False Friends?
Empirical Evidence on Trade Policy Substitution in Regional Trade Agreements

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Abstract

In this paper, we examine the interplay of regional economic integration and the use of bilateral antidumping (AD) measures. Our empirical analysis brings three central findings to light: (*i*) We find that regional trade agreements (RTAs) *generally* reduce the likelihood of AD activity among integration partners. (*ii*) In addition, an improvement in tariff treatment of trading partners —regardless of whether expressed in absolute or relative terms— *generally* leads to a lower likelihood of bilateral AD activity. (*iii*) Regarding the *interaction* of both events, however, an improvement in the relative tariff treatment among fellow integration partners leads to a higher likelihood of bilateral AD activity than an equal improvement in the relative tariff treatment among non-integration trading partners. The latter effect seems to be primarily driven by those RTAs with a participation of "South" countries.

Keywords: Antidumping, tariff liberalization, regional economic integration

JEL classification: F13; F14; F15

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1. Introduction

With cumbersome multilateral trade liberalization under World Trade Organization (WTO) auspices, regional trade agreements (RTAs) have been experiencing a global revival as a second-best for the past 25 years with around 80 percent of all existing RTAs coming into force after 1989. While mutual tariff preferences appear as a core concession among integration partners, the effect of RTAs on other —non-tariff— trade barriers, however, is less straightforward.

Concurrently with the proliferation of RTAs, the global trade community has witnessed massive growth in antidumping (AD) activity. Originally intended to prevent or offset "unfair" price setting in international trade relations, i.e. selling an export good at a lower price abroad than domestically, the increase of AD measures —especially through a growing number of emerging and developing market users since the 1990s— has given rise to the concern that they are simply used as another protectionist instrument (Stiglitz, 1997; Aggarwal, 2004; Prusa, 2005; Vandenbussche and Zanardi, 2008; Bown and McCulloch, 2012; Bienen *et al*., 2014).

Figure 1 displays the temporal evolution of both trade policies over time. While only 26 RTAs were in force in 1991, their number has increased tenfold in the wave of "new regionalism" by 2014. A similar pattern can be found for annual AD activity where the number of bilateral measures in force at the four-digit Harmonized System (HS) commodity level has jumped from 346 in 1991 to 1,594 in 2014. Notably, those imposed among integration partners recorded a respective share in the one-hundredth of a percent range in 1991 but have grown significantly to above 20 percent in this respect within the following two decades. This development may admittedly well be attributed to the mere circumstance of the increased number of RTAs, but it should however be pointed out that RTA-growth achieved some 927

percent from 1991 to 2014 whereas intra-bloc AD measures have seen an impressive five-digit expansion rate over the same time span.

{Please insert Figure 1 about here}

An important and interesting question would therefore be whether in the course of mutual tariff concessions member countries of RTAs use AD measures more or less frequently against one another compared to third countries. From a theoretical point of view, there are two possible effects: "Policy complementarity" and "policy substitution" (Beverelli *et al.*, 2014). On the one hand, mutual agreement on regional *free* trade gradually cuts intra-bloc tariffs and presumably curbs the implementation and use of non-tariff barriers in view of the benefits of the free movement of goods. In addition, less sheltered exporters' home markets make price differentials more difficult to sustain and would therefore make price dumping, and with this AD less frequent. As noted by te Velde and Bezemer (2006), many RTAs include specific investment provisions that could also lead to more vertically-motivated intra-bloc Foreign Direct Investment (FDI) and a shift to more production networks among integration partners. As a result, intra-bloc price dumping and its countermeasure would become less likely. Finally, intensified regional economic integration could entail a reluctance of trade authorities to disturb trade relations with their partners by pursuing AD cases aggressively (Niels and ten Kate, 2006).

On the other hand, intra-bloc tariff liberalization might expose member countries' domestic industries to more competitive pressure from one another that may call for protection. With the removal of intra-bloc tariffs, temporary trade barriers such as AD appear as one of the few remaining legitimate tools in this respect. Due to these ambiguous theoretical predictions the answer to the aforementioned question remains not least an empirical one.

In this paper, we examine the interplay of regional economic integration and the use of bilateral AD measures. As will be outlined more detailed in the literature review in section 2,

compared to the well-studied interplay of tariff liberalization in general and AD activity, to the best of our knowledge, there are only two empirical studies (Prusa and Teh, 2010; Ahn and Shin, 2011) that explicitly analyze the relationship between regional economic integration and intra-bloc AD activity. Both, however, use a dummy-variable-approach to identify the effect of regional economic integration on the use of AD measures.

Our paper deviates from the existing literature in several of aspects. Firstly, we extend the period of investigation to more recent years (from 1991 through 2014). Secondly, mainly through the exhaustive incorporation of a broad range of fixed effects we control for various economic influences that may have an impact on bilateral AD activity. Thirdly and most importantly, we explicitly consider that there may be different intensities of regional economic integration with respect to the progress of intra-bloc tariff liberalization. Not only do AD provisions vary widely across RTAs, some RTAs also reduce almost all intra-bloc tariffs significantly while others yield only minor tariff preferences for fellow integration partners. In addition, some products might be excluded from tariff reductions if they are considered to be sensitive and those are the ones that might also be prone to competition policy through AD. To account for this, we construct a variable that measures relative tariff treatment among RTA-members and investigate how respective developments impact the intra-bloc use of AD. More specifically, we speculate that an increase in the integration intensity of RTAs, that we define as an amplification of preferential relative tariff treatment that fellow member countries experience towards competitors, may prompt importing integration partners to mitigate the effect of granted tariff preferences by the simultaneous introduction of intra-bloc AD measures. While we are able to confirm the findings in Prusa and Teh (2010) and Ahn and Shin (2011) with respect to a pure "RTA-effect", our results also suggest a more diversified conclusion regarding the relationship between regional economic integration and AD which confirms our intuition that employing a dummy variable does not capture the full effect of RTAs on AD activity.

What is more, we differentiate between various types of RTAs with respect to their composition of member countries in an extended model specification as existing literature points towards potentially diverging effects regarding the interplay of tariff liberalization in general and AD activity between traditional- and emerging and developing market AD users. We account for that by a comparison of North-North, North-South and South-South RTAs where findings confirm variations in the extent of trade policy substitution depending on the mix of countries of an RTA.

The remainder of this paper is structured as follows: Section 2 reviews the relevant literature. Our data and methodology are outlined in section 3. Section 4 presents and discusses the main results whereas section 5 discusses an extension of our basic model. Section 6 concludes.

2. Literature Review

The relevant literature can roughly be divided in two strands: A first group of studies focuses on the relationship between tariff reductions in general and the use of AD measures whereas a second group of literature investigates the relationship between regional economic integration and AD measure use.

A large part of empirical research in the first group of literature is motivated by a theoretical model of Anderson and Schmitt (2003) which is based on a reciprocal dumping model developed in Brander and Krugman (1983). The authors find that once tariffs are reduced in the course of market-opening, there is an incentive for governments to substitute previous protection by other trade barriers where the first-best choice would be quotas. However, if the systematic introduction of quotas is no longer possible AD activity may take their place.

