

# Analysis of Anti-dumping Use in Free Trade Agreements

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**Abstract:** Proliferating FTAs in recent years may have conflicting effects on antidumping uses among FTA parties. On the one hand, an FTA may increase a country's anti-dumping activities to protect its domestic industries from the increased import flows from other parties. On the other hand, an FTA supposedly helps reduce the use of anti-dumping measures to accomplish the purpose of free trade. Which effects prevail can shed important lights on the question of whether an FTA can be a stumbling block or a building block.

This paper examines the effects of FTAs on anti-dumping activities based on comprehensive empirical analysis. Using longitudinal data of major anti-dumping user countries from 1995 to 2009, we found that there is clearly an inverse relationship between an FTA and antidumping activities. This finding represents the user's tendency to trigger less anti-dumping filings against FTA membership, regardless of facing more imports from FTA partners. The paper also captured dynamic FTA effects based on a series of distribution of time dummies. The estimation results from the dynamic model show that the FTA enactment year clearly has significant effect, suggesting substantial reduction of anti-dumping investigations in that year.

## I. Introduction

Proliferating free trade agreements (FTA) since the 1990s have provoked heated discussion on whether they have contributed to facilitating more trade or aggravating discriminatory trade diversion. The general observation is that although FTAs may have significant trade effects on certain trading partners, the overall impact to the global trading system appears to be insignificant or less impressive than expected. Apart from this macro-level question on the relationship between global trade and FTAs, there are not many studies on the micro-level question of how FTA parties behave against each other, in particular whether FTA parties use antidumping (AD) measures more or less frequently against the other parties. Considering the fact that antidumping measures are still one of the major trade barriers in the world trading system, the effect of FTAs on antidumping uses can provide an important implication to FTA policies or trade policy implementation in general.

The empirical intuition raises conflicting possibilities for potential impacts of FTA on antidumping activities between FTA parties. On the one hand, an FTA may increase a country's anti-dumping activities to protect its domestic industries from the increased import flows from the other parties. After repealing most of the trade barriers and eliminating tariffs, antidumping measures become practically the only legitimate tool to address industry injuries related to import increases. On the other hand, an FTA supposedly helps reduce the use of anti-dumping

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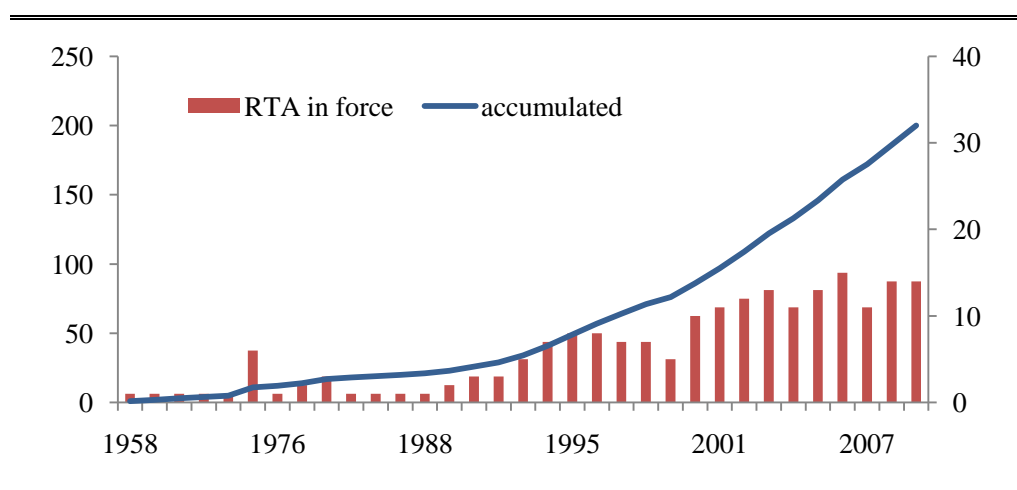
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measures to accomplish the purpose of free trade. Regardless of the legal consistency of trade remedy actions against FTA parties, FTA parties may abstain from using trade barriers – including antidumping measures – basically to promote more trade with FTA parties. When we consider the recent phenomena of FTA parties modifying trade remedy rules in the context of FTAs, the latter possibility gets even more compelling.<sup>1</sup>

This paper tries to examine this theoretical question by conducting an empirical test to quantify the effects of FTA on AD activity. Since our dependent variable is the count data – i.e., the number of AD investigations, we used the negative binomial regression techniques (I, II) in order to come to a more robust estimation. Based on the most updated WTO database of AD investigation activities between FTA parties from 1995 through 2009, the overall trend shows gradual decrease in the antidumping uses between FTA parties. In addition to analyzing the overall trend, this paper also analyzed the twelve Major AD users – i.e., Argentina, Australia, Brazil, Canada, China, European Union (EU)<sup>2</sup>, India, Korea, Mexico, South Africa, Turkey and the United States – individually to examine comparative characteristics.

We overview the developments of FTAs and AD uses in the current world trading system in Section II, and raise a research question by conceptualizing the relationship between FTA and AD in Section III. In Sections IV and V, empirical tests to answer the question are elaborated by adopting various methods such as simple data analysis and negative binomial regression estimation. Section VI concludes with policy implications.

**<Figure 1. RTA<sup>3</sup>'s Trend in the World Trading System>**



\*Source: Calculated using WTO RTA database.

< <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx> >

<sup>1</sup> For a more detailed legal and economic analysis on rule diversification by FTAs, see Dukgeun Ahn, “Foe or Friend of GATT Article XXIV: Diversity in Trade Remedy Rules”, *Journal of International Economic Law*, Vol.11,(2008), 107-133. Trade remedy provisions in FTAs are compiled in Robert Teh, et al., “Trade Remedy Provisions in Regional Trade Agreements”, 166-249, in *Regional Rules in the Global Trading System* (eds. by A. Estevadeordal, 2009, Cambridge Univ. Press).

<sup>2</sup> The EU is counted as one country even if it has currently 27 member states because an antidumping action is taken collectively by the European Commission.

<sup>3</sup> The term RTAs is used to refer to various types of Regional Trading Arrangements including preferential trade agreements, free trade agreements (FTA), customs unions (CU), strategic economic cooperation agreements (SECA), and economic partnership agreements (EPA).

## II. Overview of FTAs and Antidumping Actions in the WTO System

### 1. FTAs development in the WTO System

Aside from the long held debate in academic and policy circles since the 1990s on whether FTAs are building blocks or stumbling blocks for the multilateral trading system, the surge in FTAs has continued unabated since the early 1990s.<sup>4</sup>

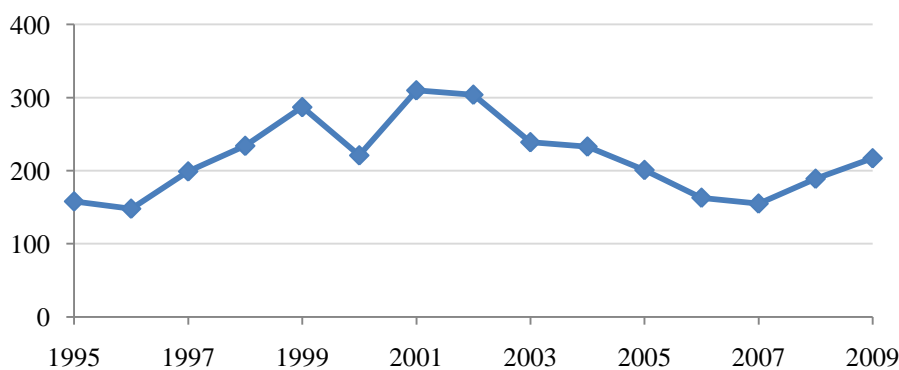
Of these RTAs, free trade agreements (FTAs) for goods and services account for a predominant portion of about 90%, while customs unions account for less than 10 %. As shown in Figure 1, RTAs have proliferated ironically since the inception of the World Trade Organization (WTO), and almost 200 RTAs are in force as of December 2010.<sup>5</sup>

It seems that the trend of FTAs would continue to increase as the WTO system remains stuck in the deadlock of the Doha Development Agenda and WTO Members try to fill in the gap of multilateral trade process by FTAs. Since no country is willing to bear the opportunity cost that may come from lagging behind in the FTA race, the proliferation of FTAs is unlikely to decline soon. In this regard, it is particularly alarming to observe strategic FTA interactions by major countries such as the United States, the EU and China.

