Blonigen and Prusa, 2016, p. 111). Beginning with the Clayton Act of 1914, the United States prohibited a number of anticompetitive policies. One

of these policies was to price low with the intent of driving competitors out of the market - a strategy nowadays known as predatory pricing. Only two years later, the same principle was applied towards imports in the first Antidumping Act of the United States. According to Viner (1966, p. 242), this step came as a response to the highly cartelised German industries that were selling excess capacity at low prices in the U.S. market. However, while the threat of cartels played a key motivation in the development of antidumping laws, their impact on cartel formation and stabilization has been unnoticed until the late 1980s (Staiger and Wolak, 1989; Messerlin, 1990; Prusa, 1992).

The only empirical contribution that has systematically linked antidumping and cartel cases is the study of the European chemical industries by Paul Messerlin (1990). For the European Commision's anticartel cases between 1980 and 1987, he observed that roughly one quarter of these cases were dealing with products that were also involved in antidumping investigations. Messerlin (1990, p. 491) finds that the firms' benefits of antidumping protection outweighted later antitrust fines, leaving him to expect the number of antidumping cases to increase in the future. Less than 20 yeras later, this expectation became a reality (Zanardi, 2004a; Bown, 2008).[1]

A number of theoretical models have addressed the question whether a cartel of domestic and foreign firms has an incentive to strategically exploit antidumping investigations. Modelling the antidumping investigation procedure,[2] Staiger and Wolak (1989) and Prusa (1992)[3] have provided a theoretical framework for how antidumping petitions can lead to anticompetitive outcomes. Staiger and Wolak (1989, p. 39) conclude that the filing of an antidumping petition helps to maintain collusion in periods of low demand, because the foreign competitor

[1] In contrast to the 1980s when Australia, Canada, the EU and the USA accounted for 73.1% of antidumping investigations, Bown observed that since 1995 39.5% of antidumping investigations were initiated by "new user" countries, such as Argentina, Brazil, Colombia, India, Indonesia, Mexico, Peru, Turkey and Venezuela.

[2] For a model of the EU antidumping investigation, consider (Veugelers and Vandenbussche, 1999).

[3] See also (Zanardi, 2004b) for an extension of the model developed in (Prusa, 1992).

would not attempt to decrease prices due to the threat of antidumping duties. Prusa (1992) showed that domestic firms have an incentive to initiate antidumping petitions in order to align defecting foreign firms in a private settlement - a process after which the antidumping petition is withdrawn. As a result, Prusa (1992) proposed that a withdrawn antidumping case could be a signal of a collusive agreement between domestic and foreign industry.

The theoretical implication of Prusa's model meant that industries would always prefer to withdraw a petition and reach a private agreement (Zanardi, 2004b, p. 96). However, since this was not observed in practice, Zanardi (2004b) modified Prusa's model with a focus on coordination cost and bargaining power of the domestic and foreign industries. In his model, antidumping petitions are rather withdrawn when coordination cost among the domestic and foreign cartel members are low. This may be the case when the cartel consists only of a few members that are able to coordinate an out-of-court agreement. In contrast, industries that employ larger shares of the working population typically enjoy higher levels of bargaining power domestically. This increases the likelihood for antidumping petitions to lead to the imposition of antidumping measures. To a certain degree, higher levels of bargaining power should incentivise foreign firms to agree to an out-of-court settlement. However, very high bargaining power provides the domestic industry with an incentive not to withdraw the petition at all (Zanardi, 2004b, p. 105).

Motivated by the theoretical models of Staiger and Wolak (1989) and Prusa (1992), the following contributions focused on the empirical assessment of the anticompetitive effects of antidumping. More specifically, it has been debated whether the withdrawal mechanism proposed by Prusa (1992) holds as an indicator for tacit collusion. Withdrawn petitions were not associated with significant effects on trade in the antidumping investigations in the United States between 1980 and 1985 (Staiger and Wolak, 1994) and between 1990 and 1997 (Taylor, 2004). This finding stands in contrast to the results reported by Zanardi (2004b), who uses a different

definition of withdrawn cases and does not include cases that were withdrawn because they were incomplete or did not satisfy legal requirements. For the European Union's antidumping cases between 1996 and 2004, Rutkowski (2007) finds that withdrawals were very likely to signify collusion in the EU. Nevertheless, a key problem in this section of the literature concerns the fact that evidence of collusion is very difficult to establish, creating a challenge to observe the unobservable (see Connor, 2014a; Blonigen and Prusa, 2016, p. 128).

A number of empirical studies have assessed whether and how domestic industries benefit from antidumping protection. Konings and Vandenbussche (2005) demonstrate for more than 4,000 EU producers that eventual antidumping protection had positive and significant effects on domestic markups. In a later contribution they highlight that antidumping protection had positive effects on domestic sales of non-exporting firms, while sales and exports of exporting firms decreased (Konings and Vandenbussche, 2013, p.316). The implications for domestic market shares have been assessed by Nieberding (1999), who reports that firms receiving protection did increase their domestic market power, while firms who had their petition rejected saw a decrease in market power. In contrast, Reynolds (2013) finds that domestic firms in the U.S. semiconductor and tapered roller industries were not able to increase their market shares through antidumping protection.