Empirical studies dealing with a potential substitution effect between tariffs and AD measures predominantly use a continuous tariff policy variable as key explanatory variable

and mostly find evidence for a respective substitution effect in developing countries or the group of new-heavy, i.e. non-traditional, AD users. Exemplarily, Aggarwal (2004) studies AD measure use within a wider array of macroeconomic factors and shows that for the group of developing countries a decline in applied tariffs is associated with a substantial increase in AD initiations in those countries. The author, however, does not find any evidence for a similar effect in the group of developed countries. In a related study, Feinberg and Reynolds (2007) empirically investigate the role of tariff liberalization in explaining the pattern of a significant increase in both, the number of AD initiations and the number of AD users. They find that for the group of non-traditional AD users there is a positive effect of Uruguay Round tariff concessions on the probability of a country filing an AD petition but, by contrast, that the effect for traditional users is negative. In greater detail, for the group of non-traditional AD users a decrease in a sector's average tariff is estimated to be associated not only with an increased probability of a country filing an AD petition but also with an increase in the number of petitions. Similarly, Moore and Zanardi (2011) find evidence for a substitution effect only for a relatively small set of developing countries that heavily use AD protection. Lastly, Ketterer (2015) explores that multilateral trade reforms undertaken by the European Union (EU) in the course of the Uruguay Round have resulted in a substitution of tariffs by AD measures.

Less attention has been given to the interplay of regional economic integration and intra-bloc AD activity. In a theoretical paper, Copeland (1990) investigates the relationship between negotiable and non-negotiable trade barriers. He argues that RTAs contain loopholes for protectionist measures which are used in the course of trade negotiations to substitute tariffs for non-tariff measures. More specifically, once tariffs are lowered towards fellow member countries, domestic producers' demand for protection will force governments to use other trade policy instruments which are comparatively more costly.

As concerns empirical studies, to the best of our knowledge, there have only been two publications to date, both of which employ a dummy-variable-approach to analyze the effect of regional economic integration on bilateral AD activity. Closest related to our study is Ahn and Shin (2011) who use a negative binominal quasi-maximum likelihood estimation with a count variable that measures the number of AD actions for members of a Free Trade Area (FTA) between 1995 and 2009 as a dependent variable. They generally conclude that the number of AD investigations drops subsequent to the FTA enactment. In comparison, Prusa and Teh (2010) employ a difference-in-difference approach and find both, trade creation through a decreased incidence of intra-bloc AD filings, and trade diversion through the increased AD use against non-Preferential Trade Agreement (PTA) members. The net effect of PTAs on total AD filings is, however, rather small.

Lastly, there are two papers that are more loosely related to our research focus. Blonigen (2005) examines whether a specific NAFTA-provision, more precisely its Chapter 19 dispute settlement panel has contributed to a reduction of US AD- and countervailing activity against Canada and Mexico and finds little evidence in this respect. By contrast, Bown and Tovar (2016) provide empirical evidence that MERCOSUR's preferential liberalization process has led to increased extra-bloc import protection including AD for the cases of Argentina and Brazil.

3. Data and Methodology

For econometric implementation, we use a non-linear probit model framework. Our sample is constructed as a symmetric bilateral panel of 9 developed and 22 developing countries including a binary dependent variable that equals unity whenever an AD measure applied by importing country i against country j is in force in period t at the HS four-digit commodity level k, zero otherwise (see Appendix 1 for the countries in our sample). The number of importers is

determined by the availability of bilateral AD information that we extract from the World Bank's Global Antidumping Database (GAD) collected by Bown (2015). Importantly, we neither distinguish between different types of the measure in force, nor do we make a distinction between preliminary and final AD measures as both are de facto trade barriers that involve respective policy measures and have been found to nearly equally impact trade flows (Staiger and Wolak, 1994; Chandra, 2016). The overall time span we consider ranges from 1991 to 2014. Based on data limitations, however, several countries enter our sample with later initial years.

We merge several explanatory variables into our AD information including annual effectively applied trade-weighted bilateral tariff rates that we draw from the World Bank's World Integrated Trade Solutions (WITS) database across all HS four-digit commodities whenever readily available. The WTO's Regional Trade Agreement Information System (RTA-IS) is used to obtain information of all RTAs in force that are relevant to our sample. While HS four-digit annual bilateral import flows come from the UN Comtrade database, we collect macroeconomic indicators such as GDP per capita at constant PPP International US-Dollars, aggregate real GDP growth and current account balance as a percentage of GDP from the World Bank's World Development Indicators (WDI).

The sample finally used for estimation is further reduced in an additional aspect. As our research interest lies upon analyzing whether or not bilateral AD activity is determined by regional economic integration we keep only those commodities with recorded bilateral AD activity. Our baseline model specification reads as:

$$AD_{ijkt} = \alpha_0 + \beta_1 RTA_{ijt-1} + \beta_2 \ln(1 + t_{ijkt-1}) + \beta_3 \ln(1 + T_{ijkt-1}) + \beta_4 \ln(1 + T_{ijkt-1}^{RTA}) + \gamma_m' \boldsymbol{X}_{i(ij)[k]t-1} + u_{ijkt} \quad (1)$$

where α_0 is a constant and u_{ijkt} is the error term that is described in greater detail further below.

The first four explanatory variables are incorporated to capture the impact of trade policy on bilateral AD activity. More precisely, RTA_{ijt} is a binary variable that equals unity if i and j are member countries of the same RTA in period t regardless of the bloc's formal status of economic integration, zero otherwise. In total, our sample encompasses 71 RTAs, 67 of them being classified as FTAs whereas four have the formal status of a Customs Union (CU). While among the entire group of RTAs 40 constitute North-South trade agreements, 17 are considered as South-South, and 14 as North-North trade agreements (see Appendix 2 for the complete list of RTAs covered by our sample).

We control for annual sector-specific bilateral tariff treatment in two different ways. Firstly, t_{ijkt} is a continuous variable indicating the *absolute* ad-valorem effectively applied tariff of i towards j in period t and commodity k. In turn, T_{ijkt} is a continuous variable indicating the *relative* tariff treatment of i towards j in period t and commodity k. Based on contributions in Low *et al.* (2005) and Carrère *et al.* (2010), T_{ijkt} is defined as:

$$\begin{aligned} & T_{ijkt} = \left(\frac{t_{ijtk}^{EB} - t_{ijkt}}{1 + t_{ijkt}}\right) \\ \text{with:} \quad & t_{ijkt}^{EB} = \textstyle\sum_s (\theta_{istk} t_{istk}), \\ & \theta_{iskt} = IM_{iskt}/IM_{ikt}^{T}\,; IM_{ijkt} \notin IM_{ikt}^{T}; j \neq s; \sum_s \theta_{iskt} = 1 \end{aligned} \tag{2}$$

where t_{ijkt} is the above introduced absolute tariff rate country i imposes on j in period t and commodity k, and t_{ijtk}^{EB} denotes the annual effective benchmark tariff that is specific to each country-pair-commodity combination. It is computed as a trade weighted average tariff over all of j's competitors in our sample, s, in i's commodity k market, with θ_{istk} representing s's share in i's total commodity k imports exclusive of those from j, and t_{istk} being the respective effectively applied tariff. Accordingly, the measure indicates above (below) *average* relative tariff treatment of j in i's market when $T_{ijkt} > 0$ $(-1 < T_{ijtk} < 0)$ so that an increase translates into an improvement in bilateral relative tariff treatment.