### 2. Anti-Dumping Development in the WTO System

There have been significant developments in the use of AD policies over the last two decades. Firstly, there was the considerable increase in the total number of AD investigations filed worldwide. For example, the average annual number of AD investigation initiations was 207 during the GATT period of 1985-1994, while in 1995~2004, the annual average reached about 265.<sup>6</sup> Secondly, the number of AD using countries has substantially increased since developing countries utilize very actively the WTO trade remedy systems.

<Figure 2. The Trend of AD Investigations in the WTO System>



\*Source: "Annual Reports of the Committee on AD Practices"

<sup>4</sup> See Bhagwati Jagdish and Arvind Panagariya (1996), "Preferential Trading Areas and Multilateralism- Strangers, Friends, or Foes?" in *The Economics of Preferential Trade Agreement*, 1-78 (eds. by J. Bhagwati & A. Panagariya, AEI press).

<sup>5</sup> <<http://rtais.wto.org/UI/PublicAllRTAList.aspx>> (visited 3 January 2011). Among 198 RTAs notified to the GATT/WTO and in force as of December 2010, 167 RTAs were notified under Article XXIV of the GATT 1947 or GATT 1994; 29 under the Enabling Clause; and 69 under Article V of the GATS.

<sup>6</sup> See Bown Chad P. (2008), "The WTO and Antidumping in Developing Countries". *Economics and Politics*, Vol. 20, Issue 2, pp. 255-288, June 2008.

As shown in Figure 2, AD investigations do not show an exponentially increasing trend although the general frequency of investigations is higher than that of the GATT period. Instead, the overall trend of AD investigations clearly shows the counter-cyclical movement that the increases of AD investigations during the early and the late 2000s have coincided with global economic recession.

**<Table 1. Top 12 AD Users in the WTO System>**

Rank	1995-1999		2000-2004		2005-2009		1995-2009	
	Country	AD	Country	AD	Country	AD	Country	AD
1	EC	164	India	244	India	171	India	498
2	US	136	US	223	EC	104	US	429
3	Argentina	89	EC	133	China	81	EC	401
4	Australia	89	Argentina	104	Argentina	79	Argentina	267
5	S. Africa	89	Canada	78	US	70	Australia	201
6	India	83	Australia	77	Turkey	64	S. Africa	172
7	Brazil	56	Brazil	60	Brazil	56	Brazil	170
8	Canada	50	S. Africa	48	Australia	35	Canada	150
9	Mexico	46	Turkey	48	S. Africa	35	Turkey	126
10	Korea	37	Mexico	41	Pakistan	29	China	120
11	New Zealand	28	China	39	Korea	29	Korea	105
12	Venezuela	23	Korea	39	Canada	22	Mexico	88

\*Source: "Annual Reports of the Committee on AD Practices" sorted by authors

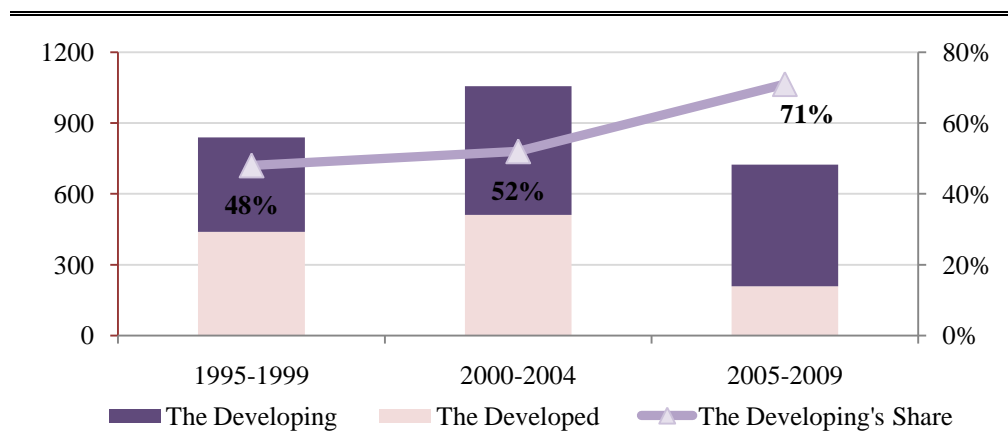
\*\*Note: The above statistics are based on AD initiations.

As shown in Table 1, it is noted that new AD users - primarily developing countries such as Argentina, Brazil, China, India, Mexico and Turkey – have become remarkably active and been responsible for much of the growth of AD activities in the WTO system. This situation is starkly contrasted with the GATT period in which trade remedy measures are almost exclusively utilized by US, EU, Canada and Australia.<sup>7</sup> Since the WTO was established, developing countries has continued to increase AD uses reaching 71% of the total share during the latter half of the 2000s, while the share of developed countries in terms of AD uses has significantly decreased as illustrated in Figure 3. In fact, this observation illustrated that developing countries did not generally reduce their AD uses during the global economic crisis period of the late 2000s in which developed countries tried to standstill or minimize AD actions in order to support the recovery of global trade.<sup>8</sup>

<sup>7</sup> The use of trade remedy measures by developing countries is more prominent in the case of safeguard actions. See generally Dukgeun Ahn, "Restructuring the WTO Safeguard System", in *The WTO Trade Remedy System: East Asian Perspectives* (eds. by M. Matsushita, D. Ahn & T. Chen, 2006, Cameron May).

<sup>8</sup> Despite political commitments in the G-20 or the WTO in relation to global economic crisis, many developed countries still adopted numerous trade barriers. See the reports by Global Trade Alert at <[http://www.globaltradealert.org/tensions\\_contained\\_8th\\_gta\\_report](http://www.globaltradealert.org/tensions_contained_8th_gta_report)> (visited 20 December 2010). But, as far as AD is concerned, the developed countries as a whole appeared to contain themselves in order to avoid excessive trade conflicts.

**<Figure 3. Trend of AD Use by the Developing & the Developed Countries>**



\*Source: Calculated using “Annual Reports of the Committee on AD Practices”

### III. The Relationship between FTAs and AD Activities

Whether trade remedy actions should be permitted in FTAs has drawn much attention among WTO Members as well as scholars.<sup>9</sup> There was no clear answer based on drafting history or formal decisions yet in the GATT/WTO system about how to interpret Article XXIV:8 of GATT.

A group in favor of a literal approach points to the definition of an FTA in Article XXIV:8 that “a free-trade area shall be understood to mean a group of two or more customs territories in which the duties and other restrictive regulations of commerce (except, where necessary, those permitted under Articles XI, XII, XIII, XIV, XV and XX) are eliminated on substantially all the trade.” They argue that even the balance of payment related exceptions enunciated in the parenthesis should be permitted limitedly “where necessary”. Accordingly, there is no room for trade remedy measures to be allowed in this structure of FTAs.

The other group in support of trade remedy measures in FTAs argues that those provisions in the parenthesis should not be understood as the exhaustive list since many other obvious exceptions such as national security and general exception are not explicitly mentioned. Moreover, duties and other restrictive regulations of commerce are to be eliminated only on “substantially all the trade” not “all the trade”. In other words, selective trade limitation based on legitimate trade remedy measures should be embraced by the purview of Article XXIV:8.

While the legal issue concerning trade remedy measures, particularly antidumping measures, has not been clearly settled, WTO Members have adopted a variety of “FTA-customized” trade remedy systems.<sup>10</sup> A majority of FTAs still adopt the WTO trade remedy system without any change. However, some FTAs entirely prohibit trade remedy measures between parties. In addition, recent FTAs adopt increasingly more customized trade remedy systems that modify procedural or substantive elements of the WTO trade remedy rules. Table 2 categorized AD provisions in FTAs.

The EU, as an economic union, does not allow AD measures among member states although the EU approves new member countries to resort to AD temporarily during their transitional periods into full EU membership in accordance with the Treaty of Rome. Likewise,

<sup>9</sup> For more comprehensive overviews on this issue, see James Mathis, *Regional Trade Agreements in the GATT/WTO: Article XXIV and the Internal Trade Requirement* (TMC Asser Press, 2002).

<sup>10</sup> For a more detailed legal analysis on rule diversity, see D. Ahn, *supra* note 1.

