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국제학석사학위논문

**A study on the Effect of the Anti-dumping  
Measure on Export Countries**

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# **A study on the Effect of the Anti-dumping Measure on Exporting Countries**

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A thesis submitted to the faculty of Seoul National University  
in partial fulfillment of the requirements for the degree of

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# Abstract

## **A study on the Effect of the Anti-dumping Measure on Exporting Countries**

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The purpose of this study is to analyze whether the trade depression effects of anti-dumping remedy exist against China, South Korea and the United States. China, South Korea and the United States as exporting countries and top ten countries as importing countries were selected. By Using the gravity model with the panel data from 2008 to 2017, estimation result is showed export amount increase rather than depression effect in all scenario. In addition, the Anti-dumping investigation and in-force variables show negative relation between the export. There are differences in degree of impacting the trade amount, but almost all cases showed inverse relationship.

**Key Words:** Anti-dumping Effect, Dumping, WTO, Anti-dumping measure, Gravity Model

**Student Number:** 2018-27751

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# **I. Introduction**

## **i. Introduction**

The establishment of the WTO in 1995 has compelling grounds for legal rights and restrictive power to sustain the protectionism movement by promoting the multilateral free trade system. The establishment of the international organization where builds up the foundation to pursue a more liberalized trade environment by numerous developed countries to release their protective measures in trade. When the country faces a form of economic crisis, they tend to pursue protectionist policies such as tariff, non-tariff measures, and domestic support policies to secure the overall domestic economy. One of the essential missions is to overcome the movements going back to the past. By proposing common goals to refrain from imposing or raising its protective barriers in investment and trade area among member countries under the WTO guidance of the WTO are too important to ignore.

The Anti-dumping, Safeguard, and Countervailing duty measures are the actions for import controls based on both the WTO agreement and individual states' related statutes. After the Uruguay round in 1995, the WTO reinforced authority, and the conditions of becoming a member state have strengthened as well. In the global market, free trade and internationalism are the causes of polarization of individuals and income inequality. Based on this argument, countries have insisted that they have limits toward protecting their injured industries by imposing tariff barriers. On the other hand, Non-Tariff Barriers (NTBs), which can temporarily restrict imports, are used to protect domestic industries since the limitation is relatively lower than other measures.

Furthermore, the NTBs have an aspect of uncertainty, complexity, and not easy to negotiate in the international field. Those blind spots became a target to be exploited by the

countries as an advantage using the non-tariff barriers. The problem of diversified interpretation brings user countries to utilize the measure based on their merit, which concerns the international trade environment.

Notably, the dumping activities have existed for a while, which allows countries to counteract their damages. That is why, in the early 1980s, countries start to ease the trend of protectionism and enact the Anti-dumping laws. Later, under the WTO system, tariff reduction and elimination were spreading, but in terms of developing countries, they have more significant damage than benefit. This flaw became the reason why developing countries have started to utilize anti-dumping measures. In the case of the labor-abundant industry and primary industries do not need advanced skills. However, as technology changes rapidly, advanced countries have a more favorable position in the trade. Despite their advantages, raising the AD measure is not limited to developed countries; in terms of usage of the AD measure, developing countries have also utilized its usage.

Developing countries have become the most frequent users of the Anti-dumping (AD) measure as a trade policy instrument. Various scholars stated those developing countries as relatively “new users,” and it has been more than ten years that these countries have used the Anti-dumping measures in various ways. We can say developing countries are no longer new users, and they had enough time to grasp regarding the usage of the AD measure fully. Both developed and developing countries progressed its usage of Anti-dumping measures, and its effect may have changed and developed along the way. World Trade Organization (WTO) pursues a goal to ensure fair and free trade from international trade to be better off with every member country. Existing WTO mechanism helps developing countries to adapt its usage of trade measures makes it possible to relatively reduce the gap between developed and developing countries on the utilize its measure.

When the country faces a form of economic crisis, they tend to pursue protectionist policies to secure their overall economy. After the financial crisis in 2008, numerous sources expressed concerns regarding increasing tendencies of protectionist movements around the globe. We have seen the economy has slowed down, and according to its occurrence, import restriction as protectionist measure and tariff rates have also increased (Choi, 2016). Furthermore, the trade war between China and the United States aggravates the negative ambience in the free trade environment.

The trade war seems to continue for a more extended period than we have imagined, and the influence between trading partners with China and the United States gets intensified as well. Both countries have been trying to reach common ground, which led to partial agreement on the trade issue last October. They have ceased the trade war momentarily, but there is still a long way left to reach full consensus to solve its trade issues. President Donald Trump specifically expressed concerns regarding foreign countries as undercutting the price of products by dumping in the domestic market to drive the US products out from the internal market. Those foreign products have enjoyed the result of it. He has directly pointed out several countries: China, South Korea, and a few other countries. All these series of events intensified the movements toward protectionism and spread negative influence to pursue free trade. The tendency of seeking protectionism policy increased usage of trade measures, including imposing Anti-dumping measures.

We can see that numerous countries are using the AD measure as their trade remedy, so it is possible to connect that its measure can affect substantially international trade. There are previous studies regarding the effect of the anti-dumping measures, and various scholars have discovered and shown different empirical results along the way of development of the dumping activities and the usage of the anti-dumping measure.

The purpose of this paper is to explore whether the effect of the AD measure in the recent ten years are showing different results or not. This research consists of 4 chapters. The introduction chapter includes the purpose of this research and question and literature review of previous studies. Chapter 2 lists general concepts of the dumping and anti-dumping measure, the recent trend of using the AD measure, and the effect of AD. Chapter 3 is about the hypothesis and empirical model to verify the assumption, the result, and the limitation of the model. The overall conclusion of this study and possible future research suggestion covered in the conclusion chapter.

This study may carry valuable findings add to the previous researchers. Previous researchers have found that the studies showed different ways to discover new results. Due to several reasons, the AD measure's effect may not appear in more recent years compared to the past. However, this research still has meaning from the point of view to verify the pessimistic arguments on the effect of AD measure. we will be able to see the empirical results shows real difference on the degree of its effect.

## **ii. Research Question**

In the previous studies, researchers were mainly focused on the effect of Anti-dumping measures imposed by the complainant countries and most likely by the developed countries or frequent top users. They have shown various effects in past studies such as FDI effect, investigation effect, deterrent effect, and others. However, this research is trying to answer the following questions:

1. Does anti-dumping measures from importing countries constantly showing certain effect on the exporting countries regardless of their economic status between 2008 and 2017? If the result does show any effect during the target years by the measure, is it significant or not?
2. the degree of effect expected to be differed by the economic status or not.
3. Each industry shows different degree of effect on the AD measure or not.

In this research, the top 10 reporting countries (Argentina, Australia, Brazil, China, EU, India, Pakistan, Turkey, U.S., Canada) with top 3 respondent countries (China, South Korea, and the USA) is the subject of this study to analyze the effect of AD measure. We are aware that developing countries are no longer the 'new user' of this measure. Among the top 10 reporting countries, six countries are developing countries. Analyzing the effect of Anti-dumping not only focused on the developed countries, but also in the developing countries, may bring new supplement point to the WTO remedy system.