One could argue that relative and absolute tariff treatment essentially measure the very same from a trade policy perspective, and would thus be highly correlated with each other. Consequently, one of the two variables would be redundant. In fact, however, relative and absolute tariff treatment are conceptually different, as the former indicates the relation of imposed tariff policy among competitors, but the latter solely defines the level of the imposed tariff burden. This view is further confirmed when inspecting the relatively low correlation between our two bilateral tariff treatment variables given below in Table 1.

{Please insert Table 1 about here}

Lastly, T_{ijtk}^{RTA} is our key variable of interest and denotes an *interaction* of the RTA dummy variable and relative tariff treatment. The variable thus captures the impact on the probability of AD measure use of a variation in relative tariff treatment of i towards j conditioned for the case that both are fellow member countries in an RTA in period t.

One potential issue with our interaction term could be a clustering of relative tariff treatment values by groups, and with this an inherent double capture of our RTA dummy variable. The distribution of relative tariff treatment for both outcomes of the RTA dummy variable is given in Figure 2. As can be seen in the lower panel, we indeed find 50 percent of all middle values of relative tariff treatment among integration partners to be grouped at above average relative tariff treatment, i.e. at positive values. Since a major motive for the conclusion of an RTA is the prospect of mutual tariff preferences, nonetheless, this outcome is not surprising. By comparison, 50 percent of all middle values of relative tariff among non-integration trading partners are found at below average relative tariff treatment, i.e. at negative values, naturally owing to the absence of mutual tariff concessions. In particular the upper panel, however, gives an indication that for both groups we still observe considerable variation in relative tariff treatment values. With this, our sample does well cover different integration intensities of RTAs with respect to relative tariff treatment so that, from our point of view, the incorpora-

tion of the above interaction term is reasonable from both an econometric and a research question perspective.

{Please insert Figure 2 about here}

Furthermore, vector $\boldsymbol{X}$ defines a set of various control variables that we adopt from literature including bilateral import growth ($\Delta\, IM_{ijkt}$) and -share (IM_SHARE_{ijkt}), both sector- and time-varying, and moreover annual per capita GDP (pc_GDP_{it}), GDP growth ($\Delta\, GDP_{it}$) and current account balance as percentage of GDP (CAB_{it}), all of which from the importers perspective. We additionally control for the complete absence of any legal framework regarding the use of intra-bloc AD measures in RTAs by employing the binary variable NO_RULES_{ijt} that equals unity in this case. By contrast, the variable's counterargument may attain three different gradations of policy severity depending on the RTA under consideration, i.e. (i) the strict prohibition of intra-bloc AD activity, (ii) WTO-rule based AD use, or (iii) a custom-tailored legal framework following WTO-rules in either milder or stricter implementation. Our sample includes two RTAs that entirely prohibit the use of intra-bloc AD activity, namely the Canada-Chile FTA and the Australia-New-Zealand Closer Economic Relations Trade Agreement (ANZCERTA).[1] The remaining RTAs divide into 6 with no legal framework, 36 with WTO-rule based AD use, and 27 with a specific legal framework (Prusa, 2011; various official documents of RTAs that are considered for empirical analysis in this paper).

As a variant specification following previous literature, we replace the three tariff policy variables that we incorporated in equation (1) in terms of their *levels* by their respective *growth rate* definitions:

[1] Plausibly, the substitution of intra-bloc tariffs by imposing AD measures is not feasible in RTAs that entirely prohibit the use of intra-bloc AD activity. The consideration of respective RTAs would thus as a consequence curtail the detection of potential trade policy substitution. Excluding the Canada-Chile FTA and ANZCERTA from our sample, however, would imply a sample selection bias that we assess to be more severe than a potential downward-bias from both an economic and an econometric perspective.

$$AD_{ijkt} = \alpha_0 + \beta_1 RTA_{ijkt-1} + \beta_2 \Delta \ln\left(1 + t_{ijkt-1}\right) + \beta_3 \Delta \ln\left(1 + T_{ijkt-1}\right) + \beta_4 \Delta \ln\left(1 + T^{RTA}_{ijkt-1}\right) + \gamma'_m \boldsymbol{X}_{i(ij)[k]t-1} + u_{ijkt} \quad (3)$$

where $\Delta \ln\left(1 + t_{ijkt}\right)$ denotes the difference of the logarithm of $\left(1 + t_{ijkt}\right)$ compared to the respective value in the previous period. A negative growth rate implies an improvement in absolute tariff treatment within two consecutive periods. In comparison, $\Delta \ln\left(1 + T_{ijkt}\right)$ gives the growth rate in relative tariff treatment computed as the difference of the logarithm of $\left(1 + T_{ijkt}\right)$ compared to the respective value in the previous period. Because a higher level of relative tariff treatment means a more preferential relative tariff treatment, by implication, a positive value of its growth rate represents an improvement within two consecutive periods. The same interpretation applies to the growth rate of conditioned relative tariff treatment.

We follow Ketterer (2016) and introduce all explanatory variables lagged by one period in order to alleviate potential reverse causality. This procedure is relevant in particular with regard to our tariff treatment variables as the use of AD measures may likewise be seen as "safety valve" for pending tariff liberalization efforts (Niels and ten Kate, 2006; Moore and Zanardi, 2009). In addition, it appears reasonable to assume AD implementation to be time lagged when considered as a response to changes in the economic or trade environment of a country.

In terms of our model specifications given above, we are well aware that both may not encompass determinants of bilateral AD activity entirely. As a result, estimation results could be subject to a classical omitted variables bias in case of a correlation of explanatory variables neglected and those included. In this respect, one may think of further non-tariff measures that find implementation complementarily or as a substitute to tariff policy and that are also correlated to AD imposition. Ideally, we would thus control for these non-tariff barriers but bilateral data coverage at the disaggregated sector level is often missing or poor. Therefore, addressing unobserved heterogeneity and thereof arising endogeneity issues, we incorporate individual effects into our model specifications and model equation (1)'s and (3)'s error terms

(u_{ijkt}) in two different fashions: Our benchmark estimation technique includes importer- (α_i), exporter- (α_j), year- (λ_t), and two-digit commodity (φ_n) dummy variables so that:

$$u_{ijkt1} = \alpha_{i1} + \alpha_{j1} + \lambda_{t1} + \varphi_{n1} + \varepsilon_{ijkt} \quad (4)$$

In comparison, a more robust version controls for importer-year- (η_{it}), exporter-year- (μ_{jt}), and commodity effects so that:

$$u_{ijkt2} = \eta_{it2} + \mu_{jt2} + \varphi_{n2} + \upsilon_{ijkt} \quad (5)$$

By contrast, we do not consider panel fixed effects as such, i.e. country-pair-commodity dummy variables in the case of the dataset at hand. While their inclusion would allow to control for historically established bilateral AD activity, it has been largely discussed that it would in turn bias estimation results due to an incidental parameters problem in fixed *T* non-linear binary response models (Greene, 2004).

