EU Antidumping and Tariff Cuts: Trade Policy Substitution?

by

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Abstract

The world trading system in its current form aims at reducing multilateral trade barriers across the board. Indeed, the last successfully concluded multilateral trade negotiations led to substantial tariff concessions on the part of most developed economies. What, however, happened to other forms of import protection? Have substantial tariff concessions subsequently been replaced by the use of alternative forms of import protection? In this paper we empirically investigate the relationship between negotiated external tariff cuts and the subsequent use of antidumping actions by the EU. Evidence is found for larger Uruguay Round tariff cuts increasing the probability of subsequent antidumping investigations.

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1. Introduction

The growth in importance of non-tariff trade barriers in general and contingent protection measures in particular has become a remarkable feature of the conduct of global trade policy, both in the developed and more recently also in the developing world (Prusa, 2001 and 2005; Zanardi, 2004 and 2006; Bown, 2008). With reduced scope for tariff protection contingent protection measures are increasingly seen as alternative trade policy instruments to protect domestic producers and industries (Blonigen and Prusa, 2003; Konings and Vandenbusche, 2005). Originally devised as 'fair' trade measures antidumping features prominently amongst the forms of contingent protection. Given the way in which antidumping policies are set up and implemented considerable room for political-economy influences tends to be created, thus generating an alternative channel for protection lobbying (Nelson, 2006).

Support for the hypothesis of declining tariff protection being replaced by an enhanced use of antidumping investigations may be found in early descriptive studies identifying anti-dumping as "a major loophole in the free-trading disciplines of the world trading system" (Lindsay and Ikenson, 2001:5).[1] Thorough empirical evidence on the subject matter is however still scarce and tends to be industry analysis and characterized by mixed results.[2] Focusing on the impact of the Uruguay Round tariff concessions, Feinberg and Reynolds (2007) analyse subsequent antidumping investigations in 19 different industries for several countries between 1996 to 2003. They find evidence for trade policy substitution mostly in developing countries.[3] Traditional users of anti-dumping measures (i.e. Australia, Canada, New Zealand, the EU and US) are not found to show a positive correlation between tariff protection and anti-dumping proceedings. Moore and Zanardi (2011) further add to these findings by examining the relationship between the probability of AD investigations and applied (rather than bound) tariffs between 1991 and 2002. Analysing AD fillings in 29 ISIC 3-digit manufacturing industries and numerous countries, the authors are not able to confirm the findings of a positive correlation between tariffs and antidumping, with the

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[1] Vandenbussche and Zanardi (2010), moreover, find in this context that antidumping measures considerably affect trade in industries which are not directly involved in the investigation thereby characterising antidumping investigations as a potentially very powerful tool of alternative import protection. A view which is also held by Blonigen and Prusa (2003:253) who state that most people "agree that AD has nothing to do with keeping trade 'fair' […] It is simply another form of protection".

[2] There is a related literature that focuses on the political choice between tariffs and other forms of (non-AD related) import protection. Hillman (1990), Hillman and Ursprung (1988) and Feenstra and Lewis (1991) analyse the use of tariffs and Voluntary Export Restraints (VERs) showing that the latter may, under certain assumptions, be preferred to tariffs. Limão and Tovar (2011) provide theoretical and empirical evidence for a substitution scenario of tariffs for non-tariff-barriers (NTBs) in general.

[3] Feinberg and Reynolds (2007) focus on AD petitions in HS 1-digit industries.

exception of a small group of developing economies.[4] By contrast, the sole study conducted at a detailed product level, Bown and Tovar (2011) provides support for the hypothesis of tariffs being substituted by more frequent AD investigations when analysing India's antidumping proceedings in the face of a major tariff reform programme.[5]

We seek to contribute to the existing literature by examining a potential product-level link between (bound) mfn tariff cuts conceded by one of the world's largest traders – the EU – and the latter's subsequent antidumping investigations. Our study contrasts to much of the previous empirical evidence by focusing on detailed and country-specific HS 8-digit product-level AD investigations, and (bound) MFN tariff concessions for a large and developed economy.[6] As pointed out by Feinberg and Reynolds (2007) the fact that industry classifications usually include several hundreds of individual product lines, industry and country level studies may lead to biased results, since sectors with a large variation in product level tariff cuts and possibly very small aggregate tariff reductions are be more likely to attract subsequent AD investigations than industries with a large aggregated degree of tariff liberalization but no extreme product level tariff reductions.

Our research is motivated by Anderson and Schmitt's (2003) theoretical contribution which analyses the effect of binding tariff reductions on the use of quantitative import restrictions and anti-dumping measures.[7] Based on Brander and Krugman's (1983) reciprocal dumping model, these authors derive a theoretical framework of preference progression for different forms of trade policy protection. They show that in an unrestricted trade policy environment tariffs tend to be the most preferred protectionist trade policy tool followed by quotas and antidumping measures. As a result, when constraining the use of tariffs by

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[4] These include Argentina, Brazil, China, India, Mexico, Peru and South Africa (Moore and Zanardi, 2011). Moore and Zanardi (2011) find evidence for antidumping deflection and retaliation as well as the importance of the size of import-flows when determining the likelihood of AD investigations across all country subsamples.

[5] Bown and Tovar (2011) analyse cross-sectional HS 6-digit imposed antidumping data for India's pre- and post- IMF imposed reform period (i.e. 1990 and 2000 to 2002). Based on Grossman and Helpman's (1994) import protection model they find that India's 1990 tariff policy is in line with the latter model's prediction whereas India's post-reform tariff data is not. Re-estimating the post-reform model including tariffs as well as imposed antidumping and safeguard duties, however, again results in theory-consistent significant estimates pointing to a substitution effect of trade policies following the IMF imposed tariff reform programme.

[6] Feinberg and Reynolds (2007) as well as Moore and Zanardi (2011) use rather broad industry or country-level data when analysing the tariff-antidumping nexus for developed economies.

[7] Further theoretical contributions on the substitution of different trade policies include Limão and Tovar (2011) who show in a political choice model that governments may benefit from coordinated tariff constraints through a higher bargaining power towards domestic special interest groups which then enhances the latters' efforts to lobby for alternative forms of protection. Moreover, political pressure deflection by governments committed to tariff liberalization as a further rationale for explaining the substitution of declining tariffs by more antidumping investigations has been analysed by Anderson and Zanardi (2009) as well as Moore and Zanardi (2011). Moore and Zanardi show that political decision makers may increasingly try to shift protectionist demands towards more administered forms of protection in order to reduce pressure from domestic interest groups.

coordinated negotiations, policy-makers are likely to resort to the use of quantitative trade policy instruments which are again superseded by the use of antidumping actions in the presences of additional agreements on ‘quota tariffication’. Restrictions on the use of tariffs and quotas will thus result in an enhanced use of antidumping protection. This trade policy preference progression tends to be in line with some stylized facts regarding the historical use of trade policy instruments. Coinciding with the end of the Kennedy Round (1964-1967), the 1960’s witnessed an upsurge of quantitative import barriers which was followed by an increasing trend towards antidumping measures since the 1980s (Renner, 1971; Finger and Olechowski, 1987). The Uruguay Round (1986-1994) finally established a guideline for the ‘tariffication’ of quantitative import restrictions for all GATT-signatory countries and additionally required them to restrict the use of quotas in the future, whereas the use of AD measures remains largely WTO-unconstrained. Import protection following the Uruguay Round (UR) tariff commitments therefore represents an interesting testing environment for a potential substitution effect of greater use of antidumping measures in response to falling tariffs.

Focusing on the UR trade policy outcome, our findings show a highly significant, albeit small, positive impact of bound MFN tariff concessions on the probability of subsequent antidumping investigations; having controlled for other influences. Employing a variety of different econometric techniques, including random-effects and a Chamberlain-Mundlak approach to control for unobserved heterogeneity, this finding is robust to a series of sensitivity tests.

The reminder of the paper is organized as follows. Section 2 describes the legal framework of the EU’s anti-dumping policy and provides some descriptive statistics. Section 3 briefly sketches out the conceptual framework which motivates our study, while section 4 introduces the empirical methodology followed by a discussion of the results in section 5. Section 6 concludes.

2. European Anti-dumping Policy and Uruguay Round Tariff Concessions

2.1 Legal framework

The EU’s trade policy is governed by the European Council and the European Commission. While the Commission proposes and enforces trade policy actions, the Council, consisting of Member States’ representatives, decides about approval or rejection of the

Commission's propositions. Antidumping measures represent a major component of the EU's trade policy mix (Rovegno and Vandenbusche, 2011). Guided by Article 207 of the Treaty on the Functioning of the European Union as well as Council regulation 1225/2009, the EU's antidumping legislation is embedded in the WTO's antidumping policy framework allowing GATT signatory countries to impose discriminatory trade protection measures if foreign exporters sell their goods at a price lower than their 'normal value',[8] and if the latter results or threatens to result in 'material injury' for the domestic industry.

The initiation of an antidumping investigation on part of the EU's antidumping authorities requires an officially lodged complaint by a Community industry which needs to provide evidence of dumping and the resulting causal material injury. Additionally, any anti-dumping complaint must be supported by enough EU producers responsible for at least 25% of the EU's product-specific production. EU regulations further specify a timeframe of 45 days for the Commission to decide whether to open an investigation or not. Preliminary measures may be imposed after an initial investigation period of 9 months, during which (mostly questionnaire-based) consultations are held with EU producers and importers as well as the investigated exporters. The time span from the opening of an investigation to the publication of the final decision may therefore take up to 15 months.[9]

Comparing foreign suppliers' export prices with 'normal values', the European Commission first investigates whether there is enough proof for the existence of dumping following a complaint of a Community industry. While the investigated export price refers to the ex-factory price - i.e. the price for goods sold to the EU net of rebates, discounts, taxes, etc. (Van Bael and Bellis, 2011), the normal value of a product is most often calculated on the basis of domestic sales prices of the like product in the exporting country. The difference between the latter two – i.e. the dumping margin – is then calculated according to one of three alternative measures specified in the WTO's Antidumping Agreement (ADA).[10]

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[8] The 'normal value' of a product is in general defined as the country of origin's production costs plus reasonable profit margins and additional costs for selling and administration. In calculating the normal value the European Commission distinguishes between whether the investigated country is a market economy or not. If it is not, an analogue country, often already proposed by the complaining industry, serves as a proxy (Liu and Vandenbusche, 2002). In light of the difficulties of estimating production costs, the European Commission often uses domestic sales prices in the exporting country to calculate the normal value. Price information of the analogue country is also used if domestic sales in the exporting, or analogue, country are too small to be representative.