### **iii. Literature Review**

#### **iii.1 History of usage of the AD measure**

There are numerous scholars have been published and studied in terms of the effect of Anti-dumping measures. Thomas J. Prusa is a well-known scholar regarding trade measures, specifically on Anti-dumping studies. Also, Chad P. Bown has contributed significantly to the issues of dumping and anti-dumping.

Prusa (2005) pointed out that the Anti-dumping measure becomes a growing problem in international trade from early 2000. The proliferated phenomenon from developed countries to the developing countries creates problems in the trade environment. In order to solve the dumping problem, a respondent country should use the anti-dumping measure to correspond to its wrongful act. However, the relationship between dumping activities and anti-dumping measures is less relevant than people have expected; this magnifies the problematic situation, which became an international trade problem nowadays.

According to Bown (2008), the developing countries' usage of AD measures carries important representation due to increased usage of AD measures in those countries as well. Developing country industries that seek and receive AD import protection are responding to macroeconomic shocks. The flexibility of this policy uses as a protectionist tool responsive to many different types of political-economic shocks (1995-2004) among these countries. Developing countries learned previous activities from developed countries, which allows them to develop and create a strategy to use AD measures within the international trade environment.

### **iii.2 Effect of the AD measure**

Li and Kim's (2018) study recently held to identify the influence of AD measure from Korea and China, specifically in the top five industries (Chemical, Plastics, Textiles, Metals, and Machinery), which AD measure was imposed. In this study, the scholars have found out that 12 complainant countries of AD measure towards in South Korea, and China's major industry does not create a deterrence effect. Rather, it creates an increase in export.

Choi (2017) studied whether the AD duties restrict imports with the United States, European Union, China, and India. The trade restriction effect of an AD duty is dominant, but a 1% increase in the AD duties decreases the import of the targeted product by about 0.43~0.51%. The total import of the targeted products increased by about 30 percent while an anti-dumping duty was in force. That indicates that an anti-dumping duty is just a temporary import relief.

Yoon and Lee (2015) analyzed the trade depression and trade diversion effect on the Korean Anti-dumping actions within the 20 years (1990-2011). South Korea's action brings trade depression effect, but only appears limited to 1 year later the imposing measure and trade diversion effect occurs in year one and year 3 with a large amount. The result was an interesting discovery because imposing the AD measure is to depress the trade to offset its damage. However, the depression effect was very temporal, which does not achieve its real purpose.

Hylke and Maurizio (2010) aim to see whether the chilling trade effects can proliferate on the AD measure by using a gravity model of annual observations (1980–2000). The estimates show that AD has trade-chilling effects on aggregate import volumes, but the impacts are heterogeneous across sectors.

According to Staiger and Wolak (1994), they have found strong evidence that indicates introducing Anti-dumping laws or measures effects imports and import-competing output other than through the imposition of duties. Initiation of the Anti-dumping measure and relevant laws can bring a trade depression effect to the trade partners.

### **iii.3 Prospect of the AD measure**

Prusa (2005) published interesting research that relates to the problems in international trade is the anti-dumping measure rather than dumping activities. Countries utilize its method into a form of protectionism that reflects more toward political aspects. Compared to the past, the AD measure's effect has been extensively altered, which allows numerous countries to adapt the alternation and use of political motives. As the usage of AD increases through countries all across the globe, the tendency to spread protectionism measures using the AD makes it hard to reform its action. Also, the author brings two scenarios that are likely to occur when the AD rules are not formally amended. Either it is a "'AD cold war' or 'AD epidemic'" (p.699) may occur, that is why Prusa presented possible development of each scenario.

## **II. Anti-Dumping**

### **i. Anti-Dumping**

The World Trade Organization (WTO) has defined the dumping as price discrimination act in international commerce. The exporting country artificially lowers its price of products and sell it to importing country less than the price that is being sold in the exporting country market. This kind of activity damages the WTO's goal to pursue fair trade in the international trade market. In addition, the dumping brings negative influence in several ways. By distorting the price of the products exporting to the foreign market, it can create unwanted pressure for destination market firms to lower their prices. The dumping activities create an unfair environment, which leads to a downward of their profits in the market as well. This discriminatory action may cause severe damage to home firms. In the worst scenario, it can close the company and people losing their jobs, which increases unemployment.

Unlike other trade measures, the Anti-dumping actions are specifically protected under the WTO rules and exempt from the non-discrimination clause, which is considered as a remedy for unfair trade practices. The Anti-Dumping Agreement (Implementation of Article VI of the GATT) covers every detail to interpret dumping activities and how to prevent and regulate unfair activities between countries. The WTO solves disputes between countries based on the agreement. Countries have built and developed their trade dispute strategies based on the Panel and the Appellate Body report, which helps to understand the future outcome. The anti-dumping measure is a trade policy tool that carries a significant impact during the process of investigation and determination. This impact is beyond what we have expected in the AD duties and filing an investigation on the dumping activities. The legal resolution and the impact of its damaged

industries in the importing country lead to its potential future strategies on dumping and the distorted outcome of market economies.

In the early stage of using the AD measure, only a few countries such as the United States, the European Union, and other developed countries, have used them as their remedy for the illegal activities. However, as time goes by, the utilization of its measure has become more expanded toward other countries. The anti-dumping measure is no longer a subset of developed countries that only limited countries have enjoyed its usage. Canada was the first country that enacted the anti-dumping law in 1904. Subsequently, countries started to follow adopting the anti-dumping law against irrational activities. In the 1980s, the number of introducing the AD laws have doubled until the 2000s. They are mostly developing countries referred to as “new adopters” at that time (Vandenbussche, Zanardi, 2010). Starting from the wealthiest countries, now also developing countries are using its measure by adopting the AD laws to defend and regulate dumping activities. Those 98 countries which adopted the following laws are the vast majority group in the trade flows.

The last decade was a period for developing countries to catch up on most of the industrialized group that had already been enacted the AD law in the 1990s. Zanardi’s study refers that “more than 90% of worldwide imports in 2003 were potentially subject to AD action” compare to the past in 1990. The comparable numerical value was around 71% (p.595, 2006). The meaning of these values means that countries are well-prepared to utilize the AD measure and law. Well-usage of its remedy may be one of the reasons why the AD measure has proliferated in trade.

### >>Negative usage of the AD measure

The AD dispute cases' proliferation begs the questions to be answered, and some remain uncertain in trade. Specifically, from the reason why the AD measure was widely spread, and the possibility of controversy on the interpretation of illegal activities in the dumping dispute needs to be explained. There are several different views on these questions, but there are no definite or accurate answers yet. According to Prusa's study (2005), on the problems of the AD in international trade is the dumping activity, which is no longer a serious problem. What is more of a problematic situation is that countries are using the Anti-dumping measure as a form of protectionism. Thus, the cure for its problem does not treat its symptom and brings a more problematic situation. Countries may not have predicted that the remedy can be used against their goodwill, but as it appears in the statistics and dispute cases. According to Zanardi (2006), the issue of expansion in AD use has evolved rapidly, which now has to deal separately with the dumping problem. Those who advocate the AD measure still argue that it is a way to discourage unfair trade practices and still effectively treat the problem.

