Determinants of Termination of Anti-dumping Measures: The Case of Korea

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This paper empirically examines what factors affected the termination of anti-dumping measures in Korea during the 2006-2019 period. Employing a meticulous literature review, the paper investigates the WTO's and Korea's rules on the termination of anti-dumping measures and sets up the related variables in the Cox proportional hazards model. The empirical results show that the GDP growth rate, employment, and trade competitiveness in domestic industries had positive effects on the hazard of the termination of AD measures, while free trade agreements had negative effects. By industry, the hazard of the termination of AD measures was less prominent in the steel industry, while it was more prominent in the machinery industry. These results imply that AD measures in Korea had the properties of a proper trade remedy policy and, at the same time, a protectionism tool to sustain its domestic industries, depending on industrial characteristics and other trade policies.

Keywords: Anti-Dumping Measures, WTO Anti-dumping Agreement, Survival Analysis

JEL Classification: F13, F14

I. Introduction

Under the regime of the World Trade Organization (WTO), trade remedy measures are the primary tools used to protect WTO members' domestic industries from fair or unfair import penetration. WTO agreements introduce three main measures: anti-dumping (AD), subsidies and countervailing (SCM), and safeguard (SG) measures. These measures have their own targets and appropriate unilateral trade remedies with legitimacy. WTO members can impose AD and SCM when dumped and subsidized imports are causing harm to a domestic industry, respectively. WTO members can also

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impose SG to prevent or mitigate serious injury to a domestic industry from an unexpected increase in imports. Figure 1 shows the annual trend of trade remedies by WTO members from 2000 to 2019. In terms of the number of cases in force, AD measures are the most common trade remedy measure. WTO members levy import tariffs as AD duties in cases when the imported products cost less than their normal value. Accordingly, this paper focuses on AD rather than the other measures.

Figure 1. WTO Members' Trade Remedies from 2000 to 2019
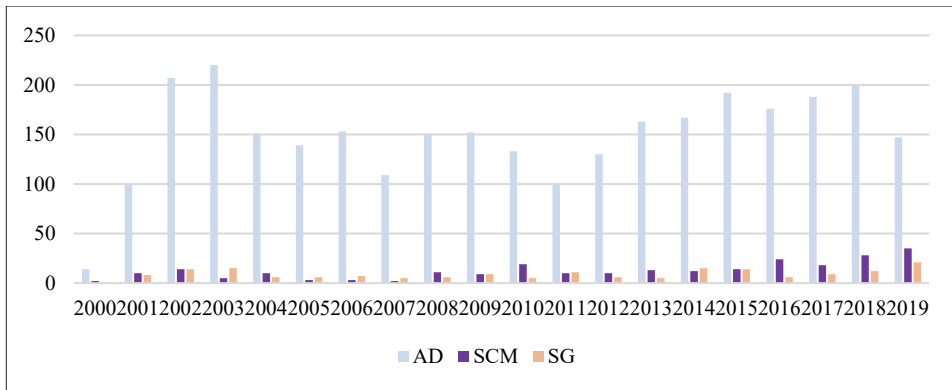
AD measures have been an important issue for both legitimacy and protectionism. From the point of view that an import tariff is a major instrument of traditional protection policies (Wall, 1999) and AD duties increase import prices and reduce import quantities (Sandkamp, 2020), AD measures are highly likely to be protectionist tools rather than providing legitimacy for trade remedies (Chang et al., 2019). Meanwhile, under the WTO regime, AD measures ensure fair competition by offsetting the effects of dumping which causes material injury to domestic industries (ICC, 2007). Dumping is qualified as being unfair and actionable (Müeller et al., 2009); thus, the WTO regime provides an international legal framework for AD.

The Korean government recognizes the importance of the trade remedy system for its small trade-dependent economy and is concerned about reducing the abusive use of

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[1] I-TIP, https://i-tip.wto.org

AD measures. Korea is one of top 10 target countries in terms of AD.[2] Egger and Nelson (2011) showed that the main AD users before 2000 were traditional industrial countries, such as the US, the EU, Canada, and Australia, while developing or transition countries, such as Argentina, Brazil, Mexico, Korea, and Turkey, became the main users after 2000. Accordingly, the Korean government attached considerable importance to AD measures in its free trade agreement (FTA) provisions (Sohn, 2020).