3 Use and abuse of antidumping laws: Mechanisms

This section presents three mechanism that motivate cartels to engage in predatory dumping or to file antidumping petitions either directly in the home market or via subsidiaries abroad. While cartels are active, they not only face a challenge to coordinate prices and quantities, but they need to develop mechanisms to respond to defecting cartel members and to the market entry of new competitors (Levenstein and Suslow, 2006). In the cartel literature, dumping and abuse of antidumping laws has been discussed through individual case studies. We refer to these

case studies and add case studies out of our data set to the discussion.

3.1 Before the Cartel

Irwin (1998) assesses a case where the US antidumping law helped governments and industries to jointly establish an implicit global cartel. This case of the 1970s semiconductor industry originates from a Japanese subsidy programme that aimed to increase the efficiency and capacity of its semiconductor exporters. As a result of the programme, Japanese producers increased their exports of semiconductors to many countries, including the US. The increased quantities of semiconductors led to a price reduction, which led to the filing of an antidumping petition in the United States by US firm Micron. Following the initiation of the antidumping investigation, a suspension agreement was negotiated with support of the US Department of Commerce and the Japanese Ministry of International Trade and Industry (MITI).

Since both Micron and several Japanese producers were caught in a cartel by the US Department of Justice in 2002, the case of the US semiconductors provides hard evidence for the relationship between cartels and and antidumping. Moreover, since the antidumping petition led to a suspension agreement rather than an actual duty, this case supports the literature that has assessed withdrawn antidumping petitions as an indicator of tacit collusion (Prusa, 1992; Zanardi, 2004b; Rutkowski, 2007).

We observe similar characteristics to the semiconductor cartel in the case of nitrile synthetic rubber. Between 1996 and 2002, five multinational firms headquartered in the US, Germany, Japan and Mexico operated a cartel in the nitrile synthetic rubber sector. Affecting an estimated 944 million USD of worldwide commerce, this global cartel was ultimately fined a total of 100 million USD (Connor, 2014b). Figure 1 presents the development of the global price of nitrile synthetic rubber between 1992 and 2014.

The link between the nitrile synthetic rubber cartel and antidumping investigations appeared

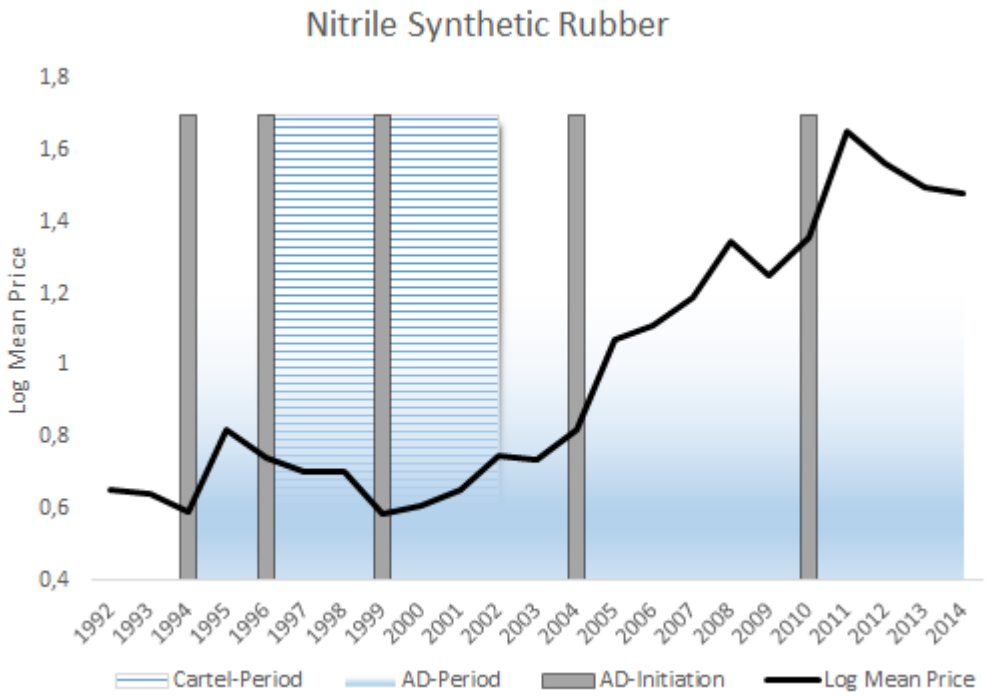

Figure 1: The global price for nitrile synthetic rubber (HS-Code: 400259) between 1992-2014. The cartel was caught for its anticompetitve behaviour for the period 1996-2002.

first before the start of the cartel. In 1994, India launched an antidumping case against Japan - which later turned out to be part of the cartel. Clearly visible in Figure 1 is the spike in prices of nitrile synthetic rubber following the initiation of India's antidumping case against Japan. Further antidumping cases for nitrile synthetic rubber were initiated in 1997, 1999 (both during the cartel period) as well in 2004 and 2010 (both after the cartel period).