[9] The EU can initiate anti-dumping investigations against all non-EU member countries, with an almost complete exception of goods stemming from Iceland, Lichtenstein and Norway (i.e. the EEA countries).

[10] The difference between a calculated normal value and the foreign firm's export price determines the dumping margin. The WTO's Antidumping Agreement (Article II) specifies three alternative approaches for contrasting the latter two prices: (i) comparing weighted averages of both price indices, (ii) comparing both price indices for each (product-level) transaction averaging the latter to compute the overall dumping margin, or (iii) contrasting

The determination of causal material injury to the domestic industry, or a threat thereof, includes an economic analysis of various domestic industry factors such as, output, productivity, profits, utilisation capacity, stocks, sales, market share, cash flow return on investment and employment, and also compares the foreign producers' export prices to the prices charged by the domestic industry (i.e. the injury margin).[11] If the Commission considers the evidence for dumping and material injury to be sufficient as well as potential trade defence actions to be in line with the general interest of the Community, the former finally proposes antidumping measures which may either take the form of price-undertakings or additional duties to offset the injury caused by the dumped products.[12]

Despite the fact that antidumping investigations directly target exporting firms and tend to impose firm-specific trade remedy duties, not investigated firms originating from the same country are most often also subjected to additional duties even if the latter were not involved in dumping activities. In the EU the duty imposed on so-called non-named or potential exporters amounts to the highest duty imposed on all investigated firms from the same exporting country (Van Bael and Bellis, 2011). Newcomers, which did not export to the EU at the time of the investigation, are also subjected to the latter antidumping duties (mostly in order to prevent circumvention). Given the nature of this process of evaluation and duty setting, and that the mere initiation of an AD investigation may affect firms' behaviour, the Commission has considerable discretion to eliminate foreign competition and to protect the domestic industry against foreign producers.[13]

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weighted normal values with individual transaction based foreign producers' export prices if the latter vary substantially across purchasers, time periods or regions. The latter method is also followed by the averaging of all transaction-to-transaction based dumping margins. Closely associated with the calculation of dumping margins is the methodology of 'zeroing'. 'Zeroing' denotes the replacement of negative dumping margins by zeros which may finally results in larger average dumping margins. For a recent discussion regarding the different approaches of zeroing and associated WTO litigations see Prusa and Vermulst (2010).

[11] When calculating the material injury of alleged dumping activities, the EU, like many other users of AD actions, often applies the principle of cumulation, which allows considering the combined impact of all imports from the investigated exporting countries on the domestic industry. Hansen and Prusa (1996) as well as Tharakan et al. (1998) find that cumulation significantly increases the probability of finding evidence for material injury.

[12] The imposed duty rate in most cases reflects the dumping-margin unless the material injury could also be withdrawn with a smaller duty rate ('lesser duty rule'). The anti-dumping import tax may either be an ad-valorem duty, a specific duty or a variable duty (i.e. a minimum import price). Moreover, in line with WTO regulations antidumping measures are in most cases imposed for a period of 5 years. Targeted parties may however ask for an interim review which may result in lower duty rates.

[13] The potential of antidumping constraints to provide import protection to the domestic industry has also been highlighted by Messerlin and Reed (1995), who find that 90% of all AD measures are implemented on the basis of rather loose injury criteria - such as simple differences in prices rather than actual predatory pricing behaviour.

2.2 Uruguay Round Tariff Commitments and EU Antidumping Investigations

During the Uruguay Round the European Union agreed to reduce its bound tariffs by almost a third, with considerable variation across industries and individual product lines. Table 1 (below) provides an overview of the EU's bound Uruguay Round MFN tariff cuts, per industry. The sector with the largest average decline in tariff protection was the tobacco industry, with a cut of around 24 percentage points.[14] Containing a much larger number of individual HS 8-digit product lines, the iron and steel sector comes second showing an average reduction in tariff protection of approximately 5.1 percentage points, followed by the processed food, furniture, paper, beverages and chemicals industries.[15] In addition, coefficients of variation displayed in Column (4) also reveal that the tariff cuts within individual industries were not conducted uniformly and were subject to considerable intra-industry (i.e. product-level) variations.

Table 1 further documents the EU's country- and product-specific use of antidumping measures for the 28 manufacturing industries over the period 1996-2008.[16] The industry with the largest number of antidumping investigations was the iron and steel industry with 491 investigated product-country pairs, followed by the textiles (232), industrial chemicals (114), fabricated metals (112), footwear (99) and electrical machineries (69) industries.[17] Analysing the number of AD-targeted product lines instead of product-country pairs (Table 1, Column 6) results in a very similar ordering with the iron and steel, chemicals and textile industries representing the sectors with the highest number of AD targeted product lines.[18]

[14] The relatively large average tariff reduction in the tobacco sector has to be interpreted with some caution as the tobacco sector only counts 6 HS 8-digit product lines, whereas the iron and steel industry includes 573 HS 8-digit products.

[15] The latter industries show average tariff cuts of 4.3, 4.2, twice 3.9 and 3.4 percentage points, respectively.

[16] A list of the countries targeted by an EU antidumping investigation over the considered time horizon is provided in Annex table 3.

[17] A similar ordering emerges when analysing the final imposed antidumping duties, with the iron and steel sector being the prime user of antidumping measures counting 218 product-country pairs subject to an antidumping duty. Further sectors with a rather high incidence of imposed duties are the fabricated metal (95), industrial chemicals (51), footwear (42) and electrical machineries (20) sectors.

[18] The exact industry ordering is iron and steel (147), industrial chemicals (43), textiles (41), footwear (36), electrical machinery (28), fabricated metals (22). Moreover, analysing the distribution of imposed preliminary and final duties per industry (Annex table 4) delivers further interesting insights. The highest preliminary duties were, on average, imposed in the non-metallic minerals (66.1), the non-electrical machinery (50.1) and the leather products (48.3) industries, while the sectors with the highest average of imposed final duties were the electrical (51.1) and non-electrical (48.0) machinery, as well as the footwear (47.6) and wearing apparel industries (46.4).

Table 1: Descriptive Statistics - European Antidumping Investigations between 1996 and 2008

		Coverage		UR Tariff Cuts			Antidumping Investigations	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
ISIC Code	Industry	Prod.-Ctry Pairs	Product Lines	Mean	Std. dev.	Coef. of variation	Targeted Products	Targeted Prod.-Ctry Pairs
311	Food Products	97.958	623	4.3	2.8	0.7	10	10
313	Beverages	5.284	14	3.9	3.6	0.9	0	0
314	Tobacco	1.669	6	23.8	12.9	0.5	0	0
321	Textiles	273.804	909	2.6	2.1	0.8	41	232
322	Wearing apparel	259.894	394	1.7	0.8	0.4	0	0
323	Leather products	50.077	107	1.6	1	0.6	11	11
324	Footwear except rubber	27.559	45	0.8	1.2	1.5	36	99
331	Wood products	45.629	113	3.2	1.7	0.5	6	6
332	Furniture except metal	29.185	37	4.2	1.6	0.4	0	0
341	Paper and products	52.671	206	3.9	2.1	0.5	2	14
342	Printing and publishing	28.046	40	3	2.4	0.8	0	0
351	Manufacture of industrial chemicals	177.633	928	2.4	2.7	1.1	43	114
352	Other chemicals	92.187	294	3.4	2.9	0.9	6	7
353	Petroleum refineries	13.306	69	1.3	0.9	0.7	1	1
354	Misc. Petroleum and coal	2.362	11	1.2	1.1	1	0	0
355	Rubber products	29.598	75	1.6	1.1	0.7	0	0
356	Plastic products	54.209	116	2.5	1.8	0.7	15	32
361	Pottery china earthenware	16.012	21	1.9	1.1	0.6	0	0
362	Glass and products	46.443	135	2.5	1.3	0.5	0	0
369	Other non-metallic mineral	39.926	113	2.3	1	0.4	9	12
371	Iron and Steel	92.062	573	5.1	2.2	0.4	147	491
372	Non-ferrous metals	64.325	245	1.6	1.5	1	4	10
381	Fabricated metal products	190.094	425	2.6	1.5	0.6	22	112
382	Machinery except electrical	374.185	946	2.3	1.3	0.6	10	12
383	Machinery electrical	236.631	472	2.5	2	0.8	28	69
384	Transport equipment	101.818	298	2	1.8	0.9	6	12
385	Professional and scientific	159.825	314	3.1	1.9	0.6	3	3
390	Other manufactured	118.016	248	3.2	1.8	0.6	8	26
	All Manufacturing Industries	2.680.408	7777	3.4	2.1	0.6	408	1273

Notes: The above statistics are based on the author's own calculation using product-country level import data from Comext, bound Uruguay Round tariff changes from the WTO's schedule of concessions and antidumping data from the World Bank's global antidumping database. The statistics displayed in Table 1 are based on 2,680,408 observations. It is worthwhile noting that while the above table includes all country-specific HS 8-digit EU import flows between 1996 and 2008 our estimations only include countries and 4-digit ISIC industries where at least one antidumping investigation had been initiated over the considered time horizon. Introducing lagged regressors and growth variables further reduces the estimating sample to 701,272 observations including 1061 antidumping targeted product-country pairs. Annex table 4 displays the distribution of AD investigations per industry for the estimating sample and shows an almost identical frequency distribution across different industries.