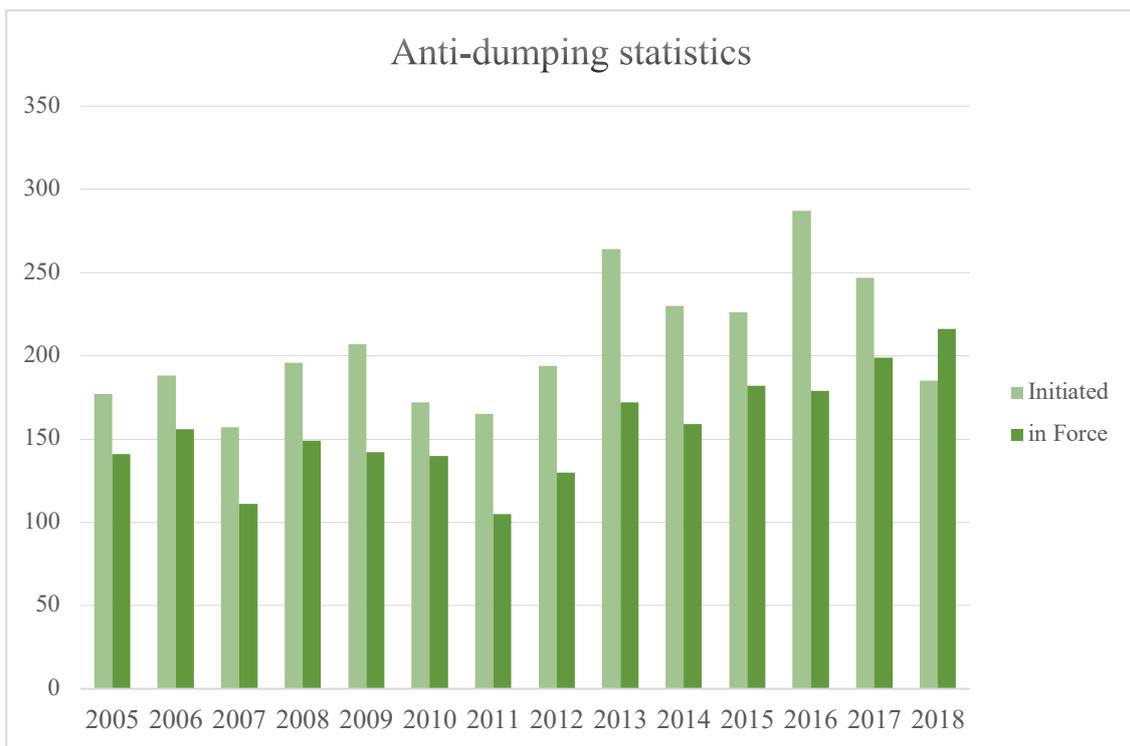
However, the problem we are facing in trade is more of the AD than dumping itself. The anti-dumping measure has become a standard policy tools in numerous countries, but the conditions have drastically changed. As a result, change its emphasis to depict more political behavior instead of using the measure to defend and protect its domestic industry.

Countries have been using the measure for some time. Those countries have figured out how to approach and collect information to get final decision for the restriction. This makes harder for less-developed countries or developing countries who have been less frequently using

the remedy. There are several means to help these countries, but practically, those frequent users have better ground to solve the problem.

## ii. Recent trend of Usage in AD measures

Figure 1. number of initiated and in force cases in the AD

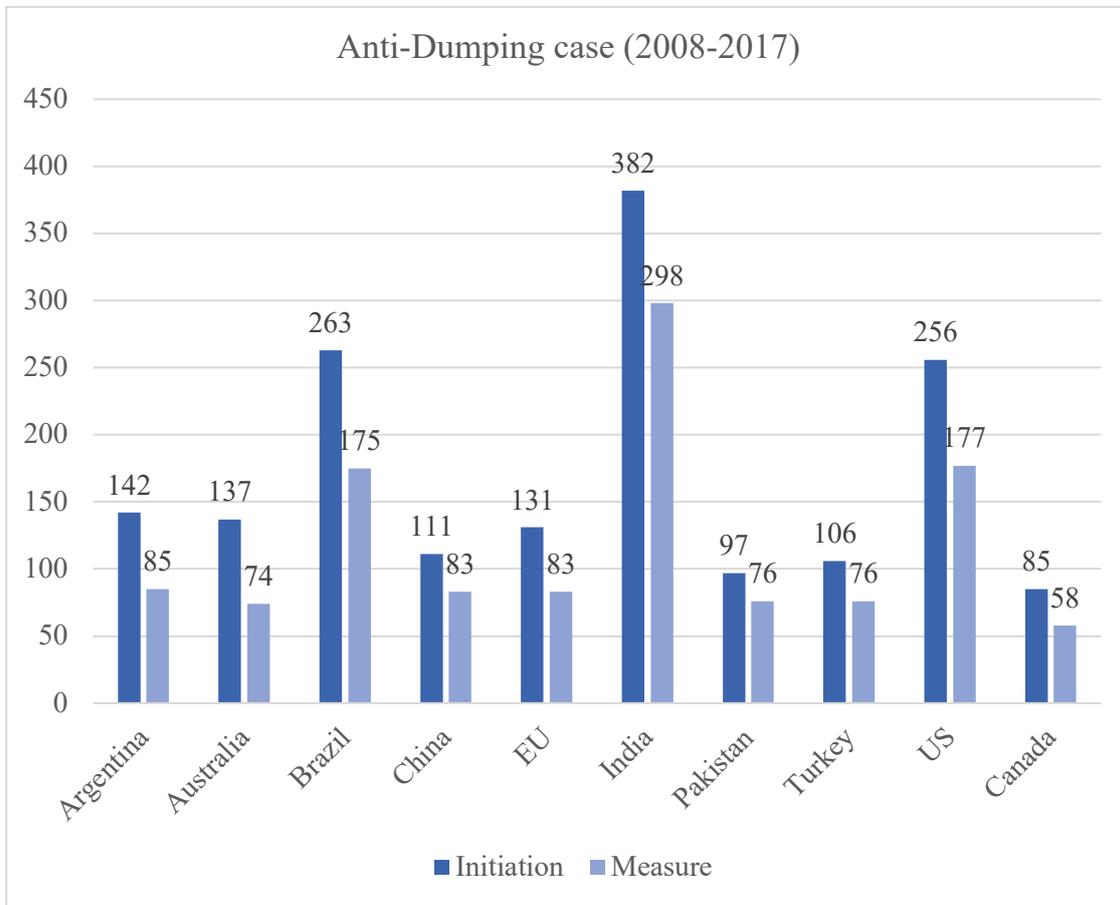


Source: *WTO Anti-dumping database*

Figure 1 shows the total amount of anti-dumping cases initiated and in force between 2005 and 2018. As we can see that countries are effectively and actively using the AD measure to deal with the problem of a discriminatory move towards importing countries. Each year, there are more than 150 dispute cases are being initiated, and more recent years, there are more than 200 cases are being reported to the WTO to be solved. Also, as follow, there are an increasing

number of implementations can be interpreted as well. Countries have common sense that reduction or elimination of tariffs no longer effective as much as in the past. Most of the WTO countries are using non-tariff measures more than an actual adjustment in the tariff rate. Notably, the AD measure is more frequently used than other non-tariff measures since countries feel more comfortable using its action. In 2008, when the financial crisis occurred, the number of dispute cases regarding the dumping issue increased for a while, but numerous sources showed concerns about countries are imposing protective measures. That may contribute to a relatively decreasing number of dispute cases from 2010, which is attempts to ease the negative tendency. In 2016, the number of initiated cases had reached the most significant amount within the ten years of range, and the US and China trade war have begun as well. The trade war may be the trigger point to aggravate the proliferation of its usage.