In line with the contribution of Irwin (1998), the example of the nitrile synthetic rubber cartel shows that antidumping cases could indeed function as a device to induce collusion in a global market environment.

3.2 During the Cartel

When cartels are already established, they face a challenge to align defecting cartel members. Beyer (2010) discusses the case of the monosodium glutamate (MSG) cartel, where Japanese firm Ajinomoto successfully filed an antidumping complaint against its Korean cartel partner. A similar pattern was observed in the lysine cartel, where the mere threat of an antidumping complaint was enough for a defecting cartel member to comply with cartel rules (Harrington Jr et al., 2006, p.64). Since in both cases antidumping has been used as a strategic tool to maintain high global prices on the cartel products, the initiation of an antidumping case could signal instability of an existing (yet undetected) cartel agreement.

A second challenge to existing cartels provides the market entry of new competitiors. Since antidumping laws provide the power to target individual firms, they would allow the incumbent cartel industries to create barriers to the market entry of new competitors. Several instances for this scenario have been discussed in the literature. In the citric acid industry, U.S. cartel members attempted twice to block the entry of Chinese firms to the U.S. market (Evenett et al., 2001, p.1228). Partially successful was the U.S. ferrosilicon cartel whose petition led to the imposition of antidumping duties against Brazil, China, and other countries. However, after the United States International Trade Commission found out about the conspiracy, antidumping duties were reversed (Pierce Jr, 1999). In contrast, the PVC and LdPE (chemical industry) cartels successfully prevented entry of East European competitors into the EC market via antidumping protection (Messerlin, 1990, p.477). Another example is the polyester staple fiber cartel, which prevented the entry of Korean and Taiwanese firms into the U.S. market (Reynolds, 2013, 416). A historical example provides the international steel cartel, which used antidumping duties in order to keep U.S. imports out of the South African market (Hexner, 1943; Staiger and Wolak, 1994). Effectively, new market entrants hit by antidumping measures can either decide to join the cartel or to stop exporting to cartelised markets. Thus initiating antidumping petition during

the cartel activity provides cartels with a mechanism to maintain cartel prices.

To illustrate the power of antidumping cases during cartel activity, we add here the example of the cathode ray tubes industry. Between 1997 and 2007, 19 multinationals originating from Asia and Western Europe operated a global cartel on cathode ray tubes, used in television, computer and camera production. Affecting an estimated USD 82.5 billion of worldwide commerce, this global cartel was fined about USD 140 million in the US, Korea and Japan according to the Private International Cartels (PIC) dataset (Connor, 2014b) and EUR 1.5 billion in the EU (European Commission, 2012).

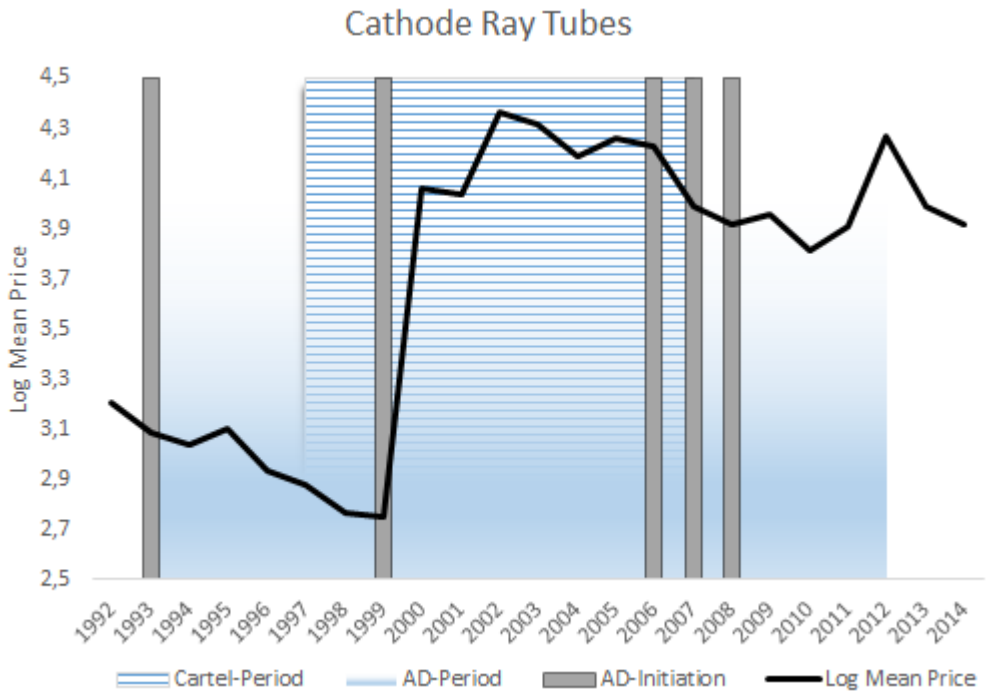

Figure 2: The global price for cathode ray tubes (HS-Code: 854011) between 1992-2014.