3. Conceptual Framework

Our empirical analysis is motivated by Anderson and Schmitt's (2003) theoretical framework which provides a rationale for investigating the impact of tariff liberalization on the use of quotas and antidumping measures. Building on Brander and Krugman's (1983) model of reciprocal dumping, they show that countries tend to resort to antidumping measures when tariffs and quotas are credibly restricted by coordinated (e.g. multilateral) commitments. Focusing on a two-country, two-firm, Cournot framework in which each firm sells the same good in both countries, Anderson and Schmitt (2003) analyse the choice between different trade policy instruments by means of a government objective function in the presence and absence of a multilateral liberalization commitment.[19] The governments' objective functions in both countries are thereby defined as: [20]

$$U(\tau_{i,} \tau_i^*) = [(\beta\ (\tau_i), \Pi(\tau_{i,} \tau_i^*)]. \quad (1)$$

The term β denotes consumer welfare including the provision of public goods financed by tariff revenue and Π represents domestic industry profits earned at home and abroad. τ and τ* are protection parameters respectively set by domestic and foreign policy makers.[21] Each government has tariffs, quotas and antidumping measures at its disposal; the latter options thereby defining τ:

$$\tau_i \in \{t_i, qr_i, ad_i\}, \quad (2)$$

where t_i represents an ad-valorem tariff rate for product i and qr_i and ad_i denote ad-valorem tariff equivalents of a binding quota or an antidumping restriction, respectively.
Assuming complete discretion for the government to set trade policy tools as freely as it chooses,[22] tariffs, when set unilaterally, are the most efficient protectionist trade policy tool. The intuition is that, while all three alternatives are likely to exert a similar impact on domestic prices, and by consequence on domestic producers' profits, non-tariff trade barriers are assumed to be more costly for governments since the latter won't generate any revenue gains. Given any tariff rate t, unilaterally imposed quantitative constraints are preferred to antidumping constraints, since the latter may exert a negative impact on the domestic

[19] For simplicity the authors exclude the potential entry and exit of firms. Since some form of market imperfection is need in order to explain the use of quotas and antidumping constraints, the authors assume an oligopolistic market structure. Adopting a strategic Cournot interaction implies a tariff quota equivalence if quotas are auctioned off (see for instance Hwang and Mai, 1988).
[20] Due to a symmetry assumption we focus in the following only on one country.
[21] τ is not explicitly mentioned in Anderson and Schmitt (2003) but has here been introduced for illustrative reasons. It is further worth noting that the domestic industry's profit does not only depend on the home government's (τ_i) but also on the foreign government's protection parameters (τ_i^*), through its sales abroad. Moreover, the utility function is assumed to apply to each industry individually and to be strictly increasing in each argument as well as to be characterised by a strictly diminishing marginal rate of substitution. U(.) is modelled by a Cobb-Douglas function of the form: $U= \beta^{1-\alpha}\ \Pi^{\alpha}$, where α denotes the weight the government puts on producers' profits. Following Stigler (1971) and Peltzman (1976), U(.) thereby takes into account the government's concern for consumer as well as producer surplus - a concern for voters and political campaign contributions. Anderson and Schmitt (2003) further assume that quotas cannot be licensed off and are thus lost to foreign producers.
[22] Several authors note that the use of antidumping measures is influenced by political-economy forces and thus may lead to a less strict interpretation of the (anti-)dumping legislation (Moore, 1992; Baldwin and Steagall, 1994; Zanardi, 2004).

industry's export profits whereas the former leave export profits unaffected.[23] As a result, the following preference ranking of trade policy tools emerges:

$$t_i \succ qr_i \succ ad_i \qquad (3)$$

Allowing both countries to commit to (reciprocal) trade liberalization via an internationally binding agreement, it is assumed that the tariff commitment reduces and restricts the use of external tariff protection relative to the unconstrained Nash equilibrium. Enhanced trade flows and declining local market power lead to Pareto improvements for both signatory countries [i.e. $U^c(.) > U^n(.)$]. Given a government's (still present) incentive to change the terms-of-trade to its own advantage the former may, however, decide to explore alternative (and potentially more subtle) ways of import protection following the binding tariff agreement.[24] In this context, the government is assumed to first negotiate binding multilateral tariff cuts in order to internalize terms-of-trade effects, and then to look for alternative ways to influence these to its own benefit. Given a restriction on the use of tariffs, the choice is between quotas or antidumping measures. In presence of an additional constraint on the use of quotas, antidumping actions prevail further limiting the scope of the protection parameter τ_i. The probability of using an antidumping measure on product i (illustrated by the variable ad_i), is thus conditional on a coordinated agreement on the use of tariffs (here illustrated by the absolute value of bound tariff reductions Δt_i^c), and a restriction on the use of quantitative import measures (qr_i^c) as illustrated in equation (4):

$$\Pr\,[ad_i = 1 \mid \Delta t_i^c \wedge qr_i^c\,] \qquad (4)$$

In this context, it is interesting to note that the Uruguay Round substantially reduced bound MFN tariffs for most signatory countries thereby representing a credible internationally-binding commitment on the use of tariffs. Moreover, the trade round also

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[23] Faced with an antidumping constraint imposed by country A, a supplying exporting firm (located in country B) then decides whether to exit the market or whether to supply A without dumping and thus complying to the condition: $p_A \geq p_B + t$. An antidumping constraint imposed on the foreign firm reduces the latter's output in country A, however, increases its output in country B (in order to comply with the above antidumping constraint), which will finally result in declining prices in B and increasing prices in A. An antidumping constraint imposed by country A on the foreign firm domiciled in B, therefore, not only protects the domestic industry but also reduces the domestic industry's export profits since profits are a decreasing function of the opponent's output.

[24] It is thereby assumed that both countries are not able to deviate from the lower negotiated tariff rates, as is the case when bound MFN tariff reductions are negotiated in GATT/WTO trade rounds. Furthermore, Anderson and Schmitt (2003) assume that trade agreements are formed to overcome negative terms-of-trade effects as illustrated in Bagwell and Staiger (1999). Others, like Maggi and Rodriguez-Clare (1998) and Limão and Tovar (2011), also include motives of better fending off lobbying pressure by having access to a commitment technology.

required its signatory countries to 'tariffy' quantitative restrictions and to limit their use in the future.[25] The use of NTBs, and in particular of antidumping measures, is however much less regulated. In light of very limited WTO-restrictions on the use of antidumping actions, we hence argue that the Uruguay Round trade agreements may represent a suitable policy setting for a potential substitution effect of declining tariff protection for an enhanced use of product-country level antidumping measures. We do not consider trade barriers stemming from technical and safety regulations given their rather less precise nature and the prevalent difficulties in finding adequate product level measures.[26] Moreover, by focusing on the Uruguay Round we based our empirical examination on an institutional framework in which policy-makers were enabled to credibly commit to binding tariff and quota restrictions. As a result, the policy context we study investigates the relationship between different forms of trade policy, and guided by the theoretical framework illustrated in this section, serves as a vehicle to address the question of trade policy substitution following major, coordinated trade reforms.

4. Empirical Methodology

4.1 Identification

In the previous section we argued that substantial bound tariff concessions and imposed restrictions on the use of quotas may lead to increasing incentives for the use of antidumping protection. To adequately account for the nature of antidumping measures we choose product-country pairs as the unit of our analysis. By focusing on product-country pairs – i.e. the use of antidumping measures targeting particular imported goods from a particular exporting country – we aim to account for the fact that antidumping policies are country-specific implying the existence of exporter-source directed factors which are likely to affect the antidumping process.

Our objective is to estimate the impact of the Uruguay Round bound tariff cuts on the probability of subsequent EU antidumping investigations between 1996 and 2008. We use linear, as well as non-linear, binomial panel data modelling techniques and define the

[25] Aiming to achieve greater transparency regarding trade restrictions a US-led proposal of 'tariffication' was adopted in the UR (Whalley, 1995). Moreover, the UR also terminated the use of Voluntary Export Restraints (VERs) within four years after its conclusion and banned their use in the future. Low and Yeats (2007) consider the latter trade policy constraint as an important achievement or the Uruguay Round.
[26] To the best of our knowledge there is no coherent time series data for technical barriers at the HS 8-digit level for the European Union. UN-TRAINS provides this information, at the HS 8-digit level only for the year 2009.

dependent variable (Y_{ijt}) as an indicator variable taking the value one if the EU initiated an antidumping investigation against a particular product-country pair ij in year t, defining the response probability as:

$$\Pr(Y_{ijt} = 1 | X_{n,i(j)t}, c_{ij}) = \Phi(\beta_n X_{n,i(j)t} + c_{ij}) \qquad t = 1, \ldots, T. \qquad (5)$$

where $X_{n,i(j)t}$ represents a vector of n explanatory variables and β_n the respective parameter estimates; c_{ij} denotes an unobservable product-country pair-specific and time-invariant effect, while $\Phi(.)$ describes the underlying distribution function. Analysing product-country pairs in a panel data framework additionally allows accounting for year-specific information which, alongside country-directed variation, is likely to represent an important element when analysing antidumping investigations. Our econometric specification is based on equations (4) and (5), and is thus given by:

$$Y_{ijt} = \alpha + \beta_1 \Delta t_i + \beta_2 Z_{i(j)t\text{-}1} + \delta_n + \upsilon_k + \eta_t + \mu_{ijt} \qquad (6)$$

We define the binary dependent variable Y_{ijt} at the HS 8-digit product level. [27] Our main explanatory variable is the variable Δt_i representing the absolute value of the (bound) MFN tariff change negotiated during the Uruguay Round. Based on the conceptual framework presented in section 3, the main theoretical prediction is that the coefficient of Δt_i is positive and that the size of the coefficient captures the probability of an antidumping investigation following the Uruguay Round. We additionally introduce a series of product-country and industry control variables captured by the vector $Z_{i(j)t}$ which are not directly based on the conceptual prediction in equation (4) but have been suggested by the relevant literature.[28] First, the lagged level of HS 8-digit import flows may represent an important determinant for the initiation of an antidumping investigation given that a higher level of import flows from a particular trading partner may a priori increase the potential for rent destruction and squeezed profit margins for the domestic industry. Second, given that EU law

[27] A small fraction of AD investigations used in this study were initiated at the HS 10-digit product level. The latter observations have been transformed into HS-8 digits, providing a potential, although considerably small, bias when estimating the impact of tariff cuts on AD use.