4. Main Results

Table 2 displays average marginal probability effects of explanatory variables of our baseline specification in columns (1) and (2), and our variant specification in columns (3) and (4). Corresponding individual effects that are taken into account for estimation are given at the bottom end of each column.[2]

Briefly, coefficient estimates for IM_SHARE_{ijkt}, pc_GDP_{it}, and $\Delta\, GDP_{it}$ either show plausible signs or confirm those found in previous studies. Compared with this, we would expect a positively signed coefficient estimate for $\Delta\, GDP_{it}$ and a negatively signed one for CAB_{it} where in both cases we find the opposite. Albeit significantly different from zero, we would

[2] The estimation with four-digit- instead of two-digit commodity effects only marginally alters the results. In an additional robustness check, we estimate both baseline and variant specifications incorporating all explanatory variables lagged by two periods instead of using their first lags as an augmented strategy to address potential reverse causality problems. In all aspects, findings quantitatively and qualitatively confirm those reported, and with this strengthen our original approach (both not reported, but can be provided upon request).

like to emphasize that the coefficient estimates of both variables across all columns are nevertheless relatively small, and with this point towards a negligible effect in economic terms. Inspecting coefficient estimates for the binary variable NO_RULES_{ijt}, unsurprisingly, estimation results across all columns point towards an increased likelihood of bilateral AD protection in those RTAs that provide no legal framework with respect to intra-bloc AD activity. With regard to concerns of double capture of the impact of regional economic integration on bilateral AD activity through the simultaneous incorporation of RTA_{ijt} and NO_RULES_{ijt}, where the latter is constructed from the former from a methodological point of view, we also run separate (unreported) estimations excluding either one of the variables. Findings, however, are quantitatively and qualitatively nearly identical to those reported.

Turning towards trade policy variables, estimation results indicate an increase in the likelihood of bilateral AD activity with increasing ad-valorem tariffs, or put differently, with a deterioration in absolute tariff treatment (t_{ijkt}). The finding is mirrored when considering relative tariff treatment (T_{ijkt}), i.e. relative tariff treatment below average increases the likelihood of bilateral AD activity. This evidence contradicts theoretical predications and to some extent results from the abovementioned first group of studies that find a substitution effect between tariffs and AD initiation as we find parallel discriminatory practice across trade policies. A trading partner that already experiences a comparatively unfavorable tariff treatment (i.e. high absolute tariffs and/or below average relative tariff treatment) will also be more likely to face more AD measures imposed.

The coefficient estimate for RTA_{ijt} points towards a decreased likelihood of AD activity between member countries of the same RTA. With this, it is in line with the findings of the abovementioned second group of literature that states that an RTA-enactment decreases the number of AD investigations between members. It needs to be noted that our negatively signed coefficient estimate could imply fewer newly initiated AD cases between fellow mem-

ber countries compared to non-integration trading partners but likewise the removal of existing AD measures skewed towards fellow member countries. When interpreting the RTA dummy variable, however, one has to keep in mind that it does not capture any tariff effects of regional economic integration, since we explicitly control for bilateral tariff treatment. Instead, the RTA dummy variable measures an additional, possibly intangible, effect of RTAs.

Albeit of deep interest from a policy perspective, the incorporation of interaction terms in probit regressions is delicate from an econometric point of view. In a widely received contribution, Ai and Norton (2003) address a prevalent misinterpretation of interaction effects as marginal effects of interaction terms in non-linear regressions. In order to compute discrete interaction effects adequately, we therefore compare the slopes of relative tariff treatment (T_{ijkt}) in bilateral AD activity using reference group contrast. More precisely, we compute the difference in the derivatives of AD_{ijkt} with respect to relative tariff treatment for the two possible outcomes of RTA_{ijt}, namely for the case that either i and j are fellow member countries of the same RTA, and its failure. We find the group contrast (denoted as "Integration Effect" in output tables) in relative tariff treatment always positively signed and with the exception of column (4) statistically significant at least at the one-percent level. Accordingly, an improvement in the relative tariff treatment among fellow integration partners leads to a higher likelihood of bilateral AD activity than an equal improvement in the relative tariff treatment among non-integration trading partners.[3]

Focusing on the identification of potential trade policy substitution effects in RTAs, we can only speculate about the reasons for these findings. Nonetheless, they seem to support the rather pessimistic theoretical view on the interplay of regional economic integration and AD

[3] Albeit preferential tariff policy that we incorporate into our model specifications as relative tariff treatment appears as a core element of regional economic integration, we also estimate both baseline and variant specifications with an interaction term of the RTA dummy variable and absolute tariff treatment. Estimation results are given in Appendix 5. With the exception of column (4) where the "Integration Effect" is found to be positively signed yet statistically insignificant, the interpretation of our original approach can be confirmed.

use which is dominated by increased competitiveness concerns that lead to the substitution of tariffs with other non-tariff measures. While competitive pressure indeed increases likewise when improving relative tariff treatment towards non-integration trading partners, trade policy remedy in the form of AD activity may yet be found easier to implement towards a *few* fellow member countries instead of *many* extra-bloc trading partners in both political and practical spheres. In a similar vein, granting multilaterally formulated tariff preferences, due to the significantly higher number of recipient trading partners, might not be adequately perceived as an immediate threat to competitiveness. Notably, this trade policy substitution effect might be one of the factors that dampen a possible positive effect of RTAs.

{Please insert Table 2 about here}

5. Extension

As pointed out in the literature review in section 2 many studies find trade policy substitution effects for developing countries only. One might therefore speculate that the impact of improvements in relative tariff treatment among integration partners on intra-bloc AD activity could vary likewise depending on the mix of countries of an RTA. For this reason, complementing our baseline model specification under equation (1), we run an extended version that substitutes the single RTA dummy variable by three different dummy variables signaling various types of RTAs with respect to their composition of member countries. More precisely, we decompose previously incorporated RTA_{ijt} into (i) RTA_{ijt}^{NS}, (ii) RTA_{ijt}^{NN}, and (iii) RTA_{ijt}^{SS} that equal unity if i and j are member countries of the same (i) North-South-, (ii) North-North-, or (iii) South-South RTA, respectively, in period t regardless of the bloc's formal status of integration, all zero otherwise. In addition, we interact each of the three new dummy variables with relative tariff treatment that allows us to estimate the impact on the probability of AD measure use of a variation in relative tariff treatment of i towards j conditioned for the

case that both are fellow member countries in one of the above introduced three types of an RTA in period t.[4]

As can be seen in Table 3, regarding our control and trade policy variables, previous findings are confirmed across all types of RTAs. With respect to the interaction term, we apply the abovementioned procedure in order to compute discrete interaction effects. Here, we find that the group contrast is statistically significant only for those RTAs which involve a "South" member. This may be interpreted in two ways. On the one hand, these results could admittedly arise from the circumstance that the new heavy users of AD are in fact mostly emerging and developing economies while trade relationships —including the implementation of AD measures— have already been established between "North" countries. On the other hand, it could likewise imply that AD measures are initiated because of competitiveness concerns, either between developing or emerging economies that try to establish or maintain their position in global markets producing a similar set of goods, or between "North" and "South" countries where the "North" fears underpriced goods from the "South" and the "South" missing competitiveness towards the "North" in the trade of capital goods. This effect also supports our hypothesis that regional economic integration leads to increased competitiveness pressure that is being met by substituting tariff reductions with other non-tariff measures, such as AD.