   This paper empirically examines what factors affected the termination of AD measures in Korea from 2006 to 2019 in order to determine whether they were operated as protectionist or trade remedy measures. According to Blonigen and Prusa (2015), previous studies on AD issues mainly focused on the motivation for dumping and the role of AD measures in the structure of multilateral trade liberalization. Also, the WTO Regime and FTAs stipulate the procedures for the initiation and enforcement of AD measures in detail, but pay less attention to their terminations. Legal basis for determining the termination of AD measures is relatively deficient. It is surprising that little is known about the terminations of AD measures and their rationales in trade policies. In this context, this paper focuses on the determinants of terminating AD measures which have not received sufficient attention compared to other AD issues. In addition, the Korean government has been trying to alleviate AD issues through trade negotiations such as FTAs, yet WTO members have filed several AD disputes against Korea in the WTO.[3] This implies that the Korean authority's practices are under challenge based on consistency with the WTO's AD rules. Thus, there is a need to determine whether AD measures in Korea are a protectionist tool or a trade remedy by examining the determinants of terminating AD measures as well as their motivations. As the WTO Regime and the Korean Customs Act emphasize various characteristics of a domestic industry for reviewing AD measures, we focus on them rather than other factors in Korea. Consequently, this is the first convergence research of Economics and law that empirically examines whether and how various characteristics of domestic industries affect the termination of AD measures in Korea, based on legal grounds.

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[2] According to the WTO I-TIP, the number of AD cases in force is 137 for Korea, which is the second greatest ones after China's 645 cases as of June 30, 2021.

[3] The examples of Korea's WTO AD disputes as the respondent are: DS553: Korea — Sunset Review of Anti-Dumping Duties on Stainless Steel Bars, DS504: Korea — Anti-Dumping Duties on Pneumatic Valves from Japan, and DS553: Korea — Sunset Review of Anti-Dumping Duties on Stainless Steel Bars

This paper is organized as follows. In Section II, we delve into the WTO's and Korea's rules on AD, focusing in particular on the termination provisions, in order to identify the important factors. In Section III, we review previous literature and establish the econometric specifications. In Section IV, we estimate the determinants of terminating AD measures in Korea during the 2006-2019 period using the Cox proportional hazards model. In Section V, we summarize the empirical results and suggest some implications for AD policies for Korea as well as compliance with global strategies.

II. Anti-Dumping Measures in the WTO's and Korea's Rules

1. The GATT/WTO Regime

Article 6 of the General Agreement on Tariffs and Trade (GATT) contains the definition of dumping and the conditions for imposing AD duties. The conditions include dumping activity, material injury to a domestic industry, and causation between them. In 1995, the WTO set up the Anti-dumping Agreement (ADA) to bind all WTO members on AD measures (Müeller et al., 2009). The WTO ADA clarifies the meanings of the key concepts in the GATT and provides practical guidance for WTO members (Matsushita et al., 2015). Hence, the legal framework on AD in the WTO regime mainly comes from Article 6 of the GATT and the WTO ADA. The important distinction between the WTO ADA and Article 6 of the GATT is that the former deals with termination procedures of AD measures, such as duration and review, while the latter does not include them. In paragraph 1 of Article 11, the WTO ADA establishes the principles on the duration of AD measures and addresses that AD duties shall remain in force only as long as needed and to the extent necessary to counteract a dumping which is causing injury.

Article 11 of the WTO ADA introduces two review procedures. In paragraph 2 of Article 11, the WTO ADA stipulates an administrative review of AD measures, stating that "authorities shall review the need for the continued imposition of the duty on their own initiative or … upon request by any interested party." During the review process, authorities examine whether the injury would be likely to continue or recur if AD measures are removed. If AD measures are no longer warranted as a result of the review, they are to be terminated immediately. The other procedure is the sunset review outlined in paragraph 3 of Article 11 of the WTO ADA. The sunset review

represents that any AD measure shall be terminated on a date not later than five years from its imposition. However, the provision also contains an exception to the sunset review. The exception clause stipulates that authorities can determine whether the expiry of the duty would likely lead to the continuation or recurrence of dumping and injury prior to the scheduled date. In addition, authorities can initiate the review on their own (self-initiated) as well as in response to requests from interested parties. Accordingly, the exception clause provides the legal ground to extend AD measures for WTO members. If authorities decide to maintain AD measures, their terminations are not mandatory. Thus, AD measures may stay in place for long periods.