FTAs between Canada-Chile, Australia-New Zealand<sup>11</sup>, EFTA, EFTA-Chile and EFTA-Singapore categorically prohibit AD activities between FTA parties, notwithstanding countervailing or safeguard measure still allowed in their FTAs. On the other hand, other FTAs try to modify WTO antidumping rules. For example, Jordan-Singapore FTA stipulates mandatory lesser duty requirement, a 5% *de minimis* rule, the prohibition of the zeroing method, a three-year sunset review period and so on.

<Table 2. Anti-dumping Provisions in Selected FTAs>

AD disallowed	Anti-dumping allowed		
	With specific provisions		No specific provisions
Canada-Chile	Andean Community	EFTA-Croatia	AFTA
CER	Australia-Singapore	EFTA-FYROM	ALADI
China-Hong Kong	Australia-Thailand	EFTA-Israel	Australia-US
China-Macao	CACM	EFTA-Jordan	Canada-Israel
European Communities	Canada-Costa Rica	EFTA-Morocco	CEMAC
EEA	CARICOM	EFTA-Palestine Authority	EC-Andorra
EFTA	COMESA	EFTA-Tunisia	EC-OCT
EFTA-Chile	EC-Algeria	EFTA-Turkey	GCC
EFTA-Singapore	EC-Chile	Group of Three	Japan-Singapore
	EC-Croatia	Korea-Chile	Mexico-Chile
	EC-Egypt	MERCOSUR	Mexico-Japan
	EC-Faroe Islands	Mexico-EFTA	US-Bahrain
	EC-FYROM	Mexico-Israel	US-CAFTA & Dom. Republic
	EC-Israel	Mexico-Nicaragua	US-Chile
	EC-Jordan	Mexico-Northern Triangle	US-Israel
	EC-Lebanon	Mexico-Uruguay	US-Jordan
	EC-Mexico	NAFTA	US-Morocco
	EC-Morocco	New Zealand-Singapore	US-Singapore
	EC-Palestine Authority	SADC	
	EC-South Africa	SAFTA	
	EC-Switzerland-Liechtenstein	SPARTECA	
	EC-Syria	Turkey-Israel	
	EC-Tunisia	UEMOA	
	EC-Turkey		

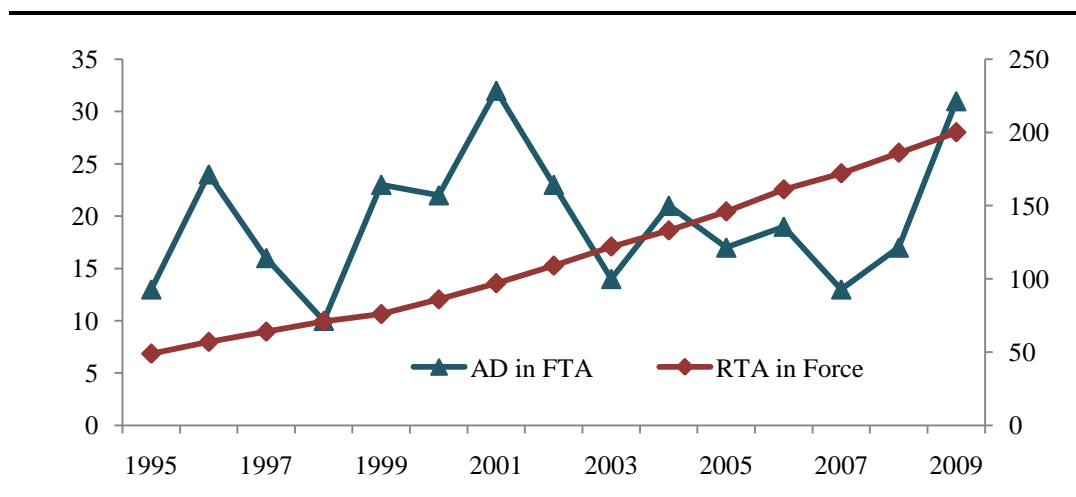
\*source: WTO, Teh *et al.* (2007)

These modified FTA provisions basically aim to reduce AD actions between FTA parties. Despite such intent, an FTA may increase the need for anti-dumping activities to protect its domestic industries from the increased import flows from other parties. For most countries, antidumping measures remain practically the only tool to address industry injuries related to import increases. Although many FTAs include bilateral safeguard mechanisms to address import surge, they are typically to halt tariff elimination process instead of limiting particular imports that can cause industry injuries. That makes antidumping measures to become

<sup>11</sup> The Australia-New Zealand FTA was agreed in 1988. In Article 4 of its Protocol, they declared that anti-dumping actions were inappropriate for free trade in goods under the accelerated implementation agreed in the Agreement.

practically the only potential safety net for import competition induced by FTAs.

**<Figure 4. The Superficial (Non-)Relationship between FTAs & AD Investigations>**



\*Source: Calculated using “Annual Reports of the Committee on AD Practices”

In reality, how do those trade remedy provisions in FTAs work? A cursory observation of overall trend of FTAs and AD investigations in the WTO system as illustrated in Figure 4 does not indicate any meaningful effect. However, the answer to the above question requires a more rigorous scrutiny based on dataset for bilateral AD activities. This paper used the data available in the WTO website and constructed the dataset for AD activities between FTA parties. Detailed data on AD investigations, initiated by WTO member countries against which countries and when, was obtained from the “Annual Reports of the Committee on Anti-dumping Practices to General Council”<sup>12</sup> for the period of 1 July 1994 to 30 June 2009. In the econometric analysis using pooled data, we examined the effects of FTAs on AD investigations of the 12 major AD user countries.<sup>13</sup> This pooled data analysis enables us to analyze the above question appropriately because the twelve main AD users have coincided mostly with active FTA negotiating countries.

#### IV. Analytical Frameworks for Empirical Model

##### 1. AD Activities between FTA Parties

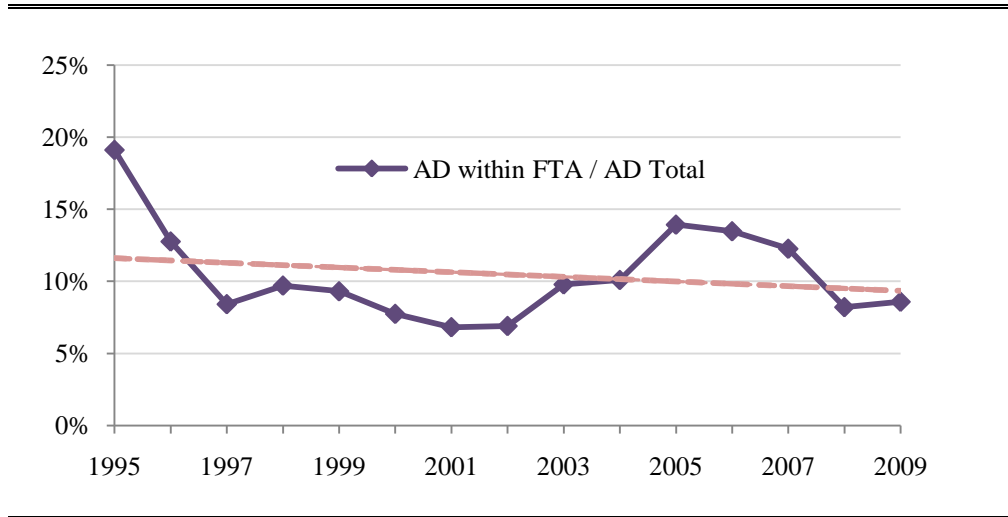
The yearly trend of AD investigations since 1995 shows a slight downward movement, although this inverse relationship was not significant. AD investigations against FTA parties have not been a significant portion of overall AD actions. As shown in Figure 5, the AD investigations against FTA parties have remained generally around 10% of the total AD actions. It is interesting to note that AD investigations against FTA parties have shown exactly the opposite trend to the overall AD investigations in Figure 2. As shown in Figure 5, AD

<sup>12</sup> Article 18.5 of the Agreement provides that "Each Member shall inform the Committee of any changes in its laws and regulations relevant to this Agreement and in the administration of such laws and regulations".

<sup>13</sup> We limited the analysis to the top twelve countries. While the limitation was arbitrary, other countries are insignificant in terms of trade remedy actions.

investigations against FTA parties had declined until 2001 during which the overall AD actions had constantly increased. In addition, while the overall AD actions decreased after 2001, the AD investigations against FTA parties continued to increase until 2005 when the trend was reversed.