[28] It is worth noting that we introduce all control variables with a one-year lag. Using a slightly lagged expression also limits potential endogeneity concerns due to reverse causality given that past or prospective antidumping measures may contribute to more aggressive tariff liberalisation (cf. the ‘safety valve’ argument). The current scarce literature on the antidumping ‘safety valve’ hypothesis has however not found any empirical evidence for anti-dumping measures making tariff reductions more likely. On the contrary, Moore and Zanardi (2011) find evidence for the opposite (i.e. AD resulting in less tariff liberalisation) when analysing a group of heavily AD-using emerging economies.

directly refers the investigating authorities to a consideration of a potential increase in allegedly dumped products as well as to an examination of a potentially depressing effect on domestic prices, we also add the lagged growth of product-country specific import flows and unit values, both in percentage terms. Third, to account for a potential retaliatory character of antidumping investigations – i.e. a higher probability of antidumping actions against countries and industries which initiated their own antidumping investigations against EU producers in the past,[29] we construct a measure which aims to account for the latter. We define an indicator variable taking the value one if an exporting country's industry initiated an antidumping procedure at the HS 6-digit product level in the same ISIC 4-digit industry within a time period of five years preceding the EU's own antidumping investigation. Moreover, accounting for further unobserved industry characteristics which are likely to determine the probability of material injury and thus the finding of dumping, as well as to control for factors such as market-specific demand and supply shocks, we additionally include industry dummies (δ_n) at the ISIC 4-digit level.[30] Finally, in order to account for unobserved time-specific factors and the possibility that some countries may be more likely to face antidumping investigations we also include year (η_t) and exporting-country specific (ϑ_k) dummies in the model.[31]

Our final estimation sample includes 47 countries which were targeted by the EU in 36 separate ISIC 4-digit categories over the time horizon 1996 to 2008. Including product-country level growth- as well as lagged variables, our empirical analysis is based on a sample of 701,272 importing product-country-year observations and 1061 antidumping investigations. The investigation excludes all observations with zero trade values as well as agricultural products because of the heavy incidence of non-AD measures in that sector.

4.2 Data

The exact definition of the variables in the empirical analysis and their data sources are presented in Annex Table 1. Summary statistics are provided in Annex Table 2. In this section we describe some of the dataset's most salient features. We use product-country specific EU antidumping data retrieved from the World Bank's global antidumping dataset

[29] Bloningen and Bown (2003), and Feinberg and Reynolds (2006), for example, provide evidence for the retaliatory character of antidumping measures.
[30] Using 4-digit industry dummies defined according to the Harmonised System (HS) results in qualitatively similar findings (the results are available upon request).
[31] Bown (2010) points out that countries like China, for instance, may be more likely to face antidumping investigations across different products.

(GAD) for the post-UR time period 1996 to 2008.[32] The EU's HS 8-digit bound Uruguay Round tariff commitments are obtained from the WTO's schedule of concessions, while the information on product-country specific trade value and quantity import flows are retrieved from the EU's Comext database. Taking into account the potential retaliatory character of antidumping actions we construct the retaliation indicator variable using antidumping information of countries targeting the EU within a preceding 5-year window. The antidumping data on countries targeting the EU is also from the World Bank's global antidumping database.

Finally, in order to link the information on product-country level antidumping investigations from 1996 to 2008 to the EU's product-level Uruguay Round tariff concessions concordance tables from the EU's Ramon database have been employed. Using concordance tables and merging the antidumping data with time and product-country level import data results in 1273 antidumping targeted product-country pairs.[33] Including lagged values and introducing the import and unit-value growth variables as additional regressors in the model reduces the number of antidumping targeted observations to 1061.

4.3 Estimation Strategy

Our estimation strategy is based on three modelling techniques. We first use a linear panel data specification which serves as a benchmark. In spite of representing a valid approximation of the average partial effects (APEs) of our independent variables, using linear estimation techniques for binary response models may also imply certain shortcomings such as nonsensical probability values – i.e. values that lie outside the unit interval (Wooldridge, 2002). We therefore employ two alternative non-linear modelling strategies. Assuming an underlying standard normal distribution function $\Phi(.)$ we additionally estimate pooled as well as panel data probit models.[34]

In order to control for potentially omitted variables at the product-country level and given a restriction on the use of fixed effects estimation techniques due to the time-invariant

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[32] Using a slightly lagged expression also limits potential endogeneity concerns due to reverse causality given that past or prospective antidumping measures may contribute to more aggressive tariff liberalisation (cf. the 'safety valve' argument).

[33] Note that all product level trade and antidumping information has been standardised to HS-1988 product codes using concordance tables. Only very few AD-targeted goods were split into multiple lines between 1996-2008, or vice versa. In case several product lines were merged into one, which was then involved in an AD investigation over the considered time horizon, only one product line was kept to avoid the problem of multiplication of AD-targeted product lines.

[34] The most commonly used distributions are the probit and logistic functions which both assume that Φ only takes values between 0 and 1.

nature of our main explanatory variable (i.e. the UR bound tariff cuts), we additionally combine the above mentioned modelling techniques with an alternative estimation method suggested by Chamberlain (1980) in the specification of Mundlak (1978). The latter estimation framework is based on the assumption that the time-invariant unobserved effect c_{ij} is a function of the means of the time-varying explanatory variables: $c_{ij} = \alpha_0 + \alpha_1 \overline{Z}_{ij} + \eta_{ij}$.[35] Using the latter property we implement a correlated random effects (CRE) model by introducing a vector of variables consisting of the time means of the time-varying regressors. Mundlak (1978) argues that the introduction of the latter time averages as additional controls explicitly allows for the individual specific effect being correlated to (at least) some elements of $X_{n,i(j)t}$. The latter estimation framework allows us to take into account potential unobserved heterogeneity concerns as well as a possible correlation between the individual-specific unobserved components with the, in the model, introduced characteristics. In order to gauge our findings we employ a random-effects (RE) linear as well as two alternative probit modelling techniques and test their sensitivity to the use of the Chamberlain-Mundlak correlated random effects estimation framework.[36]

5. Results

5.1 Main Findings

Table 2 contains the main findings for the effect of bound MFN tariff concessions on subsequent antidumping investigations at the product-country level. Column (1) presents the estimation results using the linear RE panel data model, while Columns (2) and (3) contain the estimated coefficients and average partial effects (APEs) from the pooled and panel probit specifications, respectively, without controlling for unobserved heterogeneity. Columns (4) to (6) display the results for the latter three techniques including unobserved heterogeneity using the Chamberlain-Mundlak approach.

With and without controlling for unobserved time-constant factors the coefficients as well as the estimated average partial effects, for the UR bound tariff variable are positive and statistically highly significant in all model specifications; indicating on average a positive

[35] Note that it is also assumed that the time-constant unobservable features are determined by a conditional normal distribution (i.e. $(c_{ij}|Z_{ij})\sim N(\alpha_0 + \alpha_1 \overline{Z}_{ij}, \sigma^2_\eta)$.

[36] Omitting the random-effects in the linear model specifications does not change the results. The latter findings are available upon request.

impact of the EU's Uruguay Round tariff concessions on the probability of subsequent antidumping investigations. Reporting average partial effects that vary between 0.002 and 0.011, our findings are consistent with the theoretical predictions and tend to provide empirical support for the hypothesis of trade policy substitution following the last successfully concluded multilateral trade round. This result stands in contrast to Feinberg and Reynolds (2007) as well as Moore and Zanardi (2011) who, analysing tariff reductions at rather broad industry levels, find either the opposite when analysing filed antidumping petitions in a sample of traditional AD using developed economies (including the EU) or no significant relationship for developed economies at all.[37]

Analysing the estimation results across different econometric specifications shows that the largest average marginal effects of around 0.010 and 0.011 were reported in the linear probability model (LPM), while the pooled and panel maximum likelihood estimations (MLE) show slightly smaller, but still highly significant, APEs of around 0.009 and 0.002. Controlling for unobserved heterogeneity using the Chamberlain-Mundlak device does not affect the latter results, again indicating robust findings (Table 2, Columns 4 to 6). Despite playing a crucial role in determining the probability of a future EU antidumping investigation from a statistical point of view, the economic impact of the Uruguay Round (bound) tariff reductions tends to be rather limited. A 0.00002 to 0.00011 average percentage point probability increase for a future AD investigation for each one percentage point reduction in bound MFN tariffs indicates a rather small effect, given that the EU's bound tariffs were reduced by around 2.7 percentage points on average. The very disaggregate focus of our product-country level study may, however, partially explain the limited magnitude of our baseline findings – a hypothesis which tends to be supported by larger coefficients when excluding the country dimension (see section 5.2).

The magnitude and statistical significance of the ISIC 4-digit industry dummies provides further interesting insights. They indicate a highly significant influence in oligopolistic sectors such as the industrial chemicals (3512, 3513), iron and steel (3710), fertilizers and pesticides (3710) and the fabricated metal and electrical machinery industries

[37] Feinberg and Reynolds (2007) find an average probability increase of subsequent AD fillings of 0.0042 percentage points per one percent tariff cut when focusing on a sample of 24 WTO-member countries. Looking only at industrial countries the findings of Feinberg and Reynolds (2007) suggest a higher probability for antidumping investigations in industries with rather small UR tariff concessions. Moore and Zanardi (2011) do not find consistent and statistically robust evidence for a trade policy substitution effect in developed countries when analysing the link between sector-level applied tariff and subsequent AD measures. The authors however find, for a group of developing economies, that a one percent increase in tariff cuts increases the average probability of an industry-level AD petition between 0.24% and 0.40%.