Authorities should assess whether or not dumping and injury to a domestic industry happen and persist based on forward-looking predictions for what would be likely to occur if AD measures are terminated (Vermulst, 2005). The definitions of dumping and injury are clear in the WTO ADA.[4] However, the provisions of the WTO ADA do not provide any standard to assess dumping and injury in review procedures for AD measures. With respect to calculating the dumping margin, authorities generally have a less stringent obligation in the review procedure than that in the original investigation. Furthermore, authorities are not required to demonstrate a causation between future dumping and injury in the review procedure; the authorities are obliged to consider the likelihood of dumping and injury, but not causation. Hence, the ambiguity of standards for review procedures may cause an abuse of AD measures as a protectionist tool. This is why we should empirically examine whether and how various factors affect the termination of AD measures.

The WTO Dispute Settlement Body (DSB) established the case laws for this issue. Based on these case laws, Mavroidis (2012) concluded that authorities should apply the standards in Articles 2 and 3 of the WTO ADA when assessing dumping and injury to a domestic industry in the review process to avoid inconsistencies with the WTO DSB case laws. Although the WTO DSB emphasizes that an original AD investigation cannot be automatically imported into a review process because they are distinct processes with different purposes, authorities must meet substantive requirements for any investigation. Paragraph 7.158 in the Panel Report of DS405 also addresses that a determination under Article 11.3 should be based on positive evidence, have a

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[4] Article 2 of the WTO ADA defines dumping as introducing into the commerce of another country at less than its normal value. Also, Footnote 9 of the WTO ADA states that injury to a domestic industry can be material injury or threat of material injury or material retardation of its establishment.

sufficient factual basis, involve a rigorous examination, and be supported by reasoned and adequate conclusions. Accordingly, we conclude that the substantive provisions of Articles 2 and 3 of the WTO ADA may well be relevant to an analysis in a review procedure under Article 11.3 so that authorities can make reasoned conclusions regarding the likelihood of continuation or the recurrence of dumping and injury. During the review stage, an analysis of causation from the original investigation is still valid and does not need to be reestablished under Article 11 of the WTO ADA. This ambiguity also provides the rationale behind the need for our empirical analyses.

2. The Customs Act of Korea

In Korea, the Customs Act[5] stipulates the definitions, elements, and procedures of AD measures that Korean authorities, the Ministry of Economy and Finance (MOEF) and the Korea Trade Commission (KTC) should abide by. The main feature of the AD provisions in the Customs Act is very consistent with the WTO ADA. In particular, Article 56 of the Customs Act provides the provisions for the review and termination of AD measures. Paragraph 1 of Article 56 stipulates that, if necessary, the MOEF may review the assessment of AD, modify its details, and provide a refund. Paragraph 2 of Article 56 also stipulates that the assessment of AD shall become invalid 5 years after the date of its imposition. The WTO ADA also includes the same provisions.

Meanwhile, one of the notable provisions in the Customs Act is paragraph 2 of Article 52, which states that, if necessary, the KTC may consider enhancement of competitiveness in relevant industries, domestic market structure, price stabilization, and trade cooperation with trading partners when assessing AD measures. This provision grants a certain degree of discretion when assessing AD measures, focusing on trade competitiveness. However, the WTO ADA does not have this provision.

The Enforcement Decree of the Customs Act[6] stipulates the detailed elements for AD measures. In particular, Article 70 of the Enforcement Decree sets out the detailed administrative proceedings for the review of AD measures. Paragraph 1 of Article 70 stipulates that the KTC should review an AD case when requested by any interested party providing evidential data or based on its own need. Paragraph 1 of Article 63 of the Enforcement Decree stipulates that the KTC should investigate material injuries

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[5] Act No. 18583, December 31, 2021.
[6] Presidential Decree No. 32449, February 17, 2022.

when provided concrete evidence based on the following matters: import quantities, the price of the dumping good, the extent of the dumping margin, and other characteristics of a relevant domestic industry, including output, operating rate, inventory, sales, market share, price, profits, productivity, investment returns, cash flow, employment, wages, growth, capital financing, investment capability, and technological development. Paragraph 2 of Article 63 also stipulates that the KTC should consider the remarkable increasing rate of the dumping good, the substantial expansion of the production capacity, the effects on the price of similar products, and inventories of relevant products when determining whether injury is threatened by dumped imports. These industrial characteristics are detailed in paragraph 4 of Article 3 of the WTO ADA.