Figure 2. number of AD case from the top 10 reporting countries



Source: WTO Anti-dumping database

Figure 2 is collected data from the WTO anti-dumping database. The number of cases is based on the reporting countries' report that was combined by the WTO. Listed countries are the top 10 complainant countries' during 2008 and 2017 in the anti-dumping case. These countries are the most active users of the measure. Interestingly, more than half of the countries are developing countries, so the usage of the AD no longer confined to developed countries or a handful number of countries are utilizing. The initiation process accounts for more than 70% of the whole dispute case, and imposing actual measure constitutes nearly 80%. They are increasing worrisome from the imprudent proliferation of the AD dispute cases. We can see

from the graph that countries are having numerous disputes with other members every year. The original purpose of protecting the home industry from the unfair trade activities may have altered into a spree. Developing countries are actively using this particular non-tariff action because it is relatively easy to approach compare to other measures.

Table 1.the ratio of investigation and imposed in AD of top 10 reporting countries

Country	Number of Antidumping Investigations, 2008-2017	Number of Antidumping Measure Imposed, 2008-2017	Ratio (Investigations/Measure Imposed)
<b>User-Countries in the Global Antidumping Database</b>			
Argentina	142	85	59.9%
Australia	137	74	54.0%
Brazil	263	175	66.5%
China	111	83	74.8%
EU	131	83	63.4%
India	382	298	78.0%
Pakistan	97	46	47.4%
Turkey	106	76	71.7%
United States	256	177	69.1%
Canada	85	58	68.2%
Subtotal	1710 (75%)	1155 (77%)	
Remaining Countries	569	349	

Table 1 shows the ratio between the investigation and measure in force with the top ten reporting countries from the WTO anti-dumping database. The countries show a high percentage of having real action from its dispute settlement. Getting into the actual WTO dispute case consumes time and effort from the government. However, despite its hardness, what is important is that members decide to get into the dispute settlement procedure. The WTO dispute settlement system does not work as an ordinary procedure. Countries have a burden of

proof during the trial in order to prove that there was damage due to its illegal activities between exporting and importing countries, which is not easy to gather evidence to prove the existence.

Nevertheless, the fact that there are more than 50% of its cases are concluded as clear violations based on the Anti-dumping Agreement proves something concrete. The number shows that each country is making the best use of the anti-dumping measure, and they identified which strategy would make the most efficient getting in favorable decisions. Having well-informed might have brought the problem of reckless proliferation of the AD measure. Nowadays, a high determination rate does not always depict the effectiveness of measure as much as in the past, which may connect to the vulnerable point of the WTO ruling system. The WTO system does not carry legal forcibility to revise the exporting country's illegal action, even if it gets recommendations from the dispute settlement process. That is why countries are continuously submitting similar cases to the WTO in a short period.

Table 2. Top 5 industries in AD case

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
HS Code 02										
VI Products of the chemical and allied industries	34 (46)	47 (18)	44 (32)	29 (28)	34 (36)	48 (22)	53 (31)	38 (50)	51 (39)	64 (28)
VII Resins, plastics and articles; rubber and articles	21 (25)	31 (13)	24 (15)	13 (12)	40 (8)	41 (30)	45 (21)	23 (26)	37 (12)	28 (22)
XI Textiles and articles	39 (10)	20 (30)	7 (17)	2 (2)	12 (3)	21 (5)	7 (8)	9 (4)	16 (8)	26 (10)
XV Base metals and articles	70 (29)	52 (29)	43 (40)	58 (21)	76 (41)	97 (69)	89 (61)	105 (57)	129 (80)	80 (86)
XVI Machinery and electrical equipment	16 (12)	22 (27)	10 (14)	8 (7)	18 (7)	22 (11)	17 (8)	7 (19)	14 (6)	7 (9)

Note: Based on the HS code 02 and numbers are initiation (in action) <sup>1</sup>

Source: *WTO anti-dumping database*

By interpreting the anti-dumping dataset, the top five industries are chemical and allied industry, plastic industry, textile industry, base metals and article industry, and machinery and electrical equipment industry. Table 2 is listing the number of initiated and in force cases of AD measure during 2008 and 2017. The most frequent industry getting AD investigation is the base metal industry, and next is the chemical industry. The metal industry includes steel, which is a popular product in AD dispute cases. Especially the United States has the most significant number of initiating the investigation regarding the metal industry, but Mexico, Argentina, and Australia also have a high rate of this product.

<sup>1</sup>Industries are classified base on the WTO HS code 02, HS code 02 : 28~38 is Products of the chemical and allied industries; 39~40 Resins, plastics and articles; rubber and articles; 50~63 Textiles and articles; 72~83 Base metals and articles; 84~85 Machinery and electrical equipment

### **iii. Effect of Anti-dumping**

Most of the existing researches does not single out one specific theory, but the results show multiple effects. There are various types of effects of Anti-dumping measures, and many scholars have clearly defined each of the effects. The diversification of the effect clearly shows the measure evolved along the way. New terminology to define the effect of AD measure or maybe bring new types of effect, but existing effects are listed below.

➤ *Trade destruction/depression effect*

First, trade depression or trade destruction effects<sup>2</sup> have indicated as the first-order effect of AD when the imports ruin a particular product by its measure. When the Anti-dumping tariff imposes, the price of the targeted product increases, leading to import reduction from the corresponding country (Staiger and Wolak, 1994 Prusa, 1997). This effect also has externalities that expand to other imported products from the targeted country and the specific product from other importing countries. The effect has expandability which can exercise influence on the economy or trade relationship more than what the country was anticipated.

➤ *Investigation effect*

In the early stage of empirical studies on the effect of the anti-dumping measure, Staiger and Wolak's (1994) studied the effect of trade destruction on the investigated countries regarding the AD measure. They have found an investigation effect that starts to decrease import amounts on those specific products right after the country has filed the petition on the

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<sup>2</sup> Both terms are used to explain same effect in different word

issue. This effect<sup>3</sup> occurs when country file for its petition, the importing country is possible to minimize the incentives of foreign firms to seek internal market share aggressively.