{Please insert Table 3 about here}

6. Conclusion

In this paper, we examine the interplay of regional economic integration and the use of bilateral AD measures. For the countries and commodities included, our empirical analysis brings

[4] For reasons of clarity, we only report estimation results including country-year- and commodity effects and tariff treatment variables in *levels*. Those including country-, year-, and commodity effects or tariff treatment variables in their *growth rate* definition confirm reported findings and can be provided upon request.

three central findings to light: (i) We find that RTAs *generally* reduce the likelihood of AD activity among integration partners. (ii) In addition, an improvement in tariff treatment of trading partners —regardless of whether expressed in absolute or relative terms— *generally* leads to a lower likelihood of bilateral AD activity. (iii) Regarding the *interaction* of both events, however, an improvement in the relative tariff treatment among fellow integration partners leads to a higher likelihood of bilateral AD activity than an equal improvement in the relative tariff treatment among non-integration trading partners. The latter effect seems to be primarily driven by those RTAs with a participation of "South" countries.

These results could be interpreted as an indication for trade policy substitution in RTAs. They may likewise well be seen as another piece in the puzzle regarding the "stepping-stone" versus "stumbling-block" discussion of RTAs. In this regard, it should be noted that in comparison to tariffs, other —non-tariff— protectionist measures are often more difficult to quantify and might therefore have even unexpectedly strong trade depressing effects. With this, RTAs may be attributed only sparse potential in paving the way to multilateral trade liberalization efforts in view of limited trade creation prospects. In a more general context one could argue that in order to reap the full benefits of regional *free* trade, mutual tariff concessions among integration partners must not be offset by the simultaneous implementation of other —non-tariff— trade barriers.

Based on our findings further research may be motivated. The questions that we consider most important to address involve (i) "what are potential motives of trade policy substitution in RTAs?", (ii) "why does this effect appear to be pronounced in particular in RTAs with "South" country involvement?", and (iii) "what are the implications with regard to the design of future and existing RTAs?".

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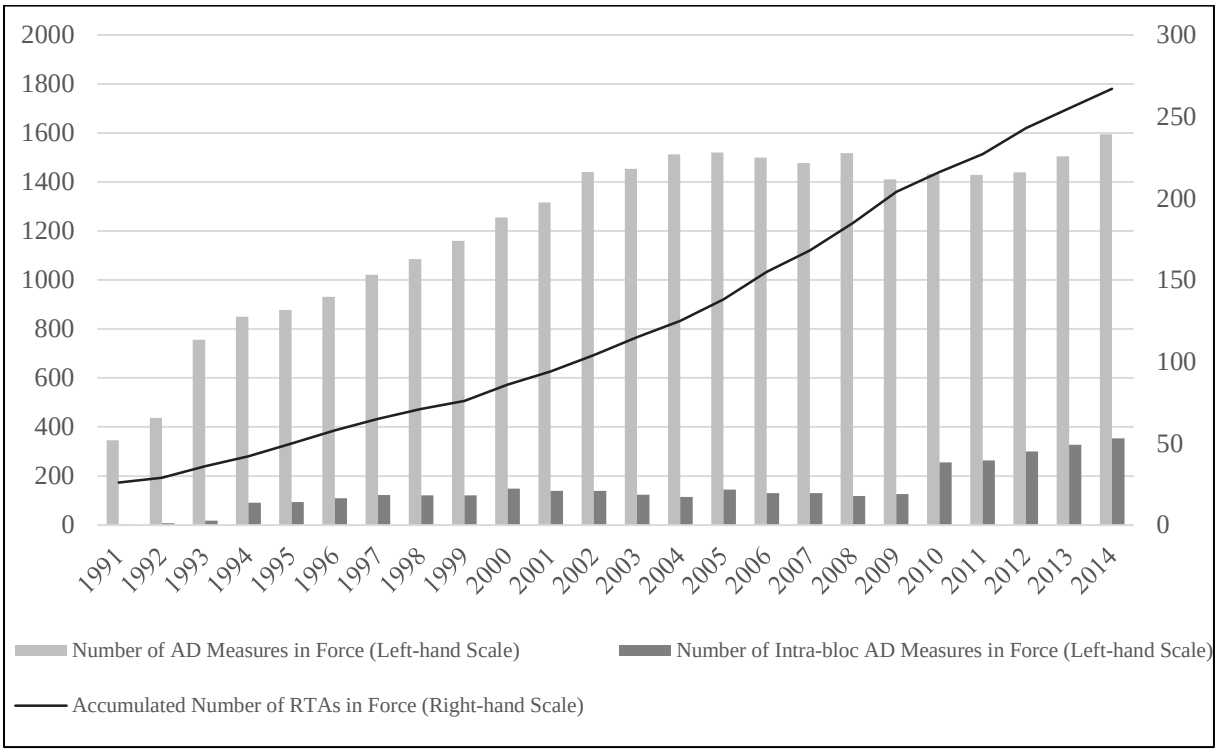
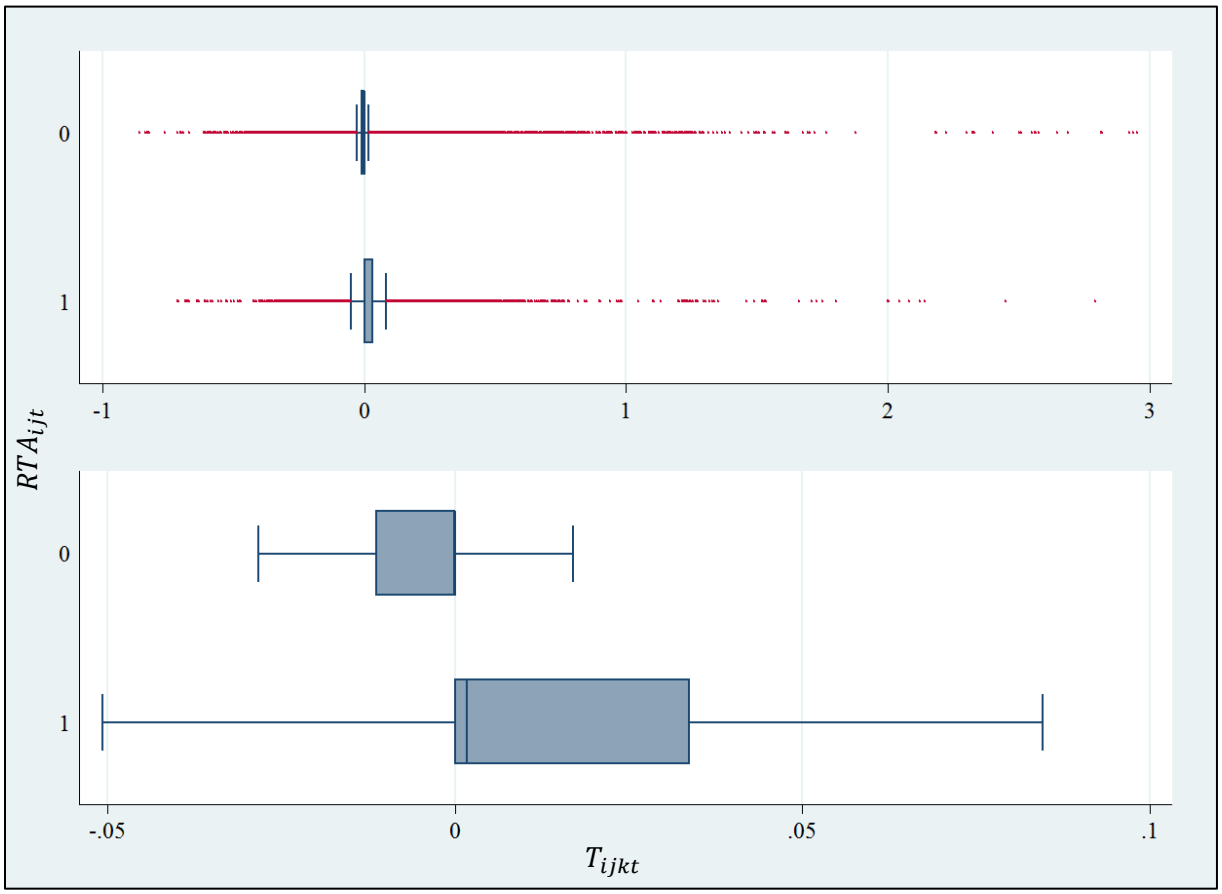
Figure 1. Temporal Evolution of Regional Trade Agreements and Antidumping Activity, 1991 – 2014