Figure 2 presents the development of the global price of cathode ray tubes between 1992 and 2014. In Figure 2, gray bars mark the initiation year of antidumping investigations, and the light blue background highlights that at least one antidumping duty for cathode ray tubes is in force in a given year. While cartel authorities found evidence for a cartel start in 1997, Figure 2

illustrates that the global price of cathode ray tubes only increased significantly in 1999-2000, which coincides with an antidumping case initiated by the EU against South Korea and India - both of which were later found to be cartel members. Thus it is very well possible that the antidumping case in the EU allowed the cathode ray tubes cartel to expand by creating barriers to entry for new competitors.

4 Data

We construct our dataset by combining the (1) Global Anti-Dumping Database (Bown, 2015) and the (2) Private International Cartels dataset (Connor, 2014b). The Global Anti-Dumping Database contains data on all antidumping cases filed in 33 countries between 1978 and 2015. Moreover, this dataset includes product descriptions and 6-digit HS codes for each antidumping case, as well as information on the domestic firms filing and the foreign firms targeted by antidumping petitions. In addition, the dataset holds for each antidumping case the date of its initiation and the day of its revocation, and the type of measure applied.

The Private International Cartels' dataset classifies cartels into three categories: domestic, international and global cartels. We focus here exclusively on global cartels, totalling 61. These cartels are known to have fixed prices on two or more continents (Connor, 2014b, p.51) and are therefore most relevant to our assessment of the strategic use of antidumping. We exclude cartels that are in services, as there are no trade services data available on such disaggregated level. Also, we drop those cartels that were active exclusively before 1992 due to the lack of trade data available.

We match the product coverage of these cartels with 6-digit HS codes by examining each HS vintage of the COMTRADE database regarding its fit to the activity of the cartel in question[4]. From official documents provided by antitrust authorities, such as the European Commission,

[4]We also checked the robustness of our product codes to the data collection of Agnosteva (2016)

the Canadian Competition Bureau and the US Department of Justice, we also added information on the firms involved in the cartels and on the fines received by the cartel participants. Finally, we match the cartel dataset with the antidumping dataset using 6-digit HS codes. This process leaves us with 44 global goods cartels that were active some time after 1992 and that were associated with antidumping investigations. Our sample covers the period from 1992 to 2014.

Table 1: Cartels and Antidumping descriptive statistics

(a) Panel A: Number of cartels and cartel products with at least one antidumping case.

	Matched with AD	No match with AD	Total
Number of cartel cases	44 (72%)	17 (28%)	61 (100%)
Number of cartel products	84 (51%)	80 (49%)	164 (100%)

(b) Panel B: Number of products with at least one antidumping case.

	Involved in AD	Not involved in AD	Total
Number of products	2133 (36%)	3851 (64%)	5984 (100%)

Table 1 presents the matches that we obtain between the Global Anti-Dumping Database and the Private International Cartels dataset. Out of the total 61 global cartels we find that 44 or 72% are matched to at least one antidumping investigation. These figures read very well in comparison to those reported by Paul Messerlin. Only for the European Commissions 1980-1987 anti-cartel cases, Messerlin (1990) reported that roughly one quarter was matched to antidumping cases. Table 1 also reports the number and share of products that are matched to antidumping investigations, and to cartels and antidumping investigations. While 36% of the overall products in the COMTRADE dataset are matched to at least one antidumping investigation, 51% of cartel products are matched to at least one antidumping investigation. These figures highlight that antidumping cases are much more frequent in cartel products and that the majority of global cartels are also matched to at least one antidumping investigation.

Table 2 provides further details on the link between antidumping and global cartels. When

Table 2: Cartels-Antidumping matches and timing

(a) Panel A: Number of cartels matched to antidumping before, during and after the cartel period.

Number of cartels	Number of cartels	Number of cartels (within 5 year)
Antidumping before cartel	11 (25%)	9 (23%)
Antidumping during cartel	28 (64%)	28 (72%)
Antidumping after cartel	34 (77%)	25 (64%)
Total Antidumping and cartel	44 (100%)	39 (100%)

(b) Panel B: Number of products matched to cartels before, during and after the cartel period.