(3819 and 3832).[38] An important impact of more oligopolistic organised sectors also tends to be highlighted when only focusing on the ISIC 4-digit industries with at least 50 product-country level antidumping investigations over the considered time horizon. For these regressions, displayed in Annex Table 6, the main explanatory variable coefficients have a higher magnitude (compared to the baseline specification in Table 2). The results also show statistically highly significant and in size larger average marginal effects that vary between 0.019, 0.018 and 0.005 for the linear, non-linear pooled and panel data specifications, respectively, which remain largely unaffected when using the Mundlak-Chamberlain estimation approach (Annex Table 6, Columns 1 to 6).

Computing marginal effects which are evaluated at fixed (mean) values of each explanatory variable (MEMs), instead of calculating the average of discrete changes over the whole sample (APEs), provides an alternative method to estimate marginal effects. [39] Given that MEMs may still provide an "asymptotically valid approximation" of average partial effects (APEs) (Greene, 1997:876), we additionally estimate equation (6) with MEMs. The results are reported in Annex Table 5 and corroborate the earlier findings by showing the same values for the linear model estimations and slighter smaller marginal effects at mean values (MEMs) of 0.002 for the pooled and panel MLE regressions compared to the average partial effects (APEs) displayed in Table 2.

The signs and significance of the remaining control variables in Table 2 are generally in line with the literature on the factors determining antidumping investigations. The retaliation indicator variable shows positive parameter estimates and average partial effects in all model specifications presented in Table 2, which are, however, only significant when using probit estimation techniques.[40] Average partial effects of around 0.002 to 0.001, when estimated with pooled or panel MLE, may therefore point to a higher probability of EU antidumping investigations against imports from trading partners whose industries had previously been targeted by EU exporters in the same ISIC 4-digit industry (Table 2, Columns 2 and 3). The latter result may therefore, under certain circumstances, point a retaliatory character of EU antidumping protection.[41]

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[38] Note that these results are not reported in Table 2, but are available upon request.

[39] To the best of our knowledge, the existing literature does not clearly favour one estimation method over the other. Some studies favour APEs over MEMs in particular in the presence of dummy variables (Long, 1997; Greene, 1997). Long (1997), for instance, points out that the presence of indicator variables among the explanatory variable may make the computation of MEM refer to inherently nonsensical observations.

[40] Note that the industry retaliation indicator have positive coefficients and APEs, which are however not significant at the usual levels when using a linear panel estimation approach (Table 2, Columns 1 and 4).

[41] Note that the retaliation results remain the same when using Chamberlain's model modifications (Table 2, Columns 5 and 6).

The lagged value of product-country specific imports is also shown to have estimated coefficients which are consistent with the theoretical predictions. They show a positive and statistically significant impact on the propensity of subsequent antidumping investigations in all model specifications. This may indicate that products which tend to be exposed to a high degree of foreign import competition are more likely to be protected by an EU antidumping investigation. While the linear model specifications show the largest APE approximations for the import value variable of 0.118 and 0.075 (Table 2, Columns 1 and 4, respectively), the pooled and panel probit models show considerably smaller values which lie between 0.020 and 0.002.

The effect of the lagged growth of product-country specific imports shows mixed results which are, however, not significant at the usual levels. Positive parameter estimates can only be reported for the estimations using the pooled or panel probit model and controlling for unobserved heterogeneity. As a result, our findings tend to provide no support for the argument that the EU's antidumping authorities are more likely to launch an antidumping investigation against products from partner countries with preceding import growth.[42]

Analysing the effect of the lagged unit value change, used as a proxy for domestic price evolutions which are likely to play an important role according to the EU's regulatory investigation framework, shows a negative sign for the average partial effect calculations. These are however only statistically significant when using a panel data estimation technique with or without controlling for unobserved heterogeneity.[43] Our estimation results may thus partially point to a significant effect of declining prices on the probability of an EU antidumping investigation.

[42] Using two or three-year lags or lagged averages over 2 and 3 years for the product-country level import growth variable results in qualitatively identical findings. The results are available upon request.

[43] Despite reporting negative parameter estimates and average partial effects, the latter are not significant at the usual levels when using a pooled probit estimation approach.

Table 2: The Impact Uruguay Round Bound Tariff Concessions on subsequent Antidumping Measures: Average Partial Effects

	(1)	(2)		(3)		(4)	(5)		(6)	
Model	Linear	Probit		Probit		Chamberlain's Linear RE	Chamberlain's RE Probit		Chamberlain's RE Probit	
	RE	Pooled MLE		MLE		RE	Pooled MLE		MLE	
Estimation Method	Coefficient	Coefficient	APE	Coefficient	APE	Coefficient	Coefficient	APE	Coefficient	APE
UR (bound) tariff cuts	0.010***	1.829***	0.009***	2.030***	0.002***	0.011***	1.901***	0.009***	2.135***	0.002***
	(0.004)	(0.572)	(0.003)	(0.729)	(0.001)	(0.004)	(0.571)	-0.003)	(0.730)	(0.001)
Industry Retaliation Indicator	0.003	0.379***	0.002***	0.492***	0.001***	0.003	0.382***	0.002***	0.496***	0.001***
	(0.002)	(0.107)	(0.001)	(0.143)	(0.0002)	(0.002)	(0.107)	(0.001)	(0.143)	(0.0001)
Import Value$^{\zeta}$	0.118***	4.295***	0.020***	5.417***	0.006***	0.075***	1.831***	0.009***	2.126*	0.002*
	(0.029)	(0.965)	(0.005)	(0.850)	(0.001)	(0.029)	(0.487)	(0.002)	(1.123)	(0.001)
Import Value Growth$^{\zeta}$	-0.033	-4.049	-0.019	-6.857	-0.007	-0.017	10.734	0.050	10.534	0.011
	(0.047)	(8.439)	(0.039)	(31.762)	(0.033)	(0.037)	(8.035)	(0.037)	(31.858)	(0.034)
Unit Value Growth$^{\xi}$	-0.232*	-21.465	-0.010	-23.388***	-0.024**	-0.225*	-21.473	-0.010	-23.220**	-0.025**
	(0.125)	(13.152)	(0.061)	(9.031)	(0.010)	(0.125)	(13.207)	(0.061)	(9.039)	(0.010)
Constant	0.002**	-3.276***	-	-0.744***	-	0.001*	-3.284***	-	-0.744***	-
	(0.001)	(0.336)	-	(0.094)	-	(0.001)	(0.336)	-	(0.094)	-
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak Transformations	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Observations	701272	634378	634378	701272	701272	701272	634378	634378	701272	701272
Log likelihood	-	-6401.87	-6395.88	-6264.13	-6254.87	-	-6386.24	-6380.44	-6248.26	-6239.34
Pseudo R-squared	-	0.19	0.18	0.18	0.18	-	0.19	0.19	0.17	0.17
Wald(chi2) p-value	0.000[(a)]	0.000	0.000	0.000	0.000	0.000[(a)]	0.000	0.000	0.000	0.000

Notes: Standard errors are in parentheses below all coefficients or Average Partial Effects (APEs). *, **, *** respectively denote the 10%, 5%, 1% significance levels. ζ and ξ indicates that the respective variable has been re-scaled by 10,000,000 and 1,000 respectively. For the linear RE model, pooled probit, and Chamberlain's pooled MLE estimation, the serial-correlation robust standard errors were computed by using clustering at the product-country level. Due to prohibitive estimation times standard errors using bootstrapping estimation techniques were not computed for the panel data MLE estimations (column 6). The superscript (a) at the bottom of the table indicates that the p-values reported for the linear probability models are based on F-tests.

5.2 Robustness Tests and Additional Specifications

We examine the robustness of the results by conducting a series of sensitivity tests using alternative estimation techniques and additional model specifications. Table 3 presents a summary of these findings. First, we introduce an additional explanatory variable to test the sensitivity of the results to the inclusion of the lagged level of applied MFN tariffs in each year. Since bound tariffs reflect the highest MFN rate possible and thus a ceiling value agreed upon in multilateral – i.e. coordinated – tariff negotiations, focusing on the latter provides a consistent framework for the theoretical framework set out in section 3. Nevertheless, including the level of applied MFN tariffs as an alternative trade liberalization measure may provide some additional insights on the impact of existing tariff protection.[44] Columns (1) to (3) in Table 3 show the computed average marginal effects for all three modelling techniques used in the previous section including the lagged level of applied MFN tariffs. Columns (1) to (3) confirm the main results of Table 2 by showing a positive effect of applied as well UR bound tariff rates, the latter however at a slightly lower significance level.[45]

Additionally introducing the (lagged) difference between the upper bound and applied tariff rates in percent of the applied MFN rate as a further control variable in the model, which may reflect the EU's flexibility to increase the (applied) MFN tariff in order to provide additional import protection, results in qualitatively similar results for the applied as well as the bound tariff rates when estimated with linear or non-linear probit estimation techniques (Columns 4 to 6, Table 2). The estimation results for the tariff overhang variable report positive coefficients which are however only significant when estimated with the linear model. This result is rather surprising as it indicates a lower probability for an antidumping investigation where bound-applied tariff margins are small. [46]

[44] It should be noted that, in contrast to developing countries, the difference between the latter two types of tariffs is in the case of developed economies generally rather small.

[45] The results for the lagged applied MFN tariff rate indicate that products with higher applied MFN tariffs in the previous year also are more likely to be protected by antidumping actions. These results are however not surprising if we assume that the use of some kind of formulaic approach, in the UR, led to larger tariff cuts on initially high bound (and also applied) MFN tariffs thereby reducing but not eliminating the within-industry variation of tariff rates. The positive correlation between applied and bound tariff rates, in particular in the case of developed economies may then explain why products with higher applied MFN tariffs may also have been subjected to larger bound cuts. Larger cuts for initially high tariff rates as well as similar inter-industry distribution of pre- and post-UR tariff levels tend to be confirmed by a visual inspection of the inter-industry tariff distribution (graphs available upon request). Due to the presumably strong correlation between the UR-negotiated tariff cuts and applied MFN tariffs, the latter specification represents a suitable robustness check but is not our preferred model specification.