Note: AD data based on countries considered for empirical analysis (see section 3 for details).
Data Sources: WTO (2015); Bown (2015).

Figure 2. Box-and-Whisker Plot of Relative Tariff Treatment
by Value of RTA Dummy Variable



Notes: Upper panel includes outside values whereas lower panel excludes outside values. Outside values are displayed as red dots. Computation of relative tariff treatment based on countries considered for empirical analysis (see section 3 for details).
Data Source: World Bank (2015b).

Table 1. Correlation Matrix of Explanatory Variables

VARIABLES	AD_{ijtk}	ln (pc_GDP_{it-1})	$\Delta\, GDP_{it-1}$	CAB_{it-1}	$\Delta\, IM_{ijkt-1}$	ln(IM_SHARE_{ijkt-1})	ln $(1 + t_{ijkt-1})$	ln $(1 + T_{ijkt-1})$	RTA_{ijt-1}	NO_RULES_{ijt-1}
AD_{ijtk}	1									
ln (pc_GDP_{it-1})	0.0166	1								
$\Delta\, GDP_{it-1}$	0.0021	-0.2773	1							
CAB_{it-1}	-0.0244	-0.0343	0.1359	1						
$\Delta\, IM_{ijkt-1}$	-0.0002	-0.0009	0.0008	0.0005	1					
ln(IM_SHARE_{ijkt-1})	0.0606	-0.1314	0.029	0.0334	0.0015	1				
ln $(1 + t_{ijkt-1})$	0.0048	-0.3521	0.081	0.038	0.0005	0.0284	1			
ln $(1 + T_{ijkt-1})$	-0.0186	0.029	0.002	0.0071	-0.0022	0.0288	-0.3681	1		
RTA_{ijt-1}	-0.0183	-0.0013	-0.0117	0.0117	-0.0004	0.0966	-0.1765	0.2813	1	
NO_RULES_{ijt-1}	-0.0088	-0.0023	0.016	0.0899	-0.0001	0.0089	-0.0669	0.0408	0.3414	1

Table 2. Average Marginal Probability Effects on Antidumping Measure Use

VARIABLES	(1)	(2)	(3)	(4)
RTA_{ijt-1}	-0.00296***	-0.00361***	-0.00346***	-0.00414***
	(0.000453)	(0.000562)	(0.000440)	(0.000540)
$\ln\left(1+t_{ijkt-1}\right)$	0.00664***	0.00365	—	—
	(0.00167)	(0.00228)		
$\Delta \ln\left(1+t_{ijkt-1}\right)$	—	—	0.00424***	0.00228
			(0.00109)	(0.00141)
Base Effect:				
$\ln\left(1+T_{ijkt-1}\right)$	-0.0206***	-0.0277***	—	—
	(0.00305)	(0.00432)		
$\Delta \ln\left(1+T_{ijkt-1}\right)$	—	—	-0.00199*	-0.00150
			(0.000903)	(0.00149)
Integration Effect:				
$\ln\left(1+T_{ijkt-1}\right)$	0.0238***	0.0306***	—	—
(at RTA_{ijt-1}: 1 vs 0)	(0.00482)	(0.00634)		
$\Delta \ln\left(1+T_{ijkt-1}\right)$	—	—	0.00465**	0.00207
(at RTA_{ijt-1}: 1 vs 0)			(0.00158)	(0.00209)
$\Delta\, IM_{ijkt-1}$	-2.92e-06*	-3.17e-06*	-2.92e-06*	-3.12e-06*
	(1.26e-06)	(1.31e-06)	(1.27e-06)	(1.30e-06)
$\ln(IM\_SHARE_{ijkt-1})$	0.00227***	0.00256***	0.00227***	0.00255***
	(8.59e-05)	(9.87e-05)	(8.61e-05)	(9.89e-05)
NO_RULES_{ijt-1}	0.00505***	0.00643***	0.00524***	0.00674***
	(0.000806)	(0.00112)	(0.000812)	(0.00112)
$\ln$ (pc_GDP_{it-1})	0.0191***	—	0.0189***	—
	(0.00103)		(0.00103)	
$\Delta\, GDP_{it-1}$	1.24e-05	—	-6.94e-06	—
	(2.33e-05)		(2.30e-05)	
CAB_{it-1}	3.67e-05	—	5.54e-05*	—
	(2.78e-05)		(2.78e-05)	
Observations	2,859,415	2,473,967	2,843,554	2,459,434
Pseudo-R^2	0.279	0.271	0.278	0.27
Log likelihood	-90,259.36	-86,425.33	-90,009.56	-86,291.30
Type of fixed effects:				
Country- (α_i, α_j)	Yes	No	Yes	No
Country-year- (η_{it}, μ_{jt})	No	Yes	No	Yes
Year- (λ_t)	Yes	No	Yes	No
Two-digit commodity- (φ_n)	Yes	Yes	Yes	Yes

Notes: Robust, clustered (at the country-pair-commodity level) standard errors in parentheses. Interaction effects are computed as contrasts of average marginal probability effects using Stata's "margins' " contrast operator (Version 14.0, StataCorp). Asterisks denote the level of statistical significance with *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. In the case of the interaction effect, asterisks denote the level of statistical significance of the $\chi^2_{[1]}$-test statistic of a comparison of average marginal probability effects across reference groups.