III. Literature Review and Econometric Specifications

1. Previous Studies

The initiation and enforcement of AD measures are precedent to their terminations. Thus, studies on the initiation and enforcement of AD measures will provide useful information for understanding which factors affect their terminations. Many studies have referred to the importance of both economic and political factors when adopting AD measures. Vandenbussche et al. (2008) empirically examined the determinants of the decision to adopt AD rules in 108 countries during the 1980-2003 period and found that retaliatory motives as a political variable were at the heart of their proliferation. However, they also found that high value added and the size of the agricultural sector as economic motives significantly affected the likelihood to adopt AD rules. Finally, they found that, after adopting AD rules, countries often used AD measures to protect intermediate inputs into the manufacturing process, which typically had smaller profit margins and a larger number of employees.

Using the panel data of AD cases in the US chemical industry during the 1976-1988 period, Krupp (1994) analyzed the likelihood of AD filing and found that total number of employees, average wages, the production index, and the import penetration ratio positively affected it. Similarly, Blonigen (2005) found that lower corporate profitability and higher unemployment increased AD filings in the US during the 1980-2000 period. Oliveira (2014) examined the applications of AD duties in Brazil using the panel data from 93 industrial sectors during the 1996-2007 period and found that imports had a

positive effect with high statistical significance. Accordingly, they concluded that industries with greater productivity would be more competitive and able to sustain against import penetration, thereby making them less likely to seek AD measures.

Several studies have examined economic variables as evidence for protectionism. For example, Ahn and Shin (2011) analyzed major AD user countries during the 1995-2009 period and found that exports and GDP growth positively affected AD investigations whereas FTAs negatively affected them. Furthermore, they determined that the positive relationship between GDP growth and AD investigations was more prominent in developed countries and interpreted these results as strong protection-seeking activities and political demands from marginalized industries. In other words, interested parties in marginalized industries were likely to request protection and be easily granted because GDP growth led to greater import growth. Firme and Vasconcelos (2020) examined the determinants of AD measures for 46 AD-imposing countries during the 1995-2013 period and concluded that retaliation and imports growth increased AD cases. They found that AD-targeted countries were more inclined to initiate AD processes.

For trade policies, previous studies have shown that their effects on AD measures were diverse. Firme and Vasconcelos (2020) found that higher import tariffs increased the number of AD measures. Meanwhile, Sudsawasd (2012) analyzed 56 countries during the 1995-2007 period and found that the effects of tariff liberalization on AD measures varied across regions. For European, North American, and Latin American countries, a lower tariff rate induced more use of AD measures, which is inconsistent with the results from Firme and Vasconcelos (2020). Sudsawasd (2012) concluded that such AD measures emerged as a protection tool among trade liberalization regimes. Similarly, Bown and Tovar (2011) analyzed Indian cases during the 2000-2002 period and found that Indian authorities used AD measures as a substitute for tariffs. They concluded that the policies of trade liberalization in India were reversed with import-restricting measures such as AD.

Similar to our paper, several studies examined the determinants of terminating AD measures. Moore (2006) analyzed the US decision on the review of AD in 1998 and provided an econometric analysis of the sunset review. He showed that the determinants of AD withdrawal varied across industries. In particular, he found that domestic industries with higher wages and share of imports were more likely to remove AD measures and concluded that the review decisions were in accordance with the AD law. Rutkowski (2007) analyzed the withdrawals of complaints on EU AD

cases through collusion during the 1996-2004 period and showed that domestic political economy, international strategic trade policy, international industry-level bargaining, and sectoral characteristics affected the probability of collusion for the withdrawals of AD measures. Gourlay and Reynolds (2012) analyzed the US AD cases during the 1995-2006 period and found that original AD measures with a higher deposit rate and/or a higher value of imports were less likely to be reviewed. For multiple countries, Choi (2017) empirically examined the determinants of terminating AD cases in the US, the EU, China, and India during the 1996-2015 period and showed that market shares, tariff rates, and dumping margins decreased the probability of termination whereas value added increased it. Accordingly, he concluded that WTO members regulated the overuse of AD measures, following Article 11 of the WTO ADA.