Number of cartel products	Number of cartel products	Number of cartel products (within 5 year)
Antidumping before cartel	18 (21%)	11 (18%)
Antidumping during cartel	40 (48%)	40 (65%)
Antidumping after cartel	59 (70%)	33 (53%)
Total Antidumping and cartel	84 (100%)	62 (100%)

we breakdown the number of cartels and cartel products by the timing of antidumping investigations, we find that the majority of antidumping-related cartels are matched to antidumping investigations after the cartel period in the overall sample. However antidumping investigations that are initiated within 5 years before cartel begin and up to 5 years after the cartel end, then the majority of antidumping cases are initiated during the cartel period.[5] Note that as one cartel can be matched with antidumping before, during and after cartel, the sum of the first 3 rows is larger than the total in the last row.

5 Estimation Strategy

Our baseline estimation evaluates the impact of antidumping investigations and duties on global prices. Our dependent variable is the average annual price of a product at 6-digit HS classification, which we observe for the period from 1992 to 2014. Our unit of observation is therefore the $Product - Year$ and the sample includes all products reported in the comtrade database.

[5]The same is true if we include antidumping investigations initiated up to 7 years before and after the cartel period.

In our baseline regression we want to assess whether the global price of product x is different in years t in which at least one antidumping investigation is initiated or there is at least one antidumping measure in force.[6] On top of this, we are interested whether antidumping investigations in cartel-prone products have different effects to antidumping investigations that were not linked to global cartels.[7]

Thus to explore the various channels of impact we interact the initiation of antidumping investigation in cartel-prone products with the timing of the initiation (i.e. before, during or after the cartel period). Specifically, an antidumping investigation before the start of the cartel could be used to initiate a cartel; an investigation during the cartel activity could be interpreted as a way to maintain or stabilize a cartel. An antidumping case after the cartel end could signify an attempt to reinstate the cartel.

The identification is based on the difference in differences of the impact of antidumping on global import prices of products that have been in a global cartel or antidumping investigation at some point in the sample period, relative to those products that have never been linked to global cartels or antidumping investigations.

Baseline regression is as follows:

$$\begin{aligned}\ln\text{Price}_{xt} =& \alpha_0 AD_{xt} + \alpha_1 AD_{xt} \mathbb{1}_{CartelProduct}(ADBeforeCartel) \\ &+ \alpha_2 AD_{xt} \mathbb{1}_{CartelProduct}(ADDuringCartel) \\ &+ \alpha_3 AD_{xt} \mathbb{1}_{CartelProduct}(ADAfterCartel) \\ &+ \gamma \mathbb{1}_{CartelPeriod_{xt}} + \eta_x + \delta_t + \epsilon_{xt}\end{aligned} \tag{1}$$

[6] In a robustness check we also control for other cases where product x has more than one antidumping investigation or measure is in force in year t.

[7] This wording is purposefully cautious: we do not claim that these products have not been cartelised but rather that our strict matching procedure did not link them to cartels or that cartels in those products have not been identified at all.

where the dependent variable $lnPrice_{xt}$ is the log price of product x in year t. We use three alternative specifications for the global price of product x. First, we take the mean of all bilateral import prices reported in comtrade to derive the $MeanPrice$. Second, we use the median of all bilateral import prices to obtain the $MedianPrice$. Third, we use the sum of all bilateral quantities and tradevalues to calculate the $WorldPrice$. AD is a dummy that turns 1 if product x is involved in at least one antidumping investigation in year t.[8] This includes each year from the initiation of antidumping procedings to the eventual revocation of antidumping duties. The vector $Timing^T = (Before, During, After)$ refers to the timing of antidumping relative to the cartel activity period. That is, AD may be initiated before, during or after the cartel period. $CartelPeriod$ controls for the cartel period reported in official antitrust investigations. Finally, η_x controls for all product-specific fixed-effects and δ_t controls for all time-specific fixed effects.

6 Results

Table 3 presents the result of our baseline difference-in-differences estimation. Our basic finding reads as follows. Global cartels appear to raise prices globally during the cartel period. The coefficient we estimate here suggests that prices increase by 9 to 12% during the cartel period. This result gives reason to assume that these cartels are powerful enough to concert prices in a global environment. At the same time, this finding highlights the need for antitrust authorities to cooperate at a global level in order to estimate the damage caused by this type of cartels.

Our second result focuses on the global impact of antidumping. Given that antidumping is a bilateral measure, its impact on global prices is rather unclear. Our estimate suggests that periods of antidumping lead to a decrease of global prices of 5 to 10%. The coefficient we estimate for the antidumping period is highly statistically significant and robust to alternative

[8] Since 6-digit-products can be part of multiple antidumping investigations, in a robustness regression we add a dummy when a product is involved in multiple antidumping cases however that does not affect the results.

Table 3: Baseline difference-in-differences Regression.