Table 3. Average Marginal Probability Effects on Antidumping Measure Use by Type of Regional Trade Agreements

VARIABLES	(1) —North-South—	(2) —North-North—	(3) —South-South—	(4) ——All——
RTA_{ijt-1}^{NS}	-0.00324***	—	—	-0.00331***
	(0.000739)			(0.000742)
RTA_{ijt-1}^{NN}	—	-0.00411**	—	-0.00451**
		(0.00156)		(0.00155)
RTA_{ijt-1}^{SS}	—	—	-0.00396***	-0.00393***
			(0.000927)	(0.000924)
$\ln\left(1+t_{ijkt-1}\right)$	0.00428†	0.00434†	0.00356	0.00348
	(0.00224)	(0.00225)	(0.00229)	(0.00229)
Base Effect:				
$\ln\left(1+T_{ijkt-1}\right)$	-0.0232***	-0.0248***	-0.0295***	-0.0283***
	(0.00417)	(0.00376)	(0.00397)	(0.00432)
Integration Effect:				
$\ln\left(1+T_{ijkt-1}\right)$ (at RTA_{ijt-1}^{NS}: 1 vs 0)	0.0135**	—	—	0.0171**
	(0.00678)			(0.00670)
$\ln\left(1+T_{ijkt-1}\right)$ (at RTA_{ijt-1}^{NN}: 1 vs 0)	—	0.000507	—	0.00321
		(0.0108)		(0.0105)
$\ln\left(1+T_{ijkt-1}\right)$ (at RTA_{ijt-1}^{SS}: 1 vs 0)	—	—	0.0480***	0.0466***
			(0.00636)	(0.006415)
$\Delta\, IM_{ijkt-1}$	-3.14e-06*	-3.07e-06*	-3.13e-06*	-3.19e-06*
	(1.30e-06)	(1.28e-06)	(1.29e-06)	(1.31e-06)
$\ln(IM\_SHARE_{ijkt-1})$	0.00254***	0.00247***	0.00248***	0.00255***
	(9.83e-05)	(9.71e-05)	(9.74e-05)	(9.88e-05)
NO_RULES_{ijt-1}	0.00651***	0.00400***	0.00427***	0.00669***
	(0.00118)	(0.00108)	(0.00106)	(0.00117)
Observations	2,473,967	2,473,967	2,473,967	2,473,967
Pseudo-R^2	0.271	0.27	0.271	0.272
Log likelihood	-86,503.37	-86,556.24	-86,493.82	-86,405.17
Type of fixed effects:				
Country- (α_i, α_j)	No	No	No	No
Country-year- (η_{it}, μ_{jt})	Yes	Yes	Yes	Yes
Year- (λ_t)	No	No	No	No
Two-digit commodity- (φ_n)	Yes	Yes	Yes	Yes

Notes: Robust, clustered (at the country-pair-commodity level) standard errors in parentheses. Interaction effects are computed as contrasts of average marginal probability effects using Stata's "margins' " contrast operator (Version 14.0, StataCorp). Asterisks denote the level of statistical significance with *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. In the case of the interaction effect, asterisks denote the level of statistical significance of the $\chi^2_{[1]}$-test statistic of a comparison of average marginal probability effects across reference groups.

Appendix 1. Country Sample

Argentina, Australia, Brazil, Canada, Chile (1995), China (1997), Colombia, Costa Rica (1996), Ecuador (1998), European Union, India (1992), Indonesia (1996), Israel, Jamaica (2000), Japan, Republic of Korea, Malaysia (1995), Mexico, New Zealand (1995), Pakistan (2002), Paraguay (1999), Peru (1992), Philippines (1994), South Africa, Taiwan, Thailand (1996), Trinidad and Tobago (1997), Turkey, United States, Uruguay (1997), Venezuela (1992).

Notes: The European Union is treated as a single country. Its evolutionary enlargement of member states is considered. Unless otherwise stated in parentheses, the initial year of the respective country in our sample is 1991.

Appendix 2. List of Regional Trade Agreements Covered by Sample

North-North (14)	North-South (40)	South-South (17)
Australia-Chile	ASEAN-Australia-New Zealand	ASEAN-FTA (AFTA)
ANZCERTA	ASEAN-Japan	ASEAN-China
Canada-Chile	ASEAN-Rep. Korea	ASEAN-India
Canada-Israel	Canada-Columbia	China-Costa Rica
Chile-Japan	Canada-Costa Rica	Group of Three
EU-Chile	Canada-Peru	Costa Rica-Peru
EU-Israel	Chile-China	India-Malaysia
EU-Rep. Korea	Chile-Columbia	Mexico-Central America
Rep. Korea-Chile	Chile-Costa Rica	Mexico-Uruguay
Rep. Korea-USA	Chile-Malaysia	Pakistan-China
TPSEP	Chile-Mexico	Pakistan-Malaysia
USA-Australia	China-New Zealand	Peru-China
USA-Chile	CAFTA-Dom. Rep.	Peru-Mexico
USA-Israel	EU-CARIFORUM States	SAFTA
	EU-Central America	ANDEAN Community
	EU-Columbia-Peru	CARICOM and Common Market
	EU-Egypt	MERCOSUR
	EU-Mexico	
	EU-South Africa	
	EU-Turkey	
	India-Japan	
	Israel-Mexico	
	Japan-Malaysia	
	Japan-Mexico	
	Japan-Peru	
	Japan-Philippines	
	Japan-Thailand	
	Rep. Korea-India	
	Rep. Korea-Turkey	
	Malaysia-Australia	
	New Zealand-Malaysia	
	NAFTA	
	Peru-Chile	
	Peru-Rep. Korea	
	Thailand-Australia	
	Thailand-New Zealand	
	Turkey-Chile	
	Turkey-Isreal	
	USA-Columbia	
	USA-Peru	

Note: ASEAN-FTA is treated as a South-South RTA as its North-member country Singapore is not included in our sample.

Appendix 3. Variable Summary Statistics

VARIABLE	Observations	Mean	Std. Dev.	Min	Max
AD_{ijtk}	4,479,186	0.007	0.081	0	1
RTA_{ijt-1}	3,589,849	0.184	0.387	0	1
RTA_{ijt-1}^{NS}	3,589,849	0.082	0.274	0	1
RTA_{ijt-1}^{NN}	3,589,849	0.031	0.175	0	1
RTA_{ijt-1}^{SS}	3,589,849	0.079	0.27	0	1
$\ln(1 + t_{ijkt-1})$	3,536,340	0.074	0.082	0	2.256
$\Delta \ln(1 + t_{ijkt-1})$	3,027,256	-0.003	0.036	-0.884	7.766
$\ln(1 + T_{ijkt-1})$	3,412,488	-0.002	0.04	-1.957	1.375
$\Delta \ln(1 + T_{ijkt-1})$	2,872,292	0.0005	0.030	-0.820	5.496
$\Delta\, IM_{ijkt-1}$	2,920,830	76.11	32942.79	-1.0	3.49e+07
$\ln(IM\_SHARE_{ijkt-1})$	3,465,811	-0.391	3.123	-17.919	4.605
NO_RULES_{ijt-1}	3,589,849	0.026	0.160	0	1
$\ln(\text{pc}\_GDP_{it-1})$	3,589,849	9.70	0.728	7.576	10.845
$\Delta\, GDP_{it-1}$	3,589,849	3.717	3.462	-13.127	21.829
CAB_{it-1}	3,589,849	0.146	4.874	-15.928	38.787