**<Figure 5. Yearly Trend of AD Investigations against FTA Parties>**



\*Source: “Annual Reports of the Committee on AD Practices”

## 2. Econometric Model

### 1) Description of Variables

The overall trend shown in the previous section should be tested with other control variables to analyze specifically how much the FTA factor affects AD activities.

Trade volumes of FTA parties – especially, imports – and macroeconomic factors such as GDP growth rate and exchange rate are often included to empirically examine AD activities. Bilateral trade volumes are generally a good control variable since AD activities are directly influenced by reciprocal trade relation. Increased imports tend to raise incentives for an importing country to initiate AD investigations whereas exports decrease such tendency because of the fear of unwanted retaliatory measures and trade dispute with lucrative exporting markets. Considering AD investigations in practice, we use the trade value lagged by one year (t-1).

For variables that explain economic environment of AD using countries, Knetter and Prusa (2003) used GDP growth and real exchange rate effects. They argue that AD filings of a country increase in years after experiencing lower GDP growth. Lower GDP growth makes it more likely that investigating authorities find an industry injury to filed AD cases. They also showed that an appreciation of the real exchange rate led to a higher number of AD case filings for their sample countries. The relationship between AD activities and macroeconomic factors – particularly, GDP growth and exchange rate – has been confirmed by subsequent studies. Using the semiannual data of US AD actions from 1980 to 1998, Feinberg (2005) showed that a real exchange rate and economic growth rate are significant variables to AD investigations. In the case of AD activities by developing countries such as Argentina, Brazil, India and South Africa, Hallworth and Pirachal (2006) analyzed the number of AD actions and related macroeconomic factors, suggesting that an economic growth rate and a real exchange rate of reporting countries are significant factors in their tests.

In our analysis, however, a real exchange rate was not used since bilateral imports and exports are included as control variables and thereby a real exchange rate could be redundant



with these variables.<sup>14</sup> In fact, an exchange rate effect is more desirable to be used in the disaggregated time series data analysis and in the case specific studies<sup>15</sup>. GDP growth rates are calculated by the average of three years.

In addition, our model incorporated the total number of AD actions that partner countries were accused of by all other WTO member countries as an indicator of partner countries' vulnerability of exportation to AD investigations. In other words, the larger the number is, it represents the greater tendency of being accused by other countries' AD investigations. This variable may capture the impact of various factors directly or indirectly related to AD filings, such as non-market economy status, business relationship in a particular sector, dumping and AD experiences in a relevant industry, and the like.

We also include country dummies in order to fix unobserved remaining individual characteristics varying across countries. This helps to control the residual country-specific characteristics such as the level of economic development, a country's unique political situation, and historical or cultural features in relation to AD actions. Since AD investigations are usually very volatile over time, year dummies are included in all specification of our regression model to control for any change in trends over time.

The dependent variable and the control variables are summarized in Table 3.

**<Table 3. Summary Description of Variables >**

Name	Explanation	Remarks	Source
AD	The number of AD Investigation Initiated by reporting country.	Bilateral data	WTO
Partner_AD	The total number of initiated AD investigation against partner country.	Partner country's data	WTO
LnIM	Logarithm of Imports from Partner (one year lagged, t-1).	Bilateral data	UN COM- TRADE
LnEX	Logarithm of Exports to Partner (one year lagged, t-1).	Bilateral data	
GRRGDP	Growth Rate of Real GDP (Mean of 3 years Gross Domestic Production).	Reporting countries' Data	IMF
FTA	When FTA enter into force (Dummy).	Once FTA enacted =1, otherwise 0	WTO

## 2) Model Specification

<sup>14</sup> Nevertheless, the regression result including real exchange rate instead of export is given in Appendix 3 to compare the difference in econometric analysis.

<sup>15</sup> The real exchange rate is related with price competitiveness of domestic producers and their imports/ exports; however, whether producers file a petition for an AD investigation would be determined by the net effect of currency fluctuation. For instance, appreciation of domestic currency might cause more imports from abroad or boost exports of final goods with lower production costs incurred with the weaker foreign currency. Since our model focusing on a broad relationship between AD and FTA is neither for industrial-level nor sector-specific analysis, we used bilateral trade as control variables with year effects controlled.

To examine the impact of FTAs on AD investigations with control variables explained above, we consider the following regression model:

$$AD_{ijt} = \alpha + \alpha_i + \alpha_j + \beta_2 \ln IM_{ijt} + \beta_3 \ln EX_{ijt} + \beta_4 GRGDP_{it} + \beta_5 AD\_Partner_{jt} + \beta_6 FTA_{ijt} + \delta Year\_dum_t + \mu_{ijt}$$

The  $AD_{ijt}$  denotes the number of AD investigations by country  $i$  against an import source  $j$  in year  $t$ . The  $FTA_{ijt}$  is a dummy variable indicating whether  $i$  and  $j$  are members of the same FTA in effect in the given year  $t$ , and the  $\delta Year\_dum_t$  represents period specific effects while  $\alpha_i$  and  $\alpha_j$  indicate country fixed dummies.

Our dependent variable is the reported number of AD investigations initiated by WTO member countries. In other words, this dependent variable is a count variable which takes on non-negative integer values. In such case, ordinary least squares (OLS) models might not provide the best overall fit for the values of the explanatory variables since the dependent variable is not continuous and does not have a normal distribution. While OLS models assume normality as the standard distributional assumption, a count variable cannot have a normal distribution due to the discontinuity of values. Moreover, when it takes on only a few values, its distribution becomes very different from a normal distribution. Instead, the nominal distribution for count data is typically the Poisson or negative binomial distribution (Wooldridge 1997).

<Table 4. Summary Statistics for Data>

Variables	Mean	Maximum	Minimum	Std. Dev.	Obs.
AD	0.109	18.00	0.00	0.599	32120
PARTNER_AD	1.019	78.00	0.00	4.070	32120
LNIM(t-1)	15.454	26.60	0.00	5.609	32120
LNEX(t-1)	16.472	26.64	0.00	4.832	32120
GRR_GDP	3.568	11.13	-10.26	3.294	32120
FTA	0.061	1.00	0.00	0.240	32120
FTA (t-2)	0.005	1.00	0.00	0.074	32120
FTA (t-1)	0.006	1.00	0.00	0.077	32120
FTA (t_0)	0.006	1.00	0.00	0.078	32120
FTA (t+1)	0.007	1.00	0.00	0.083	32120
FTA (t+2)	0.006	1.00	0.00	0.079	32120
FTA (t+3)	0.006	1.00	0.00	0.077	32120
FTA (t+4)	0.005	1.00	0.00	0.073	32120
FTA (t+5)	0.005	1.00	0.00	0.072	32120

On the other hand, the Poisson distribution is subject to the restriction that the variance of the dependent variable is equal to the mean of the dependent variable. It has long been recognized that the Poisson distributional assumption has serious difficulty in applying to the real practice while the negative binomial distribution assumption has a better applicability by

allowing the variance to differ from the mean. Since our data shows considerable dispersion inconsistent with the Poisson restriction, we adopted the negative binomial distribution.<sup>16</sup> In particular, for a more accurate and robust estimation, we used negative binomial quasi-maximum likelihood estimation (NB QMLE) introduced by Gourieroux, Monfort, and Trognon (1984) using the estimate of  $\hat{\eta}^2$  from Cameron and Trivedi (1986, 1990) tests.

The dataset contains the number of AD investigations as a dependent variable and various macroeconomic variables for the period from 1995 to 2009. Because the number of AD investigations initiated varies from year to year and from country to country, the number of observations varies each year under the assumption that each bilateral sample is case-specific and independent from one another.<sup>17</sup> Table 4 presents summary statistics for the data employed in the estimation.

## V. Empirical Results

Table 5 summarizes the results of NB QMLE regression.<sup>18</sup> More detailed econometric results that analyze country-specific data are provided in Appendix 2.

The FTA dummies representing the FTA deterrent effects on AD investigations are significantly negative (-) in the NB QMLE model, as shown in columns (A) and (C). The results indicate, for instance, that subsequent to FTA enactment, the number of AD investigations initiated against FTA partners considerably dropped – by approximately 44% (C) or 52% (A), all else being equal.<sup>19</sup> It is noted that while all major AD using countries follow the general pattern to reduce AD investigations against FTA parties, Argentina and Mexico actually increase the AD actions against FTA parties. In that sense, it is also noted that the result for Brazil, another Latin American country, showed the positive sign but was statistically insignificant. It is not clear whether this result can be generalized as a region-specific characteristic. But the fact that two major AD users in Latin America showed the tendency to increase AD investigations against FTA parties demands more attention from policy makers as well as rigorous scrutiny by academics.