➤ *Trade diversion effect*

There may be an effect on domestic production increment if the country can export more to other countries. This positive result offsets the destruction effect that has negatively affected the domestic industry. Since the AD duties are imposed in particular country's enterprises, so even if the exporting rate may decrease from the imposing subject country, there are possibilities that the export may increase from countries where its duties were not imposed. We call this effect a trade diversion effect (Yoon, Lee. 2015). The trade diversion effect occurs when the country changes its importing country where it does not impose the AD measure to balance its import amount lost from the complainant country. (Prusa, 2001).

➤ *Foreign Direct Investment effect*

Third, Foreign Direct Investment (FDI) effect can arise in order to avoid AD measure, induce FDI instead. Exporting countries can do FDI in third countries where it is not the AD target country. Through third countries, the exporting countries can export to the complainant country. (Vandenbussche, 2010) Fourth, a downstream effect appears when one country imposes AD measure on the complete product, reducing the exports of its products. However, those importing countries will increase their domestic production, which the respondent country can increase export on the components. (Feinberg and Kaplan (1993), Krupp and Skeath (2002)) Fifth, retaliation effects may occur to offset its damage from the imposed dumping activities. Since numerous countries use AD measures, there is a possibility that the respondent country

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<sup>3</sup> This is because when the final injury and dumping determinations are affirmative in the case, duties are generally implemented retroactively on the imports after the preliminary findings the result of preliminary results of the case and expectation that the final decision will be also positive would cause large decrease in the rate of imports and increment of its price as well. (Staiger, Wolak. 1994).

can impose retaliation measures on the specific product on the complainant country. Sixth, the Anti-dumping law and its usage can bring deterrent effects since the exporters cannot ensure the possibility of trade protection when they load correspond country products. Accordingly, if the country imposes AD measures relatively much, the loading shipment decreases compare to the past.

➤ *Trade deflection effect*

According to Bown and Crowley (2006), they had shown that there is trade deflection effects can occur when the country received AD duties face difficulties in exporting its products to the imposing countries. There is an increase in exporting its product to the third country. They have tested real examples based on the United States imposing AD duties towards Japanese products brought the effect on the increase exporting its products to the third countries.

➤ *Deterrent effect*

The usage of AD measures and law can bring a deterrent effect on trade partners since those countries will be more cautiously trading with importing countries. This will likely bring higher prices and lower volumes of products since they have learned the lesson from the previous filings to avoid any unnecessary conflict. That is why the exporting country would cautiously approach its trade with the country who raised the AD case to compare to those who did not bring any complaints. According to Vandebussche and Zanardi's report, the deterrent effect suggests that those importing markets have the learning behavior from the AD investigation and determination (2010).

### III. Model Equation

#### i. Hypothesis and Model

The results of previous literatures have varied with how they conduct the researches. What is important is that the AD measure always brings effects whether it is positive or negative on the trade. The purpose of imposing AD measure is to stop the discriminatory act against the trading partner which allows them to form proper relationship. Many of the researchers have discovered negative effect of the measure which corresponds to the purpose of imposing. However, relatively new study on the effect of AD initiation, the scholars<sup>4</sup> have discovered that the results shows no signs of deterrent effect on the trade but rather found there are temporal export increase effect. Based on the various studies, the necessity to reflect fundamental objective to depress trade amount from the exporting country is important for this study to build up new hypothesis.

The hypothesis of this study is:

1. The AD measure brings trade depression effect on the exporting country. The degree of its effect is valid enough to interpret that the measure is still effective.
2. The economic difference does not make any difference on the effect of AD remedy.
3. Industry level analysis shows the degree of its measure effect differently on the countries' economy.

The most widely used model for measuring the effectiveness of international trade policy is the gravity model. The key to the gravity model is that the trade volume of the two countries is proportional to the size of their economies and inversely proportional to the distance

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<sup>4</sup> Li, Kim. 2018

between the two countries. Variables used in the gravity equation is frequently used in numerous studies to determine the factor of important analysis. Different versions of gravity models used in multiple pieces of research, but the core variables remain the same or very similar. The Anderson and Van Wincoop (2003)'s paper<sup>5</sup> includes the McCallum gravity equation, which involves both export and import countries' GDP as their core variables to understand the supply and demand side of the trade. In this study, the top three receiving countries were selected from 2008 to 2017 to analyze the impact and the trade effect on the export of the top 10 reporting countries. In other words, explain the trade effects of anti-dumping measures when frequent recipient countries are exporting to the reporting countries.

This study introduces a research model based on Anderson and Van Wincoop's analysis, which was published in 2003. The Anderson and Van Wincoop used the McCallum gravity equation to interpret the impact of trade among nearby countries. Both exporting and importing countries' GDP are separately included in the model and the past value of the dependent variable as an independent variable in this particular research. According to Koings (2005), the initial export amount is affecting previous export with autocorrelation, which the past variable needs to be controlled by including a dependent variable. Due to the repeated time values because of the dispute cases, it creates a cross-sectional data set. The dependent variables include past value (t-1) of the independent variable. It creates an endogenous explanation variable to control any unexpected alternation. The dynamic panel dataset is used to consider the heterogeneity and autocorrelation among the variables. Specifically, the number of AD case initiation and final decisions shows different amounts each year among target countries, which is an important variable in this study to determine the effect of the AD measure.

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<sup>5</sup> Purpose of this paper is to solve the structural problem on the gravity model and by providing analysis, they have found i) consistent and efficient static analysis in theoretical gravity model and ii) correct calculate provides information about the trade friction. (p.1, 2003)

Figure 3. Research Model

$$\begin{aligned} \ln EX_{eijt} = & a_0 + a_1 \ln EX_{eijt-1} + a_2 \ln(OADn)_{eit-1} \\ & + a_3 \ln(OADm)_{eit-1} + \beta_1 \ln GDP_{et} \\ & + \beta_2 \ln GDP_{it} + \beta_3 \ln POP_{it} + \beta_4 \ln Dist_{ei} \\ & + \beta_5 RTA_{eit} + \beta_6 tariff_{it} + \beta_7 openness_{it} \\ & + \varepsilon_{eit} \end{aligned}$$

First, the multicollinearity test was used to see whether the variables affect negatively to each other when we run the model equation. The coefficient means the changes of independent variable from dependent variables. That is why when there is significant level of correlation exists between explanatory variables, it can show in functional relation between one explanatory variable to another. The relation will lead to increase in coefficient level, which the estimation becomes unstable and hard to interpret.

Second, the gravity model equation is used to investigate the trade impacts of anti-dumping measures, and this research builds the equation that includes specific variables from the gravity model. Numerous scholars have understood the role of the gravity model; that is why it is used frequently to interpret the trade effects. The equation in this study involves 11 different variables to interpret the result of the model. Distance, GDP, RTA relations, population, tariff and openness, and the export and import countries' GDP variables are used in this study. These particular variables are used in the McCallum gravity equation to determine the effect of trade. The two GDP variables intertwine with each demand and supply side between trading partners. One of the dependent variables includes the past (t-1) value of the export amount to control the past value of the independent variable of the year t export amount

since the variable influenced by the autocorrelation. That is why to avoid any distortion effect between the variables, the inclusion of past value is needed. Furthermore, the number of initiation and final decision in the AD measure as each variable is crucial for this study to analyze the effect of AD measure. The variation in the number of cases affects the trade amount between the countries, which is why those two variables are important in this research.