Appendix 4. Variable Description and Data Source

VARIABLE	Description	Data Source
AD_{ijtk}	Binary variable that equals unity whenever an antidumping measure applied by importing country i against country j is in force in period t at the Harmonised System (HS) four-digit commodity level k, zero otherwise.	Bown (2015)
RTA_{ijt-1}	Binary variable set to unity if both trading partners were member countries of the same RTA in the previous period, zero otherwise.	Own computation based on WTO (2015)
RTA_{ijt-1}^{NS}	Binary variable set to unity if both trading partners were member countries of the same North-South RTA in the previous period, zero otherwise.	Own computation based on WTO (2015)
RTA_{ijt-1}^{NN}	Binary variable set to unity if both trading partners were member countries of the same North-North RTA in the previous period, zero otherwise.	Own computation based on WTO (2015)
RTA_{ijt-1}^{SS}	Binary variable set to unity if both trading partners were member countries of the same South-South RTA in the previous period, zero otherwise.	Own computation based on WTO (2015)
t_{ijkt-1}	Annual trade-weighted effectively applied tariff rate of importing i towards exporting j at the HS four-digit commodity level in the previous period.	World Bank (2015b)
T_{ijkt-1}	Annual relative tariff treatment of importing i towards exporting j at the HS four-digit commodity level in the previous period (see text for calculation details).	World Bank (2015b)
T_{ijtk-1}^{RTA}	Interaction term between a binary variable set to unity if both trading partners are member countries of the same RTA and annual relative tariff treatment of importing i towards exporting j at the HS four-digit commodity level, lagged by one period.	Own computation based on WTO (2015) and World Bank (2015b)
T_{ijtk-1}^{NS}	Interaction term between a binary variable set to unity if both trading partners were member countries of the same North-South RTA and annual relative tariff treatment of importing i towards exporting j at the HS four-digit commodity level, lagged by one period.	Own computation based on WTO (2015) and World Bank (2015b)
T_{ijtk-1}^{NN}	Interaction term between a binary variable set to unity if both trading partners were member countries of the same North-North RTA and annual relative tariff treatment of importing i towards exporting j at the HS four-digit commodity level, lagged by one period.	Own computation based on WTO (2015) and World Bank (2015b)

T_{ijtk-1}^{SS}	Interaction term between a binary variable set to unity if both trading partners were member countries of the same South-South RTA and annual relative tariff treatment of importing i towards exporting j at the HS four-digit commodity level, lagged by one period.	Own computation based on WTO (2015) and World Bank (2015b)
$\Delta\, IM_{ijkt-1}$	Percentage change in annual imports of i from j at the HS four-digit commodity level compared to previous period, lagged by one period.	UN Comtrade (2015)
IM_SHARE_{ijkt-1}	Share of j in i's annual total imports at the HS four-digit commodity level in the previous period.	UN Comtrade (2015)
NO_RULES_{ijt-1}	Binary variable set to unity if both trading partners were member countries of the same RTA in the previous period and the RTA did not have a legal framework regarding the use intra-bloc antidumping measures, zero otherwise.	Rey (2012) and legal frameworks of various agreements (WTO, 2015)
pc_GDP_{it-1}	GDP per capita of i at constant PPP Int'l US-Dollars in the previous period.	World Bank (2015a)
$\Delta\, GDP_{it-1}$	Aggregate GDP growth of i in the previous period.	World Bank (2015a)
CAB_{it-1}	Current account balance as a percentage of GDP of i in the previous period.	World Bank (2015a)

Appendix 5. Average Marginal Probability Effects on Antidumping Measure Use (Interaction Term Variation)

VARIABLES	(1)	(2)	(3)	(4)
RTA_{ijt-1}	-0.00200***	-0.00228***	-0.00346***	-0.00414***
	(0.000496)	(0.000618)	(0.000440)	(0.000540)
$\ln\left(1+T_{ijkt-1}\right)$	-0.0154***	-0.0205***	—	—
	(0.00287)	(0.00393)		
$\Delta \ln\left(1+T_{ijkt-1}\right)$	—	—	-0.00199*	-0.00150
			(0.000903)	(0.00149)
Base Effect:				
$\ln\left(1+t_{ijkt-1}\right)$	0.00850***	0.00652**	—	—
	(0.00169)	(0.00223)		
$\Delta \ln\left(1+t_{ijkt-1}\right)$	—	—	0.00424***	0.00228
			(0.00109)	(0.00141)
Integration Effect:				
$\ln\left(1+t_{ijkt-1}\right)$ (at RTA_{ijt-1}: 1 vs 0)	-0.0129***	-0.0167***	—	—
	(0.00312)	(0.00412)		
$\Delta \ln\left(1+t_{ijkt-1}\right)$ (at RTA_{ijt-1}: 1 vs 0)	—	—	-0.00435*	0.000271
			(0.00176)	(0.00217)
$\Delta\, IM_{ijkt-1}$	-2.89e-06*	-3.13e-06*	-2.92e-06*	-3.12e-06*
	(1.26e-06)	(1.30e-06)	(1.27e-06)	(1.30e-06)
$\ln(IM\_SHARE_{ijkt-1})$	0.00228***	0.00256***	0.00227***	0.00255***
	(8.59e-05)	(9.87e-05)	(8.61e-05)	(9.89e-05)
NO_RULES_{ijt-1}	0.00491***	0.00622***	0.00524***	0.00674***
	(0.000802)	(0.00111)	(0.000812)	(0.00112)
$\ln$ (pc$_GDP_{it-1}$)	0.0195***	—	0.0189***	—
	(0.00104)		(0.00103)	
$\Delta\, GDP_{it-1}$	1.08e-05	—	-6.94e-06	—
	(2.34e-05)		(2.30e-05)	
CAB_{it-1}	3.65e-05	—	5.54e-05*	—
	(2.78e-05)		(2.78e-05)	
Observations	2,859,415	2,473,967	2,843,554	2,459,434
Pseudo-R^2	0.279	0.271	0.278	0.27
Log likelihood	-90,262.19	-86,420.61	-90,009.56	-86,291.35
Type of fixed effects:				
Country- (α_i, α_j)	Yes	No	Yes	No
Country-year- (η_{it}, μ_{jt})	No	Yes	No	Yes
Year- (λ_t)	Yes	No	Yes	No
Two-digit commodity- (φ_n)	Yes	Yes	Yes	Yes

Notes: Robust, clustered (at the country-pair-commodity level) standard errors in parentheses. Interaction effects are computed as contrasts of average marginal probability effects using Stata's "margins' " contrast operator (Version 14.0, StataCorp). Asterisks denote the level of statistical significance with *** p<0.001, ** p<0.01, * p<0.05, † p<0.1.

In the case of the interaction effect, asterisks denote the level of statistical significance of the $\chi^2_{[1]}$-test statistic of a comparison of average marginal probability effects across reference groups.