	(1) Log Mean Price	(2) Log Median Price	(3) Log World Price
Cartel Period	0.0912**	0.121***	-0.0377
	(2.50)	(2.64)	(-0.47)
AD	-0.0568***	-0.102***	-0.101***
	(-3.57)	(-4.75)	(-4.64)
AD Before Cartel	0.129**	0.201***	0.416***
	(2.09)	(2.84)	(2.61)
AD During Cartel	0.175**	0.159*	0.271*
	(2.20)	(1.79)	(1.78)
AD After Cartel	-0.0561	-0.133**	-0.144*
	(-1.28)	(-2.53)	(-1.70)
Observations	116,153	116,153	116,157
Products	5,649	5,649	5,649
Product-FE	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

specifications of the global price. We understand this coefficient in the light of an exporters response to antidumping duties. Firms hit by antidumping duties might simply respond by decreasing their price in order to keep exporting to the target market at all. In addition, these firms might divert their exports to alternative markets where prices are lower compared to the former target market (Prusa, 2001; Konings et al., 2001).

Our main coefficients of interest are the interaction terms of the antidumping period matched to global cartels before, during and after the cartel period. Our results suggest that antidumping cases may have very different effects on global prices, if they are matched to global cartels. Our estimates suggest that antidumping cases in cartel products before the actual cartel start lead to global price increases of 7 to 32%. One explanation for this coefficient may very well be that the antitrust authorities used a conservative start-date in the cartel investigation. Nevertheless, if we look at the coefficient for antidumping cases initiated during the cartel period, then it may well be a possibility that cartels take advantage of antidumping more strategically. Controlling for the cartel period, which has a positive and statistically significant on global prices itself, we estimate that antidumping cases initiated during the cartel period lead to an additional increase of global prices by 6 to 17%. Again, this finding is statistically significant and robust to different specifications of the global price.

In our baseline setting, we defined the antidumping period as a dummy variable that is 1 for any year where at least one antidumping case for product x is initiated or where at least one antidumping duty for the same product is in force. Since not all antidumping investigations lead to an antidumping duty, we refine our estimation strategy by adding coefficients that account for the five years after the initiation of an antidumping investigation that did not lead to an antidumping duty. This step allows us to connect our results to the literature that has studied the withdrawal of antidumping cases as a sign of tacit collusion (Prusa, 1992; Zanardi, 2004b; Rutkowski, 2007).

Table 4: 5 year lag from the initiation of Antidumping Cases.

	(1) Log Mean Price	(2) Log Median Price	(3) Log World Price
Cartel Period	0.102***	0.133***	-0.0347
	(2.89)	(2.99)	(-0.42)
AD	-0.0592***	-0.107***	-0.0993***
	(-3.68)	(-4.99)	(-4.48)
× Before Cartel	0.130**	0.193***	0.459***
	(2.19)	(2.74)	(3.33)
× During Cartel	0.231***	0.227**	0.291*
	(2.70)	(2.42)	(1.84)
× After Cartel	-0.0534	-0.115**	-0.144*
	(-1.19)	(-2.11)	(-1.92)
AD Withdrawn	-0.122***	-0.182***	-0.112***
	(-3.35)	(-3.73)	(-2.74)
× Before Cartel	0	0	0
	(.)	(.)	(.)
× During Cartel	0.264**	0.323	0.471***
	(2.04)	(1.62)	(3.31)
× After Cartel	0.0836	0.144**	0.0837
	(1.61)	(2.24)	(1.28)
AD Other	0.0260	0.0518**	0.00489
	(1.60)	(2.35)	(0.25)
× Before Cartel	-0.0407	0.0114	-0.302
	(-0.52)	(0.11)	(-0.81)
× During Cartel	-0.250***	-0.306***	-0.117
	(-3.74)	(-3.33)	(-1.24)
× After Cartel	-0.0454	-0.129**	-0.0389
	(-1.06)	(-2.48)	(-0.56)
Observations	116,153	116,153	116,157
Products	5,649	5,649	5,649
Product-FE	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4 presents the results for the refined specification where we control for cases that do not lead to antidumping duties. First, our baseline results reported in Table 3 are robust to the alternative specification in Table 4. Second, we now estimate seperately the impact of the five years following the initiation of antidumping cases that do not lead to antidumping duties. These cases are either withdrawn by the domestic industry that filed the antidumping petition, or withdrawn by the investigation authority for other reasons. We single out in particular those cases reported to be withdrawn by the domestic industry. Prusa (1992) has argued that withdrawn antidumping cases might be a signal of an out-of-court agreement reached by the domestic and foreign industries. Similar to the estimation approach in Table 3, we first estimate the impact of withdrawn antidumping cases in general. Our coefficient suggests that these type of antidumping cases are usually associated with a decline in global prices of 12 to 18%, which is in line with antidumping cases that are not related to cartels. The interaction of withdrawn antidumping cases and cartel periods provides support for the findings of (Prusa, 1992; Zanardi, 2004b; Rutkowski, 2007). We estimate that global prices increase by 14 to 36% when antidumping cases matched to cartel products are initiated and withdrawn during the cartel period. Since there is no antidumping duty in place during the five year period following withdrawn antidumping cases, this finding gives support to the hypothesis that firms may use antidumping strategically to arrange collusive outcomes at a global level. Our finding for withdrawn cases receives further support when we look at those antidumping cases that also do not lead to antidumping duties, but that are withdrawn for other reasons. In particular during the cartel period, these cases are associated with price decreases, which can be explained by the failure to either reach a collusive agreement or the failure to raise prices via antidumping duties.