2. The Cox Proportional Hazards Model

Following Vandenbussche et al. (2008), Besedes and Prusa (2017), and Choi (2017), we consider Cox's (1972) proportional hazards model (hereinafter referred as the Cox model) to empirically examine which factors affected the termination of AD measures in Korea. The Cox model is a survival analysis model that estimates the survival function of a survival time—namely, a time until failure. Suppose that the random variable T (> 0) has the continuous probability distribution $f(t)$, where t is a specific time when an event is realized, and then the cumulative probability is:

$$F(t) = \Pr(T \le t) = \int_0^1 f(t)dt \qquad (1)$$

The survival function showing the probability that the spell is greater than t is:

$$S(t) = \Pr(T > t) = 1 - F(t) \qquad (2)$$

The hazard function $h(t)$ represents the probability of an event after duration t. Given that the spell has lasted until time t, the probability that it will end in the next short period time is:

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr[t + \Delta t \ge T \ge t | T > t]}{\Delta t} = \frac{1}{S(t)} \cdot \frac{d}{dt}F(t) = \frac{f(t)}{S(t)} \qquad (3)$$

The hazard rate is the rate at which the spell is completed (or fails) after duration t, given that it lasted at least until t. In our regressions, T is the duration of an AD measure and $h(t)$ describes the risk that it is terminated at t. The denominator of $h(t)$ represents a condition on an AD measure surviving in force until t.

Our objectives are to assess the association among several factors and the hazard of the termination. For this, one of the most popular regression techniques is the Cox model. Based on (1) through (3), the Cox model suggests a semiparametric regression method to measure the effects of covariates on the hazard of the termination.

$$h(t/X) = \frac{f(t/X)}{S(t/X)} = h_0(t) \cdot e^{\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_y x_y} = h_0(t) \cdot \exp(X'B) \quad (4)$$

In (4), X refers to a column vector containing covariates and B represents their coefficients that are linearly combined with covariates. $h_0(t)$ is the baseline hazard, representing the hazard when all covariates are equal to zero.

3. Econometric Equations

(4) can be transferred to the relative hazard, which is the ratio of the hazard to the baseline one at t (i.e., $h(t/X)/h_0(t)$). Thus, we build up the following regression model:

$$DURATION_{ect} * AD_{ec} = \exp[\beta_1 GDPGRR_t + \beta_2 FTA_{et-1} + \beta_3 \ln IMP_{ect}$$
$$+\beta_4 TC_{it} + \beta_5 \ln VA_{it} + \beta_6 \ln SAL_{it} + \beta_7 \ln EMP_{it} + \beta_8 IND_i + \varepsilon_{ecit}] \quad (5)$$

where e and c refer to an exporting country and an imported product subject to AD measures, respectively; i and t refer to an industry to which product c belongs and year, respectively; t covers from 2006 to 2019; and ε_{ecit} is an error term.

AD measures are in force for the specific period of time before they are terminated or withdrawn in the next period of time. Following Choi (2017), the hazard rate is proxied as the duration of AD measures terminated during the sample period and, thus, a multiplication of two variables: $DURATION_{ect}$ and AD_{ec}. $DURATION_{ect}$ is the duration of AD measures on imported product c from country e in year t while AD_{ec} is a dummy variable that is one if such an AD measure is terminated during the sample

period and zero otherwise. Accordingly, the dependent variable represents that, among the terminated AD measures during the sample period, the longer its duration is, the greater its hazard rate is.

According to Article 11 of the WTO ADA, AD measures shall be terminated depending on the continuation or recurrence of dumping and injury without them. Thus, the termination of AD measures highly depends on variables related to the continuation of dumping and injuries to domestic industries. We consider these variables based on previous studies introduced in Section II. With the regression results, we can speculate whether Korean authorities regulate the overuse of AD measures as a protectionist tool.

$GDPGRR_t$ is the GDP growth rate of Korea at t. Generally, a high GDP growth rate represents that the overall economic status is improving and domestic industries have better business situations with greater productivity (Oliveira, 2014). Thus, the higher the GDP growth rate is, the more AD measures will be terminated, expecting β_1 to be positive. Meanwhile, GDP growth can lead to greater imports and thus may cause more requests to extend protection (Ahn and Shin, 2011), expecting β_1 to be negative. Consequently, there is a tradeoff between the effects of better business situations and those of greater imports, causing the sign of β_1 to be ambiguous. We also expect that $GDPGRR_t$ can control macroeconomic situations at t, like year fixed-effects.