## ii. Data Source and Explanation

In order to adjust the heteroscedasticity and each variable to have regularity, some of the variables have to transform to log variable. Including export amount, AD measure case amount, GDP, population and distance variables are in a form of log.

$EX_{eijt}$  and  $EX_{eijt-1}$  represent export country  $e$  to import country  $i$  with product  $j$  in year  $t$  (export amount) represented in Billion US dollars (2010 US dollar) and can be retrieved in the UN Comtrade data. Using past year ( $t-1$ ) export variables as one of the dependent variables is to control the independent variable which is year  $t$  export amount.

$(OADn)_{eit-1}$  and  $(OADm)_{eit-1}$  are the year  $t-1$ , begin AD investigation on country  $i$  and  $m$ 's complain toward WTO members. Number of AD investigation and measure imposed can be retrieved from the Anti-Dumping database of WTO. When we look at the dispute settlement procedure period, from the beginning of the investigation to delivering the final decision of its case takes average a year. This variable was used in the study of Vandebussche in 2010 to see the changes of total export amount when the 41 reporting countries using the AD measure towards 121 export countries in  $t-1$  years. The result was the trade amount and the case initiation and final decision have negative relation. That is why we can expect the variables will negatively impact the export amount.

The basic variables of the gravity equation used as control variables of this study are as follows:

$GDP_{et}$  and  $GDP_{it}$  are the export and import countries GDP at year  $t$ . These variables are used in the Anderson and Van Wincoop's paper with the McCallum gravity equation written

in 2003 to understand both supply and demand side of its trade amount in terms of billion US dollar. This data can get from the World Bank (WB database). The GDP variable represent the interaction of bilateral economy scale. Higher value of this variable means that both countries are likely to have more active interactions in trade.  $POP_{it}$  is the population of import country i in year t in million people unit from the World Bank dataset. When the importing country have high population in the country, it has more likely to positively influence in the export trade.  $Dist_{ei}$  is a geological distance between exporting country e and importing country i which are in thousand km from the CEPII (Research and Expertise on the World Economy) data. The distance between the countries affects the trade amount as well, if the distance is near, they are likely to be held more export than the opposite case.  $RTA_{eit}$  is dummy variable in the equation whether exporting country e and import country i have free trade agreement takes into effect in year t (yes=1, No=0). If the variable shows positive result, it means that it brings trade creation effect. However, it creates trade diversion effect when the estimation is negative.  $tariff_{it}$  is the import countries' median of the tariff rate. Also, this tariff data is from WITS World Bank dataset (WITS-WB). Tariff rates consist of simple mean with all products from each country. The tariff rates are important factor in the trade since when the rate is high, exporting businesses have more burden which decreases the trade amount. Openness variable is one way of representing freedom to trade internationally, which is conducted in the scale of 1 to 10 and the higher number represent it affects to export positively. The data can be searched from Openness index provided from the Fraser Institute in Canada under freedom to trade internationally.

Table 3. Data Description and Summary Statistics

Variable	Description	Obs	Mean	Std. Dev.	Min	p50	Max
<i>Dependent Variable</i>							
ln_exeitj	export amount of year t	361	16.80	2.28	6.64	17.05	22.7
<i>Explanatory Variable</i>							
ln_exeitj01	export amount of year t-1	361	17.24	2.11	9.22	17.41	23.1
oadieit01	AD initiation number	361	3.83	2.61	0.00	3.00	11.0
oadmeit01	AD in action number	361	2.83	2.47	0.00	2.00	11.0
ln_gdpet	GDP of export country at year t	361	29.10	0.97	26.74	29.44	30.5
ln_gdpit	GDP of import country at year t	361	28.59	1.27	25.92	28.19	30.46
ln_popit	population of import country at year t	361	19.09	1.33	16.86	19.16	21.1
ln_distei	distance between country i and e	361	9.09	0.60	6.31	9.10	9.9
rtaei	RTA between i and e country dummy variable (Yes=1, No=0)	361	0.25	0.43	0.00	0.00	1.0
tarit	tariff rate of import country at year t	361	1.07	0.02	1.03	1.06	1.1
openessit	trade index of openness	361	6.94	0.93	4.61	6.83	8.3

Note: Subscript i is an importing country, e is an exporting country, j is product and t is a year

Table 3 is the basic statistics of the panel dataset. The data have been collected consist of 11 countries<sup>6</sup> during the period from 2008 to 2017, totaling 361 observations.

<sup>6</sup> 11 countries include 10 reporting countries and 3 respondent countries (China and the US are one of the top reporting countries as well).

### iii. Outcome

This research analyzed the effect of AD measure on top 3 recipient countries (US, South Korea and China) from top 10 reporting countries (Argentina, Australia, Canada, Brazil, EU, China, India, US, Pakistan and Turkey) during 2008 and 2017.

Table 4. VIF results of variables

Variable	VIF	1/VIF
excitj01	1.11	0.899413
oadieit01	1.74	0.576203
oadmeit01	1.6	0.62552
gdpit	2.12	0.471692
gdpet	1.57	0.637038
popit	2.19	0.45623
distei	2.54	0.394197
rtaei	1.95	0.512301
tarit	2.66	0.37623
openessit	3.32	0.301522
Mean VIF	2.08	

In the process of VIF testing, the value was under 10 in all variables. Refer to table 4, we can conclude that there is no multicollinearity problem exists in this panel. This represent there is no significant correlation between the dependent variables and independent variable which can distort the result of this model.

Table 5.1. Model Equation Analysis (top 10 reporting countries)

Variable	(i)		(ii)		(iii)	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
_cons	-7.291	-1.71	1.227	0.12	-0.996	-0.06
ln_exeitj01	0.992***	61.94				
oadmeit01			-0.112*	-1.67		
oadieit01					-0.061***	-8.23
ln_gdpet	0.056*	3.73	-0.067	-0.41	-0.044	-0.19
ln_gdpit	0.052*	4.02	-0.04	-0.25	-0.041	-0.21
ln_popit	0.011	0.17	0.439***	4.05	0.446*	2.93
ln_distei	-0.192	-1.27	-0.248	-1.04	-0.268	-0.65
rtaei	0.12	0.96	-0.191	-0.45	-0.133	-0.20
tarit	6.531	1.23	5.003	0.69	6.026	0.84
openessit	-0.008	-0.1	0.895***	4.48	0.980***	10.75
year dummy	included		included		included	
country dummy	included		included		included	
r2	0.819		0.196		0.207	
N	361		361		361	

Note: ①. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

②. ( ) value represents  $t$  value

The table 5.1 is estimation result of the basic equation with the 10 reporting countries. The estimation carries 81% of goodness of fit result which is relatively high enough to test the model. This estimation includes 361 observations. The estimation result shows that the effect of  $\ln\_exeijt-1$  to the dependent variable  $\ln\_exeijt$  is 0.992 in 1% significance level. Interestingly, the result shows positive value which means it increases the trade amount. Expecting result was the result shows negative value which decreases the trade volume on the product. In the case of initiation and final decision variables, they have shown the effect on the  $\ln\_exeijt$  -0.112 and -0.061 coefficient level. This represents that the relationship between the number of AD case and export amount has negative relationship. the level of significance shows the variables are significant enough in negative values at each 10% and 1% significance level. Including the GDP variable, rest of the variables not enough significant level that explains the relationship between the independent and dependent variables.