[46] Omitting the lagged level of applied tariffs in this specification results in an even more significant effect of the UR tariff cuts but renders the impact of the tariff overhang variable insignificant in all estimations. This suggests significant inter-correlation when including the applied tariff level and the tariff overhang variable in

We also run an additional model specification by including MFN applied rather than UR-bound tariff changes in the model (Table 3, Columns 7 to 9). Examining applied tariff rates allows for considering the fact that the agreed tariff cuts were phased in over several years. Given a potential time lag for the tariff reductions to result in an increased import competition and injury for the domestic industry as well as the possibility of industries adjusting to increased competition over time, we introduce the absolute change in applied tariffs over three years.[47] The findings for the linear, pooled and panel probit model show, for all specifications, positive coefficients for the applied tariff change variable which are, however, imprecisely measured, and hence only provide weak support for the substitution hypothesis when looking at applied tariff rates.

Moreover, we also perform an additional robustness test by following Feinberg and Reynolds (2007) and inter-act the EU's negotiated (UR) tariff reductions with a log trend variable to proxy the impact of the UR-bound tariff cuts over time in a different way, as well as to contrast our findings more closely to Feinberg and Reynolds (2007).[48] While the regressions in Column (10) are based on a random-effects probit panel data model, the estimations results in Columns (11) and (12) use fixed-effects logit and linear panel data regression techniques. The results, displayed in Table 3, Columns (10) to (12), tend to corroborate previous findings, in favour for trade policy substitution, by showing a highly significant impact of the EU's UR tariff concessions on the probability of future antidumping measures in all model specifications.

Finally, we also test the EU's antidumping bound MFN tariff relationship by dropping the country dimension and transforming the dataset into an HS 8-digit product-level panel. Examining the product-level link between EU tariff cuts and the subsequent use of alternative forms of import protection may provide further support for trade policy substitution following the Uruguay Round. The results are displayed in Annex Table 7 and confirm previous results in favour for a significant positive relationship between the size of the EU's bound external tariff commitments and the likelihood of a subsequent anti-dumping investigation in all model specifications. The results show average partial effects that vary between 0.029 and

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the same specification. Moreover, dropping the UR tariff cut variable and only focusing on the tariff overhang variable leads to non-significant results in a fixed effects linear probability model specification.

[47] Using changes over four or five year results in similar findings, which are available upon request.

[48] Feinberg and Reynolds (2007:953) introduce this interaction "in order to capture the change in the impact of the reductions over time. For example, one would expect there to be a lag in the impact of tariff reductions on antidumping filings both because the reductions were phased in between 1996 and 1999 and because of the time it would take for industries injured by tariff reductions to file a petition. One might also expect that the impact of the tariff reduction may diminish over time as industries adjust to the new, lower tariff rates."

0.052. The signs and significance of the control variables are also broadly in line with the earlier product-country level findings.

Table 3: Robustness Analysis: EU bound tariff concessions and antidumping investigations: Average Partial Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Model	Linear	Probit	Probit	Linear	Probit	Probit	Linear	Probit	Probit	Probit(RE)	Logit(FE)	Linear
Estimation Method	RE	Pooled MLE	MLE	RE	Pooled MLE	MLE	RE	Pooled MLE	MLE	MLE	MLE	FE
	Coefficient	APE	APE	Coefficient	APE	APE	Coefficient	APE	APE	APE	APE	Coefficient
UR (bound) tariff cuts	0.007*	0.006*	0.004*	0.011**	0.008*	0.006*	-	-	-	-	-	-
	(0.004)	(0.003)	(0.002)	(0.006)	(0.004)	(0.003)	-	-	-	-	-	-
UR (bound) tariff cuts*ln(T)	-	-	-	-	-	-	-	-	-	0.001***	1.185***	0.012**
	-	-	-	-	-	-	-	-	-	(0.0004)	(0.404)	(0.005)
Applied MFN tariff changes	-	-	-	-	-	-	0.0002	0.0001	0.0001	-	-	-
	-	-	-	-	-	-	(0.0007)	(0.0003)	(0.0002)	-	-	-
Applied MFN tariff	0.015***	0.013***	0.009***	0.0002***	0.0002***	0.0001***	-		-	-	-	-
	(0.002)	(0.002)	(0.002)	(0.00003)	(0.00002)	(0.00002)	-		-	-	-	-
Tariff Overhang	-	-	-	0.0004**	0.0003	0.0002	-		-	-	-	-
	-	-	-	(0.0002)	(0.0002)	(0.0002)	-		-	-	-	-
Industry Retaliation Indicator	0.003	0.002***	0.001***	0.005	0.002***	0.002***	0.063***	0.013***	0.010***	0.001***	-	-
	(0.002)	(0.001)	(0.0004)	(0.003)	(0.001)	(0.001)	(0.018)	(0.004)	(0.004)	(0.0002)	-	-
Import Value$^{\zeta}$	0.108***	0.019***	0.014***	0.285***	0.045***	0.033***	0.006*	0.0025***	0.0019**	0.006***	3.868**	0.067***
	(0.028)	(0.004)	(0.003)	(0.071)	(0.009)	(0.005)	(0.003)	(0.0006)	(0.0007)	(0.001)	(1.377)	(0.015)
Import Value Growth$^{\zeta}$	0.009	0.087**	0.062	-0.003	0.111	0.079	0.008	0.0379	0.0284	-0.007	1.271	-0.034
	(0.037)	(0.039)	(0.088)	(0.035)	(0.071)	(0.095)	(0.056)	(0.468)	(0.355)	(0.033)	(32.960)	(0.137)
Unit Value Growth$^{\xi}$	-0.00002*	-0.129	-0.092***	0.00001	-0.229**	-0.167***	-0.00001	-0.0153	-0.0117	-0.024**	-2.949	-0.00001
	(0.00001)	(0.081)	(0.034)	(0.00001)	(0.107)	(0.055)	(0.00001)	(0.025)	(0.019)	(0.010)	(4.079)	(0.0002)
Mundlak Transformations	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Observations	575365	509737	575365	483635	406263	483635	410302	410302	410302	701272	9445	701272
Log likelihood	-	-5113.95	-5109.95	-	-4280.42	-4278.75	-	-3611.59	-3601.21	-6252.22	-2034.62	-
Pseudo R-squared	-	0.19	0.19	-	0.20	0.20	-	0.22	0.18	0.003	0.10	-
Wald(chi2) p-value	0.000[(a)]	0.000	0.000	0.000[(a)]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000[(a)]

Notes: Standard errors are in parentheses below all coefficients or Average Partial Effects (APEs). *, **, *** respectively denote the 10%, 5%, 1% significance levels. All regressions in Table 3 include time-specific fixed effects. The results displayed in the columns (1) to (6) are based on estimations which include exporting country as well as (ISIC 4-digit) industry-level dummies. For the linear RE models and the pooled probit serial-correlation robust standard errors were computed by using clustering at the product-country level. Due to prohibitive estimation times standard errors using bootstrapping estimation techniques were not computed for the panel data MLE estimations (columns 3 and 6). Columns (7) to (9) report the findings when focusing on applied tariff changes. Columns (10) to (12) report the estimation results when interacting the UR tariff concessions with a log trend variable in order to proxy the latter's over time changing impact (i.e. phasing-in schedules). ζ and ξ indicates that the respective variable has been re-scaled by 10,000,000 and 1,000 respectively. The superscript (a) at the bottom of the table indicates that the p-values reported for the linear probability models are based on F-tests.

6. Conclusions

Using data at the product-country level, this paper examines the impact of bound MFN tariff cuts, negotiated during the Uruguay Round, on subsequent EU anti-dumping actions. Our findings tend to provide empirical support for the hypothesis of an enhanced use of antidumping protection following coordinated (e.g. multilateral) tariff liberalization when coupled with an additional constraint on the use of quantitative protectionist measures. Based on a persisting incentive to alter the terms of trade policy-makers may be more likely to resort to alternative WTO-permitted forms of import protection following major multilateral trade reforms. In light of the Uruguay Round's tariff commitments as well as its restrictions on the future use of quotas, we consider the latter to represent a suitable testing ground for the above theory. We test the effect of the UR negotiated tariff reductions on subsequent product-country level EU anti-dumping investigations initiated between 1996 and 2008.

Our results tend to point to a substitution of different forms of trade policy instruments following the Uruguay Round, with a statistically highly significant impact of bound MFN tariff concessions on the probability of future antidumping investigations being identified. The average partial effects vary between 0.010 and 0.002, which indicates a positive, but quantitatively limited, probability increase of up to 0.00010 percentage points per one percentage point tariff reduction agreed upon during the UR.

Our findings stand in contrast to previous studies in the literature. These studies either find no statistically viable relationship between tariff liberalization and antidumping measures for developed economies, or even a weak negative link between the latter two forms of import protection as shown by Moore and Zanardi (2011) and Feinberg and Reynolds (2007), respectively.[49] Common to both of the latter two studies is that they focus on rather broad industry-level tariff and antidumping actions. However, antidumping measures are, in general, imposed on a very disaggregated product-level, giving rise to a potential bias. Interestingly, our results tend to corroborate those of Bown and Tovar (2011) who analyse HS 6-digit product-level tariff cuts in India and find evidence for tariffs being substituted by an enhanced use of antidumping and safeguard measures.

To sum up, our findings tend to point to a substitution effect of bound MFN tariff protection for more antidumping investigations in the European Union. Our results show that

[49] Note that Moore and Zanardi (2011) focus on sectoral applied and not on bound MFN tariff changes between 1991 and 2001. Feinberg and Reynolds (2007) find a significant positive link between bound MFN tariff cuts and subsequent antidumping actions mainly for developing countries and a rather weak negative relationship for traditional AD using countries (i.e. Australia, Canada, EU, New Zealand, and the USA).

coordinated tariff liberalization is partially reversed by the use of alternative trade remedy instruments, and caution against only focusing on tariffs as a country's trade liberalization indicator. Moreover, our empirical analysis also provides evidence that the substitution of tariffs for more antidumping protection is an aspect of trade policy in emerging economies, as indicated in previous studies, but is also to be found in developed economies.