On the other hand, countries such as China, India and Turkey show significant negative effects of FTAs on AD investigations, possibly implying that the AD actions in those countries are strongly influenced by overall trade policies. The political commitment to facilitate more trade with FTA parties in those countries may dominate policy decisions on whether selective trade constraints based on trade remedy actions should be utilized against FTA parties. In any case, the finding seems to suggest that considering China, India and Turkey are all very active countries in AD actions in recent years, FTAs can become more attractive policy tools to address trade remedy problems in those countries.

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<sup>16</sup> The test for the Poisson restriction, is based on an auxiliary regression. After the test regressions, with derived variance parameter we can compute variance parameters for each Negative Binomial Pseudo Maximum Likelihood (NB PML) estimator. In this analysis, our tests suggest the presence of overdispersion and estimated coefficient is significantly positive with the t-statistic of the coefficient is highly significant, indicating the rejection of the Poisson restriction (Cameron and Trivedi 1986, 1990). Refer to more details of this issue in the appendix.

<sup>17</sup> In fact, it is common that more than one partner country is involved with one AD investigation and reporting countries initiated AD investigations once or more times for a year.

<sup>18</sup> The Poisson regression estimation showed that the signs of the coefficients on variables are consistent with this result, although the values of the coefficients are different.

<sup>19</sup> When the conditional mean function contains a dummy variable, the marginal effect could be calculated in the given maximum likelihood estimates ' $\delta$ '. The details are explained in Appendix.

**<Table 5. FTA Deterrent Effects on the Anti-dumping Investigation>**

Dependent Variable (No. of AD)	NB QMLE Regression			
	(A)	(B)	(C)	(D)
Constant	-10.70*** (0.273)	-10.55*** (0.269)	-12.61*** (1.051)	-12.20*** (1.042)
Partner_AD	0.112*** (0.007)	0.113*** (0.007)	0.141*** (0.013)	0.146*** (0.013)
LnIM(t-1) (Imports)	0.214*** (0.018)	0.211*** (0.018)	0.226*** (0.034)	0.222*** (0.034)
LnEX(t-1) (Exports)	0.168*** (0.021)	0.164*** (0.021)	0.222*** (0.038)	0.207*** (0.037)
GRRGDP(t-3~t)	0.152*** (0.009)	0.156*** (0.009)	0.025* (0.014)	0.026* (0.014)
<b>FTA</b>	<b>-0.736***</b> (0.108)		<b>-0.580***</b> (0.140)	
<b>FTA (t-2)</b>		<b>0.555**</b> (0.266)		<b>0.513*</b> (0.311)
FTA (t-1)		<b>-0.694**</b> (0.348)		-0.543 (0.384)
<b>FTA (t_0)</b> (Year in force)		<b>-0.819**</b> (0.363)		<b>-0.638*</b> (0.399)
<b>FTA (t+1)</b>		<b>-0.766**</b> (0.304)		<b>-0.590*</b> (0.346)
FTA (t+2)		-0.487 (0.296)		-0.502 (0.359)
FTA (t+3)		<b>-0.639*</b> (0.338)		-0.286 (0.393)
<b>FTA (t+4)</b>		<b>-1.056***</b> (0.358)		<b>-0.877**</b> (0.401)
<b>FTA (t+5)</b>		<b>-1.126***</b> (0.374)		<b>-0.991**</b> (0.420)
Country Fixed Effect <sup>20</sup>	No	No	Yes	Yes
N. obs.	32120	32120	31770	31770
Fixed variance	4.538	4.465	5.169	5.416
Parameters ( $\alpha$ )	(0.043)	(0.043)	(0.032)	(0.033)
Log Likelihood	-7444.11	-7443.64	-6441.51	-6466.17

Note: \*denotes statistical significance at the 10%, \* \* at the 5%, \*\*\* at the 1% level. Robust standard errors are in parenthesis. Period effect is considered in all models. The result is based on NB I, which has a variance that is proportional to the mean, i.e.  $(1 + \alpha)\lambda$ . Please refer to the Appendix regarding the issues of QML parameter ( $\alpha$ ), a measure of over-diversion, used for estimations.

To examine dynamic FTA effects, additional specifications are introduced by dividing the FTA dummy into FTA dummies of different years as in columns (B) and (D). Dummy variables of t-2 through t+5 are designed to capture the FTA deterrent effects on AD activities along with time variance. For example, the dummy variable t\_0 takes the value of 1, if the

<sup>20</sup> Unconditional Maximum Likelihood (ML) by estimating negative binomial regression models that include dummy variables for all individuals are considered as a true fixed effects regression model. See “Fixed Effects Regression Models”, in the fixed effects models for count data, 49-69 (Paul D. Allison 2009) and “Negative Binomial Regression”, 199-203 (Joseph M. Hilbe 2007, Cambridge Univ. Press).

current year is the first year that FTA between countries comes into force; otherwise, it is zero. Likewise,  $t + 'n'$  takes the value of 1 if  $t$  is ' $n$ 'th year after FTA entry into force; otherwise, it is zero.<sup>21</sup>

The results of Table 5 reveal a statistically significant and negative relationship between the number of AD investigations and FTA ( $t-2 \sim t+5$ ) except for FTA ( $t-2$ ).<sup>22</sup> The estimate on FTA  $t_0$  implies that FTAs would reduce AD investigations against the named parties by about 47 ~ 56% in the year the FTA enters into force. At FTA  $t+1$ , one year after the FTA entry into force, AD investigations decrease by 45 ~ 54%, compared with other years of the FTA implementation. However, by looking at the result of FTA effects in dynamic dimension, we can find an interesting result associated with our hypothesis. For the result of FTA  $t_0$ , an incentive to serve the purpose of FTA, facilitating freer trade and maintaining good foreign relations with the parties, prevails over an incentive for protecting domestic industries driven mostly by internal politics. If the initiation of AD investigations itself has a chilling effect on bilateral trade, as empirically supported by Prusa (2001, 2005) and other scholars, it seems that two governments do not wish to cast a chill over a trade relationship that has just upgraded with a strong economical tie. Ironically, this result implies that investigating authorities of major AD using countries maintain substantial discretion for AD investigations although the WTO system aims to strengthen the rule based mechanism for controversial trade remedy systems, especially AD actions.

On post-FTA ( $t+2, t+3\dots$ ), as imports normally grow due to the FTA with the actual elimination of the tariffs and non-tariff barriers, AD petitions by industries that are competing with foreign exporting companies are likely to rise. During this period, governments may need to compromise between domestic and foreign politics since the economic and political pressures from domestic industries might not be left ignored. The coefficient signs of FTA  $t+2$ , FTA  $t+3$  in Table 5 indeed give a hint on that. The coefficients are losing statistical significance, indicating that to some extent, the negative relationship between FTAs and AD investigations is considerably diluted after two or three following years of the FTA entry into force.

Interestingly, the coefficients for  $t+4$  and  $t+5$  in both models are statistically significant and shows negative signs again, implying that FTA ( $t+4$ ) and FTA ( $t+5$ ) decrease AD investigations by about 58 ~ 65% and 63 ~ 68%, respectively. This means that the FTA enactment ultimately leads to a reduction in AD investigations. In other words, when market liberalization by FTAs that provide typically three to five year transition periods becomes almost completed, trade remedy actions against FTA parties tend to eventually decrease despite somewhat vague tendency during the transition period. As a result, substantial deterrent effects of FTAs on AD investigations not only do exist but also become stronger after the typical FTA adjustment period.

Macroeconomic variables reflected the typical features that might lead to AD investigations. As expected, the coefficients for 'Partner\_AD' as a good indication of a country's vulnerability to AD uses from other countries and 'LnIM' (imports from partners) have positive signs with great significance. The positive coefficient of 'Partner\_AD' indicates that a country tends to initiate more AD investigations when the exporting countries are exposed to more AD investigations. In other words, importing countries become more aware of dumping possibilities from a certain country when AD investigations are initiated against exportation from that

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<sup>21</sup> Note that FTAs enacted before 1994 – WTO system is invalid – are counted as  $t+1$  (the 1 year after FTA enactment) from 1995. Since the inception of the WTO system, new rules of AD and FTA are applied. Thus, setting aside the question of data unavailability, it is better to fix the dataset in this way for a consistent analysis.