The dumping case variables did show valid significant level in both initiation and final decision. This may interpret there are still influence when country imposes AD measure or start the investigation, but the other factor which we cannot specify in this paper influences more than the effect of the measure. That is why even the relationship of AD case and export amount shows negative, the export amount still increases compare to the past. One interpretation can be explained as the country is trying to export the target product as much as they can before the measure is in force to avoid direct damage, which means the increase of export amount is temporal. Another possible scenario is that export country is changing their distribution path into third country which is not the subject of AD measure. However, in order to accurately understand the situation, there needs to be further research on relatively recent changes.

Table 5.2. Economic Status (Developed and developing countries)

	Developed Countries		Developing countries	
	Coef.	t-value	Coef.	t-value
ln_excitj				
_cons	-26.44	-0.68	-2.75	-0.21
ln_excijt01	1.07***	187.86	1.01***	37.9
oadieit01	-0.04**	-1.39	0.05*	0.89
oadmeit01	-0.12**	-1.05	-0.09**	-0.91
ln_gdpet	0.17	0.27	-0.81	-2.31
ln_gdpit	-0.20	-0.08	0.71	2.59
ln_popit	0.88	0.37	-0.36	-1.37
ln_distei	-0.95	-0.95	-0.83	-2.21
rtaei	0.42	0.23	0.28	0.42
tarit	30.28	1.17	29.20	2.3
openessit	0.63	0.21	0.96	1.5

Note: ①. \* $p < 0.01$ , \*\* $p < 0.05$ , \*\*\* $p < 0.1$

②. ( ) value represents *t* value

Table 5.2 shows the result divided into economic status whether the country is developed or developing based on the World Bank standard. Four countries have considered as developed countries which are the United States, Canada, the European Union and Australia. Remaining six countries are classified as developing countries. As we can see in the table, both developed and developing countries have increased export amount compare to the past nearly doubled. Interestingly the initiation and in force of the AD measure's coefficient level shows different result whether it is developed or developing countries. Developed countries showed negative relationship between the measure variable and the export amount, but developing countries only showed negative relations with the initiation variable, but the in-force variable shows positive relationship between the export variables. There are not much of difference within the economic level, two groups are showing similar results in the analysis.

Table 5.3. Industry level analysis (Industry HS code 02)

	VI		VII		XI		XV		XVI	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
ln_exeijt										
_cons	8.66	2.57	0.19	0.03	9.89	1.43	-5.02	-1.15	64.59	54.85
ln_exeijt0 1	1.15** *	13.09	0.97* *	13.8	1.13** *	25.09	1.03* *	53.55	0.97* *	42.98
oadieit01	- 0.12**	-1.01	- 0.47*	-2.5	- 0.78** *	-3.11	- 0.33*	-0.24	- 0.37** *	-0.21
oadmeit0 1	- 0.22**	-1.53	- 0.38*	-2.54	- 0.85** *	-4.13	- 0.28* *	-1.66	-0.64* *	-0.35
ln_gdpet	0.29	1.76	0.15	0.62	-0.14	-0.55	0.06	12.31	-1.02	-3.16
ln_gdpit	-0.31	-2.38	-0.23	-1.01	0.06	2.01	-0.24	-2.22	-1.98	-5.11
ln_popit	0.16*	1.02	0.37	1.22	0.10*	0.52	0.16	3.36	2.07	4.69
ln_distei	0.10	0.38	0.30	0.66	-0.08	-0.38	0.01	0.13	3.25	4.12
rtaei	1.33	2.81	-0.08	-0.22	0.23	0.22	0.05	1.01	-0.93	-1.27
tarit	-11.74	- 2.07* *	-6.74	-0.5	- 9.77** *	-0.7	4.50	1.15	-5.13	-6.50
openessit	-0.93	-3.06	-0.05	-0.26	-0.53	-2.64	0.14	1.11	1.19	2.65

Note<sup>7</sup>: ①. \* $p < 0.01$ , \*\* $p < 0.05$ , \*\*\* $p < 0.1$

②. ( ) value represents  $t$  value

There are frequent industries that appear in the AD measure trade dispute. Table 5.3 shows the top five sectors to see the effect of using the model equation. All five industries indicate a relatively large coefficient value within the 1%, 5%, and 10% significant level. The value represents that all industries have increased export value compared to the last year (t-1). Especially the textile industry (HS code XI) shows a more than 100% increase in export, and the rest of the industries also showed more than 90% export growth. To explain other variables that

<sup>7</sup> VI: Products of the chemical or allied industries; VII: Plastics and Articles thereof; Rubber and Articles thereof; XI: Textiles and Textile articles; XV: Base metals and articles of base metal; XVI: Machinery and mechanical appliances

carry meaningful enough, the plastic and rubber related industry (VII) has a 0.97 positive coefficient value at 5% significant level. When there is more population, home countries are more likely to import from foreign countries. Every industry showed a positive correlation between the population and export variables.

Based on the test results, the first hypothesis that the measure will create a trade depression effect is not applied in this model. In contrast, the export amount increases compare to the t-1 year even when the country has final determination on the measure. Not just general analysis, economic status, and the industry level all showed an increase in export amount compare to the t-1 year. There may be different reasons to explain this abnormal increase in export. First, the increase of the trading amount is just temporal, which takes time to show the effect of its measure. Second, the foreign country exports more before the measure is in effect to sell the remaining product and contracts with the importing companies in advance. Third, the exporting country sends components instead of the finished product, which may attribute to increment to the overall export amount. The goodness of fit is relatively high in this model, and we can assume that the result will reflect its validity of the effect. The AD measure effect exists because the export variable shows an increase in trade amount between year t-1 and t. Those AD measure initiation and final decision variables show a negative relation with the export amount discovered in other research. This clearly shows that the effect of the measure exists, but other factors may overwhelm its decreasing export amount. That is why to verify the identity of its specific effect, and there must be further investigation throughout more year variables.

Secondly, the hypothesis is that the economic difference does not differ in the effect of AD measure. As we can see in the result of the estimation, there is not much of difference that exists with the economic gap. In contrast, the countries showed a very similar level of the coefficient on the export-dependent variable. The only difference between the two groups is that

the developed country showed that the GDP interaction variable positively affects the independent variable in the estimation result.

Thirdly, the industry level analysis showed a similar outcome as well; the difference between those industries is the degree of how much coefficient correlation shows. There is no one particular industry that distinctively shows among other industries, which prevails the result of the analysis. The degree of its effect does not show any distinct differences among the top five industries. The export amount increases in this analysis just like other analysis held in the study.

#### **iv. Limitation**

In the process of conducting the analysis of the specific model, there were limitations exists which may need to be improved in the future.