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ANNEX

Annex Table 1: Variable Description and Data Sources

Variable	Abbreviation	Exact definition	Source
		Dependent variable	
Anti-dumping indicator variable	ad_{ijt}	Indicator variable that equals one if the EU initiated an antidumping investigation on a particular product-country pair ij	Bown (2012)
		Main Explanatory variable	
Bound MFN tariff rate reductions	Δt_i	Bound 'Most Favoured Nation' (MFN) tariff reductions agreed upon during the Uruguay Round	WTO + authors' own calculations
		Control Variables	
Import trade value	imp_{ijt}	Trade value of HS 8-digit import flows in 1000 ecu	COMEXT
Industry Retaliation Indicator	R_{ijt}	Indicator variable which takes the value one if the foreign investigated ISIC 4-digit industry had filed an antidumping investigation against exports from a European Member State in the same sector during the past 5 years	Bown (2012) + authors' own calculations
Import Value Growth	Δimv_{ijt}	HS 8-digit Import trade value change in 1000ecu	COMEXT + authors' own calculations
Unit Value Growth	Δuv_{ijt}	HS 8-digit unit value changes calculated as product level import value over import quantities	COMEXT + authors' own calculations
UR concession trend variable	$UR*log\text{-}trend_i$	Interaction between a log trend variable and the bound MFN rate UR tariff concessions at the HS 8-digit product level (i.e. UR-reduction*ln(T), where the year 1995 represents t=1)[(a)]	WTO + authors' own calculations
Tariff overhang	$overhang_i$	HS 8-digit product-level difference between bound MFN and applied MFN tariff rates in percent of the applied rate	WTO + COMEXT + authors' own calculations
Applied tariffs	$MFN\text{ -}applied_i$	Applied most-favoured nations (MFN) tariff rate at the 8-digit HS product level	COMEXT
Imposed AD duties	$final\text{-}duty_i$	Final imposed punitive (ad-valorem) tariff duty at the 8-digit HS product level (preliminary imposed duties were used when the final duties were missing)	Bown (2012)

Notes: (a) Defining a UR concession trend variable follows the estimation approach chosen by Feinberg and Reynolds (2007:953) and aims at capturing "the change in the impact of the reductions over time." Using the year 1994 as t=1 (and thus 1996 as t=3), results in qualitatively identical findings.

Annex Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Antidumping indicator	0.002	0.039	0.000	1.000
Uruguay Round tariff change	0.027	0.020	0.000	0.268
Industry retaliation indicator	0.003	0.051	0.000	1.000
Import value	0.001	0.005	0.000	0.808
Import value growth	2.03*10-6	0.0004	-1.00*10-7	0.253
Unit value growth	0.002	0.289	-0.001	148.59
UR concession trend variable	0.052	0.042	0.000	0.401
Tariff overhang	-0.234	0.324	-1.000	3.333
Applied tariffs	0.050	0.038	0.000	0.406
Imposed AD duties	29.16	19.64	0.000	96.80

Notes: The summary statistics of the explanatory variables used in the main specifications estimated in table 2 are based on a sample of 701,272 observations. Including the applied tariff rate reduces the sample to 575,365 year product-country observations. The summary statistics of the latter variable and the tariff overhang are thus based on a slightly smaller dataset. It is further worth noting that the import value and import value growth variables have been re-scaled by 10,000,000, whereas the unit value-growth variable has been re-scaled by a factor of 1,000.The reported values for imposed AD duties were calculated over product lines involved in a case which ended in a fine. If the final fine was zero, the preliminary fine (not reported here but available upon request) was in all cases significantly larger than zero.

Annex Table 3: Descriptive Statistics - European Antidumping Investigations between 1996 and 2008: Targeted Countries

				Antidumping Investigations	
		(1)	(2)	(3)	(4)
No.	Targeted Country	Prod.-Country Pairs	Product Lines	Targeted Products	Targeted Prod.-Country Pairs
1	Algeria	5.823	1.783	1	1
2	Armenia	1.518	690	1	1
3	Australia	31.347	4.319	2	2
4	Belarus	13.481	2.941	9	9
5	Bosnia Herzegovina	11.708	2.868	3	3
6	Brazil	34.006	4.514	5	5
7	Bulgaria	24.114	4.007	13	13
8	Canada	42.811	4.801	0	0
9	China	50.899	5.037	280	305
10	Croatia	27.788	4.127	14	19
11	Czech Republic	30.048	4.697	18	18
12	Egypt	19.646	3.553	36	50
13	Estonia	15.975	3.514	4	4
14	Hong Kong	34.357	4.303	2	2
15	Hungary	26.557	4.534	13	14
16	India	42.708	4.805	113	131
17	Indonesia	26.821	3.892	29	43
18	Iran	10.969	2.639	10	10
19	Japan	50.358	4.949	20	26
20	Kazakhstan	4.508	1.504	4	4
21	Latvia	9.843	2.784	2	2
22	Libya	2.525	962	13	13
23	Lithuania	11.899	3.080	11	11
24	Macao	5.032	1.449	0	0
25	Macedonia	10.510	2.713	2	2
26	Malaysia	27.048	3.871	28	36
27	Mexico	27.294	4.088	3	3
28	Moldova	5.728	1.910	8	8
29	Pakistan	14.484	2.749	21	40
30	Philippines	17.608	3.062	7	7
31	Poland	28.958	4.692	15	15
32	Romania	28.183	4.229	20	25
33	Russia	35.213	4.567	46	51
34	Saudi Arabia	14.407	2.977	2	2
35	Singapore	27.937	3.988	1	1
36	Slovakia	20.526	3.936	21	21
37	Slovenia	22.177	4.054	2	2
38	South Africa	33.597	4.490	17	17
39	South Korea	39.043	4.561	53	60
40	Taiwan	39.466	4.482	55	63
41	Thailand	31.158	4.116	29	36
42	Turkey	43.006	4.803	51	67
43	USA	60.686	5.213	34	34
44	Ukraine	23.263	3.971	36	41
45	Uzbekistan	2.392	945	0	0
46	Vietnam	14.843	2.845	46	46
47	Yugoslavia	12.453	3.080	10	10
	All Manufacturing Industries	1.114.721	7353	1111	1273

Notes: The above statistics are based on the author's own calculations using product-country level import data form Comext and antidumping data from the World Bank's global antidumping database. Column (1) reports the total number of imports per country over the total time horizon, while Column (2) denotes the number of different products imported by the EU from the respective partner country. Column (3) shows the number of different products subjected to an AD investigation and column (4) reports the total number of observations characterized by an antidumping investigation.

Annex Table 4: Descriptive Statistics - European Antidumping Decisions between 1996 and 2008

		Antidumping Investigations		Preliminary AD Duties		Final AD Duties	
		(1)	(2)	(3)	(4)	(5)	(6)
ISIC Code	Industry	Targeted Products	Targeted Prod.- Country Pairs	Product lines	Average Duties	Product lines	Average Duties
311	Food Products	8	8	4	23.7	2	12.9
313	Beverages	0	0	0	-	0	-
314	Tobacco	0	0	0	-	0	-
321	Textiles	39	227	124	28.8	24	25.5
322	Wearing apparel	0	0	0	-	0	46.4
323	Leather products	11	11	5	48.3	5	12.5
324	Footwear except rubber	35	97	45	17.8	45	47.6
331	Wood products	4	4	3	41.6	3	15.8
332	Furniture except metal	0	0	0	-	0	-
341	Paper and products	2	14	14	18.2	12	-
342	Printing and publishing	0	0	0	-	0	-
351	Manufacture of industrial chemicals	41	103	60	27.9	56	26.5
352	Other chemicals	5	7	3	-	0	-
353	Petroleum refineries	1	1	0	-	0	-
354	Misc. Petroleum and coal	0	0	0	-	0	-
355	Rubber products	0	0	0	-	0	-
356	Plastic products	15	29	3	22.8	8	22.2
361	Pottery china earthenware	0	0	0	-	0	-
362	Glass and products	0	0	0	-	0	-
369	Other non-metalic mineral	9	12	6	66.1	6	39.9
371	Iron and Steel	94	317	151	33.1	196	30.6
372	Non-ferrous metals	4	8	5	34	6	25.1
381	Fabricated metal products	22	106	84	37	95	33.4
382	Machinery except electrical	9	11	4	50.1	11	48
383	Machinery electrical	26	68	19	32	21	51.1
384	Transport equipment	6	12	4	24.6	7	25.1
385	Professional and scientific	1	1	0	-	0	-
390	Other manufactured	8	25	5	34.7	2	34.1
	All Manufacturing Industries	340	1061	539	33.8	499	31

Notes: The above statistics are based on the estimating sample of 701,272 observations including 1061 antidumping targeted product-country pairs. The antidumping data stems from Bown (2012). Columns (1) and (2) display the number of targeted products and product-country pairs per ISIC 3-digit industry, while columns (3) to (6) illustrates the number of product lines that were subject to a preliminary or final antidumping tax, including the respective average of the punitive import duties.