<sup>22</sup> It is interesting to note that the coefficient of FTA ( $t-2$ ) came out to be positive. It might be explained that those countries several years prior to FTA enactment used to be targets for AD use against each other since many FTAs were created among intensive trading partners formed naturally by the benefits of regional approximation.

country. This effect, however, appears to be much less significant than the effect of import increase that is the most direct factor for AD actions.

On the other hand, the coefficients of exports and the growth rate of GDP turned out to be positive that seems contradictory to previous literature. As shown in Appendix 2, the regression by individual countries showed that in the case of some Latin American countries such as Argentina and Mexico, their 3 year average ( $t-3 \sim t$ ) of GDP growth rates was negatively related with AD filings. But, the GDP growth rate and AD activities showed a positive relationship at a significant level mostly in developed countries such as Australia, Canada, EC, USA, and Korea. This peculiarity may be explained at least partly by recent international initiatives of G-20 that includes all of the countries in our data. These countries committed themselves to gradual reduction of trade barriers including AD measures. The overall downward trend of AD actions since the early 2000s might be the result of these political initiatives. In fact, some researchers in their recent paper found that GDP growth rates as a macroeconomic factor turned out to be either insignificant or sometimes positively related with AD investigations.<sup>23</sup> Moreover, it is possible that protection-seeking activities and political voices from marginalized industries could be even stronger and thereby their AD petition might be easily heard during times of economic growth. In other words, as GDP growth leads to more import and export growth, it is more likely that AD petitions requesting protection from the sectors relatively more aggrieved could be greater than before. Actually, AD investigations are mostly initiated in the marginalized sector decoupled with economic growth.

The positive coefficients of exports also appear for many major AD using countries at a significant level. The positive correlation between exports and AD actions may be due to growing trends of retaliatory AD actions. More exportation tends to cause more AD actions from importing countries and in turn invokes more AD investigations by exporting countries. It seems clear that countries are no longer seriously limited or intimidated by the size of export markets against which they initiate AD investigations. In fact, the United States, the EU, China, India and Korea show a tendency to increase AD investigations when they have more exportation. It seems that those countries have more widely diversified their trading partners through the WTO and FTAs. Thus, they might feel less burdened with the possibility of future retaliation when they initiate an AD investigation against a particular exporting market.

## VI. Conclusion

The question of whether FTAs contribute to global trade requires more rigorous and comprehensive analysis. Nevertheless, the result of our analysis can add important insights to that discussion. While AD measures are still widely used to serve as the most popular protectionist instruments in the WTO system, FTAs have inversely affected AD investigations within the boundary of FTA membership. This result appears to be statistically robust for individual countries as well as at an aggregate level. The dynamic effects of FTAs over the pre- and post-FTA periods confirmed the negative relationship between FTAs and AD investigations. However, we found that Argentina and Mexico are exceptions in that they tend to increase AD investigations against FTA parties. The underlying reason for this peculiarity is not clear at this stage.

The empirical finding of our analysis may have interesting economic and legal implications for future FTA negotiations. If this result is globally confirmed, the effect on AD investigations alone can become a crucial element for FTA strategies and policies of WTO Members – particularly for Asian countries that have been exceptionally vulnerable to AD

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<sup>23</sup> For example, see Sadni Jallab et al. (2006), Bao and Giu (2008), Bown (2008), and Moore and Zanardi (2008).

measures. Competitive advantages ensued by favorable AD actions may be sometimes a key factor to secure stable access to exporting markets. In addition, the actual effectiveness of FTAs in taming AD investigations may further raise incentives to modify the AD rules in particular and trade remedy rules in general in the context of FTAs in order to create more artificial advantages for FTA parties.

There are numerous other issues to be addressed in relation to the relationship between FTAs and trade remedy actions. For example, whether diversification of trade remedy rules observed in the recent FTAs actually leads to reduction or diversion of trade remedy actions and if so, how much will be able to shed important light on the future renovation of the trade remedy system. We hope our finding in this study to invoke more academic interest regarding the economic and legal effect of FTAs on trade remedy actions.

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## Appendix 1. Technical Notes on Econometric Methodology

### 1. Tests for over-dispersion and yielding variance parameter for estimation.

The Poisson function may be expressed as

$$P(n) = \frac{e^{-\lambda} \lambda^n}{n!}$$

where  $n$  is the number of occurrences of the event  $\lambda$  is the mean and the variance of the distribution. if the  $n$  is the number of AD investigations initiated by a reporting country  $i$  to a partner country  $j$  at time  $t$ , the parameter  $\lambda$  depend on a set of explanatory variables that affect on the probability :

$$\ln \lambda_{ijt} = \beta' X_{ijt}$$

Poisson model, however, assumes the equality between the mean and the variance of the distribution. For instance, the Poisson model underestimates the variance-covariance matrix in the case of over-dispersion (the variance is bigger than mean).

The negative binomial model is an extension version of the Poisson model that loosens the restriction of that equality. (Cameron and Trivedi, 1986)

Cameron and Trivedi (1986, 1990) proposed an auxiliary regression for NB QMLE-I and II. The regression is based on so called 'QMLE  $\hat{\beta}$  (Pseudo Maximum Likelihood), which obtains the fitted values of the dependent variable ( $\hat{\beta} = \hat{Y}_i$ ) by estimating the Poisson model. By running this regression, we can diagnose the over-dispersion when the t-statistic of the coefficient is significant, leading us to reject the Poisson restriction.

Since  $E[(Y_i - f(X_i, \beta))^2] = \Omega(X_i, \beta, \alpha)$ ,  $\alpha$  could be derived by a regression based on the relation  $(Y_i - f(X_i, \beta))^2 = \Omega(X_i, \beta, \alpha) + \varepsilon_i$ , where  $\varepsilon_i$  is an independent error with zero mean. For the case  $f(X_i, \beta) = \exp(X_i\beta)$ , for  $\Omega(X_i, \beta, \alpha) = (1 + \alpha)\exp(X\beta)$ , we could obtain  $\hat{\alpha}$  with an auxiliary regression of  $e_{oi}^2 - Y_i$  on  $\hat{Y}_i$  for NB QMLE-I variance parameter whereas for one for NB QMLE-II,  $\Omega(X_i, \beta, \alpha) = \exp(X\beta)(1 + \alpha\exp(X\beta))$  with an auxiliary regression of  $e_{oi}^2 - Y_i$  on  $\hat{Y}_i^2$ .

For the case of our model, the results of the regressions were all significantly positive, meaning all parameters ( $\alpha$ ) is different from zero.

### 2. Calculation for Marginal effect for MLE (Maximum Likelihood Estimation)

$$\text{if } E(Y_i) = \lambda_i = \exp(\beta_1 + \beta_2 x_i + \delta D_i),$$

$$\text{then, } E(Y_i | D_i = 0) = \exp(\beta_1 + \beta_2 x_i), \text{ and } E(Y_i | D_i = 1) = \exp(\beta_1 + \beta_2 x_i + \delta).$$

Therefore, the percentage change in the conditional mean is identical to the effect of a dummy variable in a log-linear model, thus, the effect is calculated as such

$$100 \left[ \frac{\exp(\beta_1 + \beta_2 x_i + \delta) - \exp(\beta_1 + \beta_2 x_i)}{\exp(\beta_1 + \beta_2 x_i)} \right] \% = 100 [e^\delta - 1] \%$$