The availability of the data is crucial when the research is conducting the effect of AD measure. In order to decide which variable will be using in the empirical study depends on data existence. In terms of dumping and AD measure related information, certain dataset is inadequate or unavailable to include as variable. One of the datasets is AD tariff rate information, which developed countries provides better information. Developing countries or less-developed countries data is hard to find.

The result of the estimation found positive relation between the  $\ln\_ex_{ijt-1}$  and  $\ln\_ex_{ijt}$  variables. In order to identify adequate effect of the AD measure, there need to be more year variables such as  $t+2$ ,  $t+1$ ,  $t$ ,  $t-1$  and  $t-2$  to see the amount changes in export. By examining five years period, it will show whether current study result was temporal or actual trade creation effect. Just taking one-year gap as variable has limitation to explain current outcome and may not accurately explain the increase in export amount.

## IV. Conclusion

### i. Conclusion

The purpose of this study is to analyze the trade effect when the reporting countries imposes the anti-dumping measures toward receiving countries while the protectionism expands world widely. Therefore, this study includes the empirical model to interpret the trade effect of the AD measure between the imposing countries and the recipient countries. Specifically, the United States, China and South Korea are the top three recipient (exporting) countries, and imposing (importing) countries are Australia, Argentina, Brazil, Canada, China, India, Pakistan, the U.S., European Union, and Turkey. The study has used 10 years of panel data from 2008 to 2017 for empirical analysis.

The difference with other researches is the usage of export variable. In this study, the export variable reflects each product's export amount with year and country specific based on the HS code in order to estimate the result more successfully. The research separate importing countries into developed and developing country group based on the World Bank classification. Furthermore, we collect the data based on the HS code 02 from the WTO classification, the top five industries are selected to see the outcome of this study.

By using the gravity model, the estimation result showed that the effect of  $\ln\_exejt-1$  (independent variable) to the dependent variable ( $\ln\_exejt$ ) is positive, which means there is an export increase. Not just the top 10 reporting countries case, but also economic difference case and industry level analysis are showing similar results. The increment of the export amount can be temporal or may bring continuous changes in the export amount. The export amount increases in all scenarios from 90% to more than 100% within the 1,5 and 10% significance level. More importantly, the number of cases with the initiation and final decision of the AD

measure shows negative results in almost all cases except one scenario, which is in developing countries' initiation variables. The result showed a positive sign between the export amount in year t and the AD dumping initiation case. Those gravity model variables effectively worked as the control variables for this analysis. Specifically, the population variable showed a strong positive correlation between the independent export variable.

The implication from this research suggests that further research needs to proceed with the effect of AD measure in recent years to understand whether the export increase is the temporal or actual creation of trade effect. However, the empirical testing result in this study shows an increase in the export amount in every scenario. The AD measure variables show a negative correlation between the export amount, but to fully grasp what made the export growth, there needs a future study. If further study continually indicates an increase in export compared to the past, the necessity to find the causing factor is emphasized. If the remedy no longer shows any signs accord with the purpose of the measure, the structural reform or how to deal with this problematic situation needs to be studied and practically solved in the near future.

## **ii. Future Research**

Numerous researches analyze the effect of most frequent users of the remedy. To suggest possible future research direction, instead of just focusing on top users, we could divide into strong usage group and weak utilization group to analyze the effect of AD measure. This study is using the variable of one-year range of export amount since most of the dispute case takes average of one year to draw out final decision. However, some of the dispute cases take more than a year to come up with the conclusion. In the future research, it would be better to subdivide the year to  $t-1$ ,  $t-2$ ,  $t$ ,  $t+1$ ,  $t+2$  to see the medium- and long-term effect.

Also, proliferation of AD measure brings questions that the remedy does not actually work as much as countries expected. In that point of view, the verification of AD remedy has actual effect on the countries during the years of the final decision and withdrawal needs to be studied.

Many sources are showing concerns regarding the current situation leads to accelerating deglobalization. The deglobalization represents the countries to get out from the globalization process and disconnect any interchange of information and cooperation between countries. This particular term constantly showed up during the global financial crisis in 2008, and the US-China trade war intensified its tendencies. Now, the COVID-19 situation will accelerate more than any other event.

Due to these serious circumstances, the needs of industrial counter measure and policy studies is emphasized to protect a higher value-added business and products from the dumping activities

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# Appendix

Table. Pearson's Correlation Coefficient

	ln_exe-j	ln_ex~01	oadie~01	oadme~01	ln_gdpet	ln_gdpit	ln_popit	ln_dis~i	rtaei	tarit	openes~t
ln_exeij	1										
ln_exeij01	0.883	1									
	0										
oadieit01	0.0604	0.1279	1								
	0.2527	0.0151									
oadmeit01	-0.0389	-0.0345	0.3674	1							
	0.4608	0.5134	0								
ln_gdpet	-0.0386	-0.0357	0.2603	0.2813	1						
	0.4644	0.4992	0	0							
ln_gdpit	0.3876	0.4951	0.2081	0.0721	-0.0199	1					
	0	0	0.0001	0.1717	0.7058						
ln_popit	0.2304	0.2116	0.1515	0.0781	0.0942	0.5386	1				
	0	0.0001	0.0039	0.1385	0.074	0					
ln_distei	-0.2093	-0.1707	0.0153	0.1593	0.108	-0.0745	-0.4607	1			
	0.0001	0.0011	0.7721	0.0024	0.0403	0.1579	0				
rtaei	0.0485	0.0349	-0.2255	-0.3565	-0.6733	-0.0873	-0.1496	-0.2875	1		
	0.358	0.5087	0	0	0	0.0975	0.0044	0			
tarit	-0.1917	-0.2796	0.0394	0.1636	0.1017	-0.486	0.0596	0.1214	-0.101	1	
	0.0002	0	0.4559	0.0018	0.0536	0	0.2588	0.0211	0.0551		
openessit	0.3303	0.4221	0.1388	-0.0923	-0.209	0.5949	-0.0685	-0.1098	0.2762	-0.6925	1
	0	0	0.0083	0.0799	0.0001	0	0.1944	0.037	0	0	

## 국문 요약

본 연구의 목적은 반덤핑구제조치의 효과가 주요 피소 3 개국 (중국, 한국, 미국)에서도 무역 감소효과가 과연 존재하는지를 증명하고자 한다. 본 연구는 중국, 한국, 미국을 피제소국으로 선정하였고, 2008 년부터 2017 년을 기준으로 하여 인도, 아르헨티나등을 포함한 상위 10 개국을 제소국으로 선정하였다. 중력 모델을 이용해 목표연도 동안의 패널데이터를 사용하여 실증분석을 진행하였다. 예측 모형을 바탕으로 분석한 결과 반덤핑조치를 부과할 때 전년도에 대비해 금년도 수출량이 증가한다는 결론이 도출되었다. 반덤핑 조사의 개시 그리고 최종판결 수에 대한 변수에서 전반적 통계 결과치는 모두 수출량이 감소하는 음의 결과가 도출되었다. 하지만 개도국의 경우, 반덤핑 조사 개시 변수에서만 수출량이 정(+ )의 결과를 나타낸다.

주요어: 덤핑효과, 반덤핑구제조치, 중력 모델, 국제무역효과

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