6.1 Robustness

In our baseline and extended regression we found that cartel-related antidumping cases help raising prices globally if antidumping cases are initiated either before or during the cartel period. In this setting the category $BeforeCartel$ may include antidumping cases initiated at any point in time before the actual cartel start. Thus, it may very well be possible that these cases have little to do with the cartel itself. To test for this possibility, we restrict the cartel-antidumping matches before and after the cartel period to a limit of 5 years. That is, $BeforeCartel$ now is a dummy that is equal to 1 for any year where cartel product x has at least one antidumping case initiated in the 5 year period before the cartel start. Likewise, $AfterCartel$ now equals to 1 for any year where cartel product x has at least one antidumping case in the 5 year period following the cartel breakdown.

Table 5 presents the regression output for this robustness regression. In line with our finding in Table 4, we find that global cartels are able to raise prices globally during the cartel period between 10 and 13%. Years where at least one antidumping case is initiated or in force are associated with a global price decrease between 6 and 10%. If we look at the interaction terms for the timing of antidumping (before, during and after), then we find that antidumping cases initiated up to 5 years before the cartel start are associated with a global price increase of 7 to 34%. This result confirms our finding without the five year restriction and is robust to further restriction of up to 3 years (see Table A3). Finally, it is visible in Table 5 that we do not observe any withdrawn antidumping case in the period either 5 years before or 5 years after the cartel. Nevertheless, our results confirm that withdrawn antidumping cases during the cartel period help global cartels to raise prices by 15 to 40%.

In the appendix we provide further robustness checks that consider a) the impact on traded quantities rather than prices (Table A3) and b) the impact of more than one antidumping case (Table A2).

Table 5: Robustness: 5 year lag from the initiation of Antidumping Cases. AD initiated max. 5 years before or after cartel.

		(1) Log Mean Price	(2) Log Median Price	(3) Log World Price
Cartel Period		0.102***	0.133***	-0.0343
		(2.89)	(2.99)	(-0.41)
AD		-0.0590***	-0.107***	-0.0992***
		(-3.67)	(-4.97)	(-4.48)
	× Before Cartel (max. 5 years)	0.128**	0.200***	0.443***
		(2.15)	(2.93)	(3.10)
	× During Cartel	0.228***	0.221**	0.289*
		(2.67)	(2.33)	(1.81)
	× After Cartel (max. 5 years)	-0.0577	-0.133**	-0.140*
		(-1.35)	(-2.54)	(-1.78)
AD Withdrawn		-0.122***	-0.180***	-0.112***
		(-3.36)	(-3.73)	(-2.75)
	× Before Cartel (max. 5 years)	0	0	0
		(.)	(.)	(.)
	× During Cartel	0.272**	0.330*	0.515***
		(2.13)	(1.72)	(3.81)
	× After Cartel (max. 5 years)	0	0	0
		(.)	(.)	(.)
AD Other		0.0252	0.0500**	0.00446
		(1.59)	(2.32)	(0.23)
	× Before Cartel (max. 5 years)	-0.0306	-0.0435	-0.250
		(-0.47)	(-0.45)	(-0.71)
	× During Cartel	-0.247***	-0.297***	-0.114
		(-3.72)	(-3.25)	(-1.20)
	× After Cartel (max. 5 years)	-0.0770	-0.163**	-0.196*
		(-1.51)	(-2.43)	(-1.91)
Observations		116,153	116,153	116,157
Products		5,649	5,649	5,649
Product-FE		Yes	Yes	Yes
Year-FE		Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7 Conclusion

This paper examines the use of antidumping protection by cartels and its impact on global import prices. Making use of a novel cartel dataset, we assess whether antidumping investigations linked to global cartels help cartels to increase and maintain collusive prices in a global environment. While previous literature suggests that antidumping laws could provide incentives to initiate anticompetitive behaviour, our paper is the first to empirically test the price effect of cartel-related antidumping cases at a global level. Our estimates suggest that antidumping cases initiated before and during the cartel period can help raise global prices above regular cartel prices. In response to the theory developed by (Staiger and Wolak, 1989; Prusa, 1992; Zanardi, 2004b), we find that withdrawn antidumping cases lead to higher global prices if these cases are initiated and withdrawn while there is a cartel mechanism in place. Since the coefficient we estimate for the impact of withdrawn antidumping cases during the cartel period is larger than the coefficient of antidumping cases that lead to a duty, it may very well be the best option for cartels to initiate and withdraw antidumping cases. However, since (Zanardi, 2004b) has shown that bargaining power and coordination cost determine an industries decision to withdraw an antidumping petition, it may very well be possible that even global cartels do not possess sufficient bargaining power to rely on withdrawn antidumping cases. Instead, antidumping duties provide cartels with secure barriers to entry of outsiders.