**Appendix 2. FTA Effects on the Anti-dumping Investigation: The Case of Major AD users**

Dependent Variable (No. of AD)	Argentina		Brazil		Mexico		Australia		Canada		EC	
	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II
Constant	-11.550*** (0.978)	-11.656*** (0.579)	-10.980*** (1.395)	-11.309** (4.407)	-4.140*** (0.656)	-4.827*** (0.591)	-18.339*** (1.755)	-17.505*** (0.823)	-15.365*** (1.530)	-14.397*** (0.787)	-17.064*** (1.164)	-15.229*** (0.651)
Partner_AD	0.062*** (0.007)	0.053*** (0.003)	0.057*** (0.010)	0.043** (0.020)	0.137*** (0.020)	0.106*** (0.009)	0.046*** (0.010)	0.039*** (0.003)	0.060*** (0.012)	0.051*** (0.005)	0.060*** (0.010)	0.047*** (0.004)
LnIM (t-1) (Imports)	0.487*** (0.071)	0.484*** (0.043)	0.306*** (0.051)	0.304* (0.175)	0.051 (0.051)	0.079* (0.046)	0.592*** (0.101)	0.548*** (0.050)	0.543*** (0.124)	0.515*** (0.072)	0.435*** (0.118)	0.443*** (0.079)
LnEX (t-1) (Exports)	0.033 (0.069)	0.039 (0.044)	0.038 (0.059)	0.068 (0.204)	0.058 (0.046)	0.065 (0.040)	0.065 (0.099)	0.071 (0.050)	-0.043 (0.112)	-0.040 (0.065)	0.258** (0.124)	0.170** (0.081)
GRR_GDP (t-3~t)	-0.236*** (0.063)	-0.217*** (0.036)	0.436* (0.261)	0.403 (0.817)	-2.578*** (0.839)	-2.106*** (0.631)	0.644* (0.330)	0.650*** (0.165)	0.830*** (0.310)	0.748*** (0.144)	1.568*** (0.344)	1.674*** (0.210)
<b>FTA</b>	<b>0.718***</b> (0.260)	<b>0.723***</b> (0.134)	-0.344 (0.423)	-0.428 (1.314)	<b>0.881**</b> (0.374)	<b>0.920***</b> (0.282)	-0.746 (0.508)	<b>-0.747***</b> (0.268)	-0.401 (0.457)	<b>-0.365*</b> (0.234)	<b>-0.443*</b> (0.243)	<b>-0.417**</b> (0.163)
N. obs.	2475	2805	2565	2565	2535	2535	2820	2820	3045	3045	3198	3198
Parameters ( $\alpha$ )	0.508 (0.028)	0.030 (0.003)	1.480 (0.035)	0.306 (0.008)	2.404 (0.057)	0.633 (0.013)	0.925 (0.034)	0.216 (0.012)	1.539 (0.025)	0.228 (0.004)	1.039 (0.046)	0.088 (0.007)
Log Likelihood	-427.57	-426.25	-627.45	-608.49	-305.82	-301.97	-374.66	-370.84	-341.09	-335.24	-612.15	-630.75

Note: \*denotes statistical significance at the 10%, \*\* at the 5%, \*\*\* at the 1% level. Period effect is considered in all models. Robust Standard errors are in parenthesis<sup>24</sup>.

<sup>24</sup> However, unlike NB QMLE II, since the NB QMLE I does not assume that the relationship between the mean and variance is linear exponential, it is not possible to do a GLM robust NB QMLE I analysis even when 'α' is fixed ahead of time (Wooldridge 1997).

Dependent Variable (No. of AD)	USA		China		India		Korea		South Africa		Turkey	
	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II
Constant	-18.010*** (1.271)	-18.067*** (0.631)	-105.07 (85.45)	-97.89 (65.72)	-43.787*** (9.450)	-37.124*** (8.379)	-23.987*** (2.384)	-23.812*** (1.414)	-24.181*** (4.012)	-24.074*** (2.146)	-11.922*** (1.787)	-12.152*** (0.928)
Partner_AD	0.092*** (0.014)	0.043*** (0.003)	0.024 (0.029)	0.018 (0.019)	0.075*** (0.015)	0.039*** (0.005)	0.025** (0.010)	0.019*** (0.004)	0.074*** (0.014)	0.064*** (0.005)	0.109*** (0.022)	0.061*** (0.005)
LnIM (t-1) (Imports)	0.418*** (0.096)	0.466*** (0.054)	0.006 (0.046)	0.008 (0.036)	0.239*** (0.041)	0.206*** (0.031)	0.389*** (0.118)	0.394*** (0.073)	0.534*** (0.104)	0.499*** (0.054)	0.540*** (0.113)	0.567*** (0.054)
LnEX (t-1) (Exports)	0.194** (0.096)	0.170*** (0.054)	0.620*** (0.079)	0.561*** (0.058)	0.218*** (0.055)	0.219*** (0.041)	0.449*** (0.145)	0.442*** (0.088)	0.080 (0.106)	0.073 (0.056)	-0.088 (0.091)	-0.110*** (0.037)
GrGDP (t-1~t-3)	0.919*** (0.239)	0.876*** (0.101)	9.919 (9.365)	9.270 (7.201)	4.865*** (1.365)	4.005*** (1.206)	0.426** (0.190)	0.406*** (0.118)	3.946*** (1.527)	4.280*** (0.834)	-0.329 (0.256)	-0.172 (0.151)
<b>FTA</b>	-0.362 (0.306)	<b>-0.558***</b> (0.149)	<b>-1.531***</b> (0.386)	<b>-1.580***</b> (0.314)	<b>-1.746***</b> (0.529)	<b>-1.469***</b> (0.461)	-0.027 (0.749)	-0.010 (0.474)	-0.417 (0.400)	<b>-0.355*</b> (0.211)	<b>-0.812*</b> (0.420)	<b>-0.948***</b> (0.227)
N. obs.	3091	3091	1295	1295	2640	2640	2760	2760	3015	3015	2415	2415
Parameters ( $\alpha$ )	1.317 (0.025)	0.075 (0.002)	0.508 (0.028)	0.030 (0.003)	3.135 (0.100)	0.261 (0.009)	0.564 (0.019)	0.096 (0.005)	1.967 (0.046)	0.563 (0.011)	2.820 (0.038)	0.266 (0.003)
Log Likelihood	-647.19	-639.39	-549.14	-565.31	-1431.37	-1566.89	-221.61	-219.04	-346.17	-341.55	-241.76	-250.27

Note: \*denotes statistical significance at the 10%, \*\* at the 5%, \*\*\* at the 1% level. Period effect is considered in all models. (Robust) Standard errors are in parenthesis<sup>25</sup>.

<sup>25</sup> However, unlike NB QMLE II, since the NB QMLE I does not assume that the relationship between the mean and variance is linear exponential, it is not possible to do a GLM robust NB QMLE I analysis even when ' $\alpha$ ' is fixed ahead of time (Wooldridge 1997).

### Appendix 3-1. Regression Results Including Real Exchange Rate (RER) as Control Variable

Table 6 shows the result of NB QMLE regression that includes bilateral “real exchange rate (RER)” as a control variable into our model. Basically, the results are identical with the former regression model with export instead of real exchange rate; the coefficient signs of FTA dummies and other variables used in the models are all same with slight differences in their values. In terms of country analysis, the five countries – the United States, Canada, the EU, Argentina and Mexico – have shown significantly positive signs for the coefficients as expected, in line with previous studies, suggesting that a strong currency creates an environment more attractive to filing AD petitions.

On the other hand, in the case of most other developing countries (Brazil, China, India, South Africa and Turkey), there is no prevalent pattern related to RER. This result is supported by recent comprehensive studies on determinants of AD use. These papers examined the patterns of AD uses by distinguishing the groups by developed and developing countries. They found the effects of real exchange rates are inconsistent with earlier studies in the case of developing countries.<sup>26</sup> However, interestingly China and Turkey cases appear to show counter-intuitive results with significantly negative coefficients for RER. This result may be explained by the peculiar trade policies of those countries that are contingent on macroeconomic situations. Given the perception that Chinese yuan is undervalued, low currency values for yuan tend to entail more aggressive AD actions against China and in turn provoke more retaliatory AD actions by China. This kind of reactive AD actions by Turkey also seems very plausible particularly considering its aggressive AD uses since the early 2000s.