Annex Table 5: Uruguay Round Tariff Concessions and EU Antidumping Investigations: Marginal Effects at Mean Values (MEM)

	(1)	(2)		(3)		(4)	(5)		(6)	
Model	Linear	Probit		Probit		Chamberlain's Linear RE	Chamberlain's RE Probit		Chamberlain's RE Probit	
	RE	Pooled MLE		MLE		RE	Pooled MLE		MLE	
Estimation Method	Coefficient	Coefficient	MEM	Coefficient	MEM	Coefficient	Coefficient	MEM	Coefficient	MEM
UR (bound) tariff cuts	0.010***	1.829***	0.002***	2.030***	0.002***	0.011***	1.901***	0.002***	2.135***	0.002***
	(0.004)	(0.572)	(0.001)	(0.729)	(0.001)	(0.004)	(0.571)	(0.001)	(0.730)	(0.001)
Industry Retaliation Indicator	0.003	0.379***	0.001**	0.492***	0.005***	0.003	0.382***	0.001**	0.496***	0.002*
	(0.002)	(0.107)	(0.0004)	(0.143)	(0.001)	(0.002)	(0.107)	(0.0004)	(0.143)	(0.001)
Import Value$^{\zeta}$	0.118***	4.295***	0.004***	5.417***	0.0004***	0.075***	1.831***	0.002***	2.126*	0.001***
	(0.029)	(0.965)	(0.001)	(0.850)	(0.0001)	(0.029)	(0.487)	(0.001)	(1.123)	(0.0001)
Import Value Growth$^{\zeta}$	-0.033	-4.049	-0.004	-6.857	-0.006	-0.017	10.734	0.010	10.534	0.010
	(0.047)	(8.439)	(0.008)	(31.762)	(0.028)	(0.037)	(8.035)	(0.007)	(31.858)	(0.029)
Unit Value Growth$^{\xi}$	-0.00002*	-21.447	-0.020*	-23.388***	-0.021***	-0.00002*	-21.473	-0.019*	-23.220**	-0.021***
	(0.00001)	(13.152)	(0.011)	(9.031)	(0.008)	(0.00001)	(13.207)	(0.011)	(9.039)	(0.008)
Constant	0.002**	-3.276***	-	-4.050***	-	0.001*	-3.284***	-	-4.062***	-
	(0.001)	(0.336)	-	(0.472)	-	(0.001)	(0.336)	-	(0.474)	-
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak Transformations	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Observations	701272	634378	634378	701272	701272	701272	634378	634378	701272	701272
Log likelihood	-	-6401.87	-6395.88	-6264.13	-6254.87	-	-6386.24	-6380.44	-6248.26	-6239.34
Pseudo R-squared	-	0.19	0.19	0.18	0.18	-	0.19	0.19	0.18	0.18
Wald(chi2) p-value	0.000[(a)]	0.000	0.000	0.000	0.000	0.000[(a)]	0.000	0.000	0.000	0.000

Notes: Annex Table 5 reports the estimated parameter estimates and marginal effects evaluated at the mean value of the explanatory variables. Standard errors are reported in the parentheses below the estimated coefficients and calculated marginal effects (MEMs). *, **, *** illustrate the 10%, 5%, 1% significance levels, respectively. ζ and ξ indicates that the respective variable has been re-scaled by 10,000,000 and 1,000 respectively. For the linear RE model, pooled probit, and Chamberlain's RE probit estimated by pooled MLE, the serial-correlation robust standard errors were computed by using clustering at the product-country level. Due to prohibitive estimation times standard errors using bootstrapping estimation techniques were not computed for the APE of the MLE probit model in column (6). (a) The reported p-value for the linear probability models is based on an F-test.

Annex Table 6: Tariff Concessions and Antidumping Measures - Most Targeted Industries: Average Partial Effects

	(1)	(2)		(3)		(4)	(5)		(6)	
Model	Linear	Probit		Probit		Chamberlain's Linear RE	Chamberlain's RE Probit		Chamberlain's RE Probit	
	RE	Pooled MLE		MLE		RE	Pooled MLE		MLE	
Estimation Method	Coefficient	Coefficient	APE	Coefficient	APE	Coefficient	Coefficient	APE	Coefficient	APE
UR (bound) tariff cuts	0.019***	2.426***	0.018***	2.873***	0.005***	0.019***	2.534***	0.019***	3.028***	0.005***
	(0.006)	(0.619)	(0.005)	(0.799)	(0.001)	(0.006)	(0.621)	(0.005)	(0.802)	(0.002)
Industry Retaliation Indicator	0.210**	4.452***	0.034***	5.887***	0.010***	0.127**	2.204***	0.017***	2.570*	0.004*
	(0.084)	(1353)	(0.01)	(1.080)	(0.002)	(0.065)	(0.638)	(0.005)	(1.460)	(0.003)
Import Value$^{\zeta}$	0.002	0.379***	0.003***	0.501***	0.001***	0.002	0.389***	0.003***	0.513***	0.001***
	(0.002)	(0.107)	(0.001)	(0.147)	(0.0003)	(0.002)	(0.107)	(0.001)	(0.148)	(0.0003)
Import Value Growth$^{\zeta}$	-0.078	-6811	-0.051	-10206	-0.017	-0.008	35.948***	0.269***	52603	0.089
	(0.095)	(9.050)	(0.068)	(37.193)	(0.061)	(0.045)	(13.106)	(0.099)	(43.699)	(0.075)
Unit Value Growth$^{\xi}$	-0.00003	-19220	-0.145	-20.828**	-0.034**	-0.00003	-18641	-0.14	-20.055**	-0.034**
	(0.00004)	(13.661)	(0.103)	(9428)	(0.016)	(0.00004	(13.560)	(0.102)	(9.400)	(0.017)
Constant	0.005**	-2.752***	-	-3.539***	-	0.005**	-2.762***	-	-3.556***	-
	(0.002)	(0.331)	-	(0.475)	-	(0.002)	(0.331)	-	(0.478)	-
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak Transformations	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Observations	359316	331341	331341	359316	359316	359316	331341	331341	359316	359316
Log likelihood	-	-5344.13	-5344.13	-5204.69	-5204.69	-	-5320.17	-5320.17	-5180.51	-5180.51
Pseudo R-squared	-	0.16	0.16	0.01	0.01	-	0.16	0.16	0.01	0.01
chi2	0.000[a]	0.000	0.000	0.000	0.000	0.000[a]	0.000	0.000	0.000	0.000

Notes: Standard errors are in parentheses below all coefficients or average partial effects (APEs). *, **, *** respectively denote the 10%, 5%, 1% significance levels. ζ and ξ indicates that the respective variable has been re-scaled by 10,000,000 and 1,000 respectively. For the above regressions only industries with at least 50 product-country level AD investigations have been considered. For the linear RE model, pooled probit, and Chamberlain's pooled probit model, the serial-correlation robust standard errors were computed by using clustering at the product-country level. Due to prohibitive estimation times standard errors using bootstrapping estimation techniques were not computed for the APEs of the MLE probit model (column 6). (a) The reported p-value for the linear probability models is based on an F-test.

Annex Table 7: Tariff Concessions and Antidumping Measures - Product Level Analysis: Average Partial Effects

	(1)	(2)		(3)		(4)	(5)		(6)	
Model	Linear	Probit		Probit		Chamberlain's Linear RE	Chamberlain's RE Probit		Chamberlain's RE Probit	
	RE	Pooled MLE		MLE		RE	Pooled MLE		MLE	
Estimation Method	Coefficient	Coefficient	APE	Coefficient	APE	Coefficient	Coefficient	APE	Coefficient	APE
UR (bound) tariff cuts	0.052**	2.708**	0.049**	2.859**	0.030**	0.052**	2.666**	0.049**	2.803**	0.029**
	(0.026)	(1.157)	(0.021)	(1.216)	(0.013)	(0.026)	(1.178)	(0.022)	(1.226)	(0.013)
Industry Retaliation Indicator	0.016***	0.320***	0.006***	0.367***	0.004***	0.016***	0.321***	0.006***	0.367***	0.004***
	(0.006)	(0.094)	(0.002)	(0.098)	(0.001)	(0.006)	(0.093)	(0.002)	(0.098)	(0.001)
Import Value$^{\zeta}$	0.056***	1.461***	0.027***	1.517***	0.016***	0.0001	-0.236	-0.004	-0.295	-0.003
	(0.022)	(0.480)	(0.009)	(0.476)	(0.005)	(0.027)	(0.318)	(0.006)	(0.749)	(0.008)
Import Value Growth$^{\zeta}$	-2.21e-07**	-0.002	-0.00003	-0.002	-0.00002	0.000	-0.001	-0.00002	-0.001	-0.00001
	('8.69e-08)	(0.003)	(0.00005)	(0.003)	(0.00004)	(0.000)	(0.002)	(0.00004)	(0.003)	(0.00003)
Unit Value Growth$^{\xi}$	-0.00001	-0.139*	-0.003*	-0.152***	-0.002**	-0.00001	-0.142*	-0.003*	-0.156***	-0.002**
	(0.00001)	(0.072)	(0.001)	(0.058)	(0.001)	(0.00001)	(0.076)	(0.001)	(0.059)	(0.001)
Constant	0.006***	-2.615***	-	-2.858***	-	0.006***	-2.606***	-	-2.847***	-
	(0.002)	(0.152)	-	(0.189)	-	(0.002)	(0.152)	-	(0.189)	-
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak Transformations	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Observations	50890	46782	46782	50890	50890	50890	46782	46782	50890	50890
Log likelihood	-	-1763.88	-1763.88	-1747.47	-1747.47	-	-1756.77	-1756.77	-1740.51	-1740.51
Pseudo R-squared	-	0.15	0.15	0.33	0.33	-	0.15	0.15	0.33	0.33
Wald(chi2) p-value	0.000[(a)]	0.000	0.000	0.000	0.000	0.000[(a)]	0.000	0.000	0.000	0.000

Notes: Standard errors are in parentheses below all coefficients or Average Partial Effects (APEs). *, **, *** respectively denote the 10%, 5%, 1% significance levels. ζ and ξ indicates that the respective variable has been re-scaled by 10,000,000 and 1,000 respectively. For the linear RE model, pooled probit, and Chamberlain's pooled probit model, the serial-correlation robust standard errors were computed by using clustering at the product-country level. Due to prohibitive estimation times standard errors using bootstrapping estimation techniques were not computed for the APE of the pooled probit MLE model (column 6). (a) The reported p-value for the linear probability models is based on an F-test.