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Appendix

Table A1: Robustness: 5 year lag from the initiation of Antidumping Cases. AD initiated max. 3 years before or after cartel.

		(1) Log Mean Price	(2) Log Median Price	(3) Log World Price
Cartel Period		0.102***	0.134***	-0.0349
		(2.90)	(3.02)	(-0.42)
AD		-0.0590***	-0.107***	-0.0990***
		(-3.67)	(-4.97)	(-4.47)
	× Before Cartel (max. 5 years)	0.127**	0.202***	0.403***
		(2.13)	(3.00)	(2.58)
	× During Cartel	0.229***	0.222**	0.292*
		(2.68)	(2.35)	(1.78)
	× After Cartel (max. 5 years)	-0.0570	-0.133**	-0.138*
		(-1.34)	(-2.55)	(-1.67)
AD Withdrawn		-0.122***	-0.180***	-0.112***
		(-3.36)	(-3.73)	(-2.74)
	× Before Cartel (max. 3 years)	0	0	0
		(.)	(.)	(.)
	× During Cartel	0.275**	0.333*	0.491***
		(2.16)	(1.76)	(3.48)
	× After Cartel (max. 3 years)	0	0	0
		(.)	(.)	(.)
AD Other		0.0252	0.0500**	0.00223
		(1.59)	(2.32)	(0.11)
	× Before Cartel (max. 3 years)	-0.0238	-0.101	0.195
		(-0.30)	(-0.85)	(1.56)
	× During Cartel	-0.247***	-0.298***	-0.113
		(-3.71)	(-3.25)	(-1.19)
	× After Cartel (max. 3 years)	-0.0881	-0.175**	-0.128
		(-1.57)	(-2.35)	(-1.43)
Observations		116,153	116,153	116,157
Products		5,649	5,649	5,649
Product-FE		Yes	Yes	Yes
Year-FE		Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Robustness: More than one Antidumping Case.

	(1) Log Mean Price	(2) Log Median Price	(3) Log World Price
Cartel Period	0.0946***	0.126***	-0.0357
	(2.64)	(2.78)	(-0.44)
AD	-0.0379**	-0.0611**	-0.0816***
	(-1.98)	(-2.41)	(-3.22)
Many AD	-0.0447*	-0.0955***	-0.0445
	(-1.92)	(-3.20)	(-1.58)
AD Before Cartel	0.0713	0.109	0.372**
	(1.11)	(1.36)	(2.34)
Many AD Before Cartel	0.421***	0.633**	0.295**
	(2.93)	(2.55)	(2.46)
AD During Cartel	0.163***	0.152**	0.283
	(2.94)	(2.42)	(1.43)
Many AD During Cartel	0.0536	0.0750	-0.00202
	(0.55)	(0.81)	(-0.01)
AD After Cartel	-0.0666	-0.139*	-0.236**
	(-0.91)	(-1.67)	(-2.11)
Many AD After Cartel	0.0353	0.0482	0.152*
	(0.51)	(0.60)	(1.69)
Observations	116,153	116,153	116,157
Products	5,649	5,649	5,649
Product-FE	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: 5 year lag from the initiation of Antidumping Cases: Quantity.

		(1) Log Mean Quantity	(2) Log Median Quantity	(3) Log World Quantity
Cartel Period		-0.0918**	-0.0918**	-0.0201
		(-2.42)	(-2.42)	(-0.20)
AD		0.103***	0.103***	0.243***
		(6.55)	(6.55)	(7.21)
	× Before Cartel	-0.0359	-0.0359	-0.396
		(-0.21)	(-0.21)	(-1.40)
	× During Cartel	-0.235**	-0.235**	-0.369**
		(-2.36)	(-2.36)	(-2.40)
	× After Cartel	0.00560	0.00560	0.166
		(0.09)	(0.09)	(1.64)
AD Withdrawn		0.146***	0.146***	0.151***
		(3.74)	(3.74)	(2.72)
	× Before Cartel	0	0	0
		(.)	(.)	(.)
	× During Cartel	-0.342**	-0.342**	-0.726***
		(-2.23)	(-2.23)	(-7.13)
	× After Cartel	0.101	0.101	-0.166*
		(1.58)	(1.58)	(-1.95)
AD Other		-0.000780	-0.000780	0.0340
		(-0.04)	(-0.04)	(1.19)
	× Before Cartel	-0.0693	-0.0693	-0.0143
		(-0.49)	(-0.49)	(-0.03)
	× During Cartel	0.145*	0.145*	0.0235
		(1.69)	(1.69)	(0.21)
	× After Cartel	0.0852	0.0852	0.115
		(1.40)	(1.40)	(1.16)
Observations		116,153	116,153	116,157
Products		5,649	5,649	5,649
Product-FE		Yes	Yes	Yes
Year-FE		Yes	Yes	Yes

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$