<Table 7. FTA Deterrent Effects on the Anti-dumping Investigation>

Dependent Variable (No. of AD)	QMLE-Negative Binomial Regression			
	(A)	(B)	(C)	(D)
Constant	-9.671*** (0.287)	-9.547*** (0.281)	-10.532*** (0.997)	-10.313*** (0.971)
Partner_AD	0.108*** (0.007)	0.108*** (0.007)	0.148*** (0.013)	0.151*** (0.013)
LnIM(t-1) (Imports)	0.332*** (0.013)	0.325*** (0.012)	0.351*** (0.040)	0.342*** (0.038)
LnRER(t-1) <sup>27</sup>	-0.046 (0.031)	-0.042 (0.031)	-0.036 (0.046)	-0.036 (0.047)
GrrGDP(t-3~t)	0.157*** (0.009)	0.161*** (0.009)	0.027** (0.010)	0.027** (0.011)
<b>FTA</b>	<b>-0.665***</b> (0.103)		<b>-0.396***</b> (0.115)	
<b>FTA (t-2)</b>		<b>0.473**</b> (0.201)		<b>0.596***</b> (0.176)
<b>FTA (t-1)</b>		<b>-0.783***</b> (0.279)		<b>-0.651**</b> (0.267)
<b>FTA (t_0)</b> (Year in force)		<b>-0.847***</b> (0.325)		<b>-0.565**</b> (0.307)
<b>FTA (t+1)</b>		<b>-0.717***</b> (0.264)		<b>-0.459*</b> (0.275)

<sup>26</sup> See Moore and Zanardi (2008), “Trade Liberalization and Antidumping: Is There a Substitution Effect?” ECARES working paper 2008\_024, and C. Bown (2008), “The WTO and Antidumping in Developing Countries” Economics & Politics, Vol. 20, Issue 2, p. 255-288. In Bown’s analysis, his Probit model estimation of the industry-level AD use for India and Mexico does not show statistical significance on effects of real exchange rate.

<sup>27</sup> LnRER: Logarithm of Real Exchange Rates (one year lagged, t-1).

FTA (t+2)		-0.423 (0.381)		-0.343 (0.274)
FTA (t+3)		<b>-0.589**</b> (0.250)		-0.160 (0.338)
<b>FTA (t+4)</b>		<b>-0.955***</b> (0.282)		<b>-0.740***</b> (0.271)
<b>FTA (t+5)</b>		<b>-0.992***</b> (0.349)		<b>-0.797**</b> (0.381)
Country Fixed Effect	No	No	Yes	Yes
N. obs.	28442	28422	28205	28250
Parameters ( $\alpha$ )	4.130	4.090	5.733	5.835
Log Likelihood	-7350.63	-7349.52	-6443.96	-7350.63

Note: \*denotes statistical significance at the 10%, \* \* at the 5%, \*\*\* at the 1% level. Robust standard errors are in parenthesis. Period effect is considered in all models.

The result is based on NB I, which has a variance that is proportional to the mean, i.e.  $(1 + \alpha)\lambda$ .

Please refer to the Appendix regarding the issues of QML parameter ( $\alpha$ ), a measure of over-diversion, used for estimations.

\*\* Data source of Real Exchange Rates: USDA Economic Research Service

**Appendix 3-2. FTA Effects on the Anti-dumping Investigation: The Case of Major AD users**

Dependent Variable (No. of AD)	Argentina		Brazil		Mexico		Australia		Canada		EC	
	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II
Constant	-11.106*** (0.784)	-10.981*** (0.570)	-10.655*** (1.183)	-10.749*** (3.261)	-4.395*** (1.121)	-5.055*** (0.608)	-17.810*** (1.343)	-16.913*** (0.869)	-19.102*** (6.497)	-19.295*** (5.148)	-16.898*** (0.861)	-15.009*** (0.678)
Partner_AD	0.067*** (0.009)	0.054*** (0.003)	0.056*** (0.009)	0.043*** (0.015)	0.128*** (0.021)	0.105*** (0.009)	0.047*** (0.008)	0.040*** (0.004)	0.061*** (0.008)	0.051*** (0.005)	0.054*** (0.009)	0.045*** (0.004)
LnIM (t-1) (Imports)	0.520*** (0.042)	0.515*** (0.029)	0.340*** (0.040)	0.357*** (0.085)	0.121** (0.058)	0.150*** (0.033)	0.632*** (0.041)	0.591*** (0.030)	0.499*** (0.047)	0.473*** (0.037)	0.689*** (0.038)	0.605*** (0.030)
LnRER (t-1)	0.175** (0.086)	0.173** (0.076)	0.017 (0.105)	-0.004 (0.316)	0.494*** (0.095)	0.451*** (0.074)	0.016 (0.372)	-0.168 (0.241)	0.257*** (0.096)	0.273*** (0.074)	0.290*** (0.049)	0.276*** (0.040)
GRR_GDP (t-3~t)	-0.207*** (0.058)	-0.171*** (0.030)	0.372 (0.226)	0.341 (0.637)	-2.793*** (0.525)	-2.286*** (0.628)	0.634** (0.311)	0.637*** (0.176)	1.964 (2.004)	2.237 (1.580)	1.633*** (0.371)	1.727*** (0.218)
<b>FTA</b>	0.763*** (0.228)	0.789*** (0.135)	-0.361 (0.322)	-0.416 (0.995)	1.085*** (0.387)	1.087*** (0.273)	-0.705 (0.513)	-0.704** (0.282)	-0.404 (0.356)	-0.379 (0.249)	-0.403* (0.230)	-0.375** (0.175)
N. obs.	2307	2307	2367	2367	2367	2367	2487	2487	2697	2697	2412	2412
Parameters ( $\alpha$ )	0.737	0.034	1.470	0.312	2.287	0.630	0.926	0.217	1.645	0.239	1.073	0.11
Log Likelihood	-433.62	-439.01	-592.36	-592.36	-294.96	-289.92	-373.51	-369.43	-340.30	-334.20	-575.02	-585.93

Note: \*denotes statistical significance at the 10%, \*\* at the 5%, \*\*\* at the 1% level. Period effect is considered in all models. Robust Standard errors are in parenthesis.

Dependent Variable (No. of AD)	USA		China		India		Korea		South Africa		Turkey	
	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II	NB I	NB II
Constant	-17.915*** (1.262)	-18.166*** (0.682)	-10.660*** (3.944)	-9.266** (4.466)	-2.961 (4.244)	-3.446 (5.528)	-22.850 (19.867)	-28.962*** (13.026)	-14.712*** (1.966)	-13.424*** (1.151)	-13.183*** (1.357)	-13.360*** (0.989)
Partner_AD	0.092*** (0.023)	0.041*** (0.003)	0.085*** (0.021)	0.069*** (0.020)	0.080*** (0.014)	0.041*** (0.005)	0.037*** (0.009)	0.028*** (0.004)	0.075*** (0.012)	0.064*** (0.005)	0.106*** (0.023)	0.059*** (0.005)
LnIM (t-1) (Imports)	0.601*** (0.043)	0.632*** (0.027)	0.311*** (0.037)	0.300*** (0.031)	0.366*** (0.024)	0.338*** (0.019)	0.707*** (0.069)	0.719*** (0.045)	0.575*** (0.047)	0.537*** (0.034)	0.518*** (0.064)	0.523*** (0.047)
LnRER (t-1)	0.272*** (0.069)	0.301*** (0.048)	-0.557*** (0.139)	-0.547*** (0.165)	-0.014 (0.061)	-0.063 (0.066)	0.004 (0.202)	0.018 (0.135)	-0.058 (0.151)	-0.074 (0.120)	-0.316 (0.141)	-0.314*** (0.104)
GrGDP (t-1~t-3)	0.939*** (0.259)	0.900*** (0.105)	0.316 (0.414)	0.201 (0.469)	-1.013* (0.593)	-0.803 (0.791)	0.620 (2.374)	1.358 (1.601)	0.492 (0.584)	0.328 (0.306)	-0.268 (0.226)	-0.111 (0.148)
<b>FTA</b>	-0.241 (0.213)	-0.463*** (0.153)	-1.539*** (0.437)	-1.482*** (0.337)	-1.551*** (0.514)	-1.303*** (0.464)	-0.143 (0.584)	-0.125 (0.467)	-0.334 (0.324)	-0.287 (0.218)	-1.053*** (0.349)	-1.215*** (0.225)
N. obs.	2685	2685	1202	1202	2412	2412	2532	2532	2652	2652	2322	2415
Parameters ( $\alpha$ )	1.514	0.092	1.513	0.371	3.242	0.269	0.564	0.124	1.989	0.566	2.820	0.266
Log Likelihood	-646.19	-631.18	-571.45	-596.06	-1438.46	-1572.99	-226.22	-223.72	-340.189	-335.421	-237.11	-246.02

Note: \*denotes statistical significance at the 10%, \*\* at the 5%, \*\*\* at the 1% level. Period effect is considered in all models. (Robust) Standard errors are in parenthesis.