We consider FTA_{et-1} and IMP_{ect} as trade-related variables. FTA_{et-1} is a dummy variable that is one if Korea and country e have signed an FTA and zero otherwise. We consider one-year lagged variables to control the time lag effects of FTA (Bae et al., 2012). On one hand, we expect β_2 to be positive because Korea's FTAs contain various WTO-plus provisions of AD measures (Eom, 2014). On the other hand, it is possible that the Korean authorities may use AD measures as a substitute for tariff reductions by FTAs (Sudsawasd, 2012; Bown and Tovar, 2011). In this case, β_2 can be negative, implying that AD measures emerged as a protection tool among trade liberalization regimes in Korea. Consequently, there is a tradeoff between the effects of the WTO-plus provisions and those of the substitute for tariff reductions, causing the sign of β_2 to be ambiguous.

$ln\ IMP_{ect}$ is the log of the import value of product c from country e in year t. As a natural logarithm can exclude zero values of the original data, thereby inducing selection bias, we add one for every import value (Liu, 2009). As the decrease in

imports leads to a decrease in injuries to domestic industries and an increase in the probability of AD terminations, we expect β_3 to be negative.

The remaining variables represent various characteristics of industries in which products being subject to AD measures belong. TC_{it} is the change in trade competitiveness of industry i in year t. According to paragraph 2 of Article 52 in the Customs Act of Korea, Korean authorities may consider an enhancement to the trade competitiveness of domestic industries when assessing AD measures. However, if Korean authorities overcount the importance of trade competitiveness under this clause, AD measures in Korea show a tendency for protectionism despite the legal basis. Again, it should be noted that the original purpose of AD measures is to prevent unfair trade from causing material injuries to domestic industries under the WTO ADA, rather than other characteristics such as market competitiveness. In this context, if β_4 is positive, implying that the improvement of the trade competitiveness increases the hazard of the termination of AD measures, then we speculate that Korean authorities used AD measures to prevent unfair trade. However, if β_4 is negative, implying that the improvement of the trade competitiveness decreases the hazard of the termination of AD measures but increases their continuity and retention, then we speculate that AD measures in Korea were a tool to protect uncompetitive industries from imported products as a protectionist measure.

We consider two types of trade competitiveness indices: the Trade Specialization Index (TSI) and the Revealed Comparative Advantage (RCA). TSI is the value of trade balance divided by the sum of imports and exports for industry i to the world (Yu and Ding, 2019). RCA is the proportion of a country's exports divided by that of world exports for industry i (Balassa, 1965). For any index, the greater its value is, the higher trade competitiveness is.[7] In the regressions, we consider the change rate of TSI and RCA as they are an index form (Wooldridge, 2016: pp. 633-634).

$ln\,VA_{it}$, $ln\,SAL_{it}$ and $ln\,EMP_{it}$ are the logs of value added, sales, and employment in industry i at t, respectively. These variables represent the elements to determine material injuries and thus examine whether AD measures are trade remedy

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[7] Many previous studies considered both indices as major proxies for a level of trade competitiveness (Choi and Lee, 2010). However, there is a difference between them: TSI denotes whether an industry specifies more in exports or imports, while RCA denotes its market share in the world. With this difference, we can speculate whether Korean authorities considered trade specification or global market share importantly as trade competitiveness.

policies. Paragraph 4 of Article 3 in the WTO ADA and paragraph 1 of Article 63 in the Enforcement Decree of the Customs Act stipulate that authorities may consider variables such as outputs, operating rate, inventory, sales, market share, price, profits, productivity, investment return, cash flow, employments, wages, growth, capital financing, investment capability, and technology development to determine material injuries to domestic industries. However, it causes multicollinearity problem to consider all these elements in the regression. Hence, we select value added, sales, and employments as proxies for production and policymakers' concerns, based on previous studies and data availability. Article 11 of the WTO ADA speculates that AD measures shall be terminated if there are no more material injuries to domestic industries. Accordingly, we expect the coefficients of $ln\,VA_{it}$, $ln\,SAL_{it}$ and $ln\,EMP_{it}$ to be positive, implying that the increase in their values led to the higher hazard rate of terminating AD measures. However, if the coefficients of $ln\,VA_{it}$, $ln\,SAL_{it}$ and $ln\,EMP_{it}$ are negative, then we speculate that AD measures were valid even after injuries to domestic industries were recovered and thus used as a protectionist instrument.

Finally, in some regressions we consider dummies for four industries (IND_i) to check whether the hazard rate is more prominent for a specific industry. The four industries are steel (IND_ST), chemical (IND_CM), machinery (IND_MC), and light industries (IND_LI). Chemical industry includes plastic, organic and inorganic chemistries, and battery. Light industry includes paper, ceramics, carpentry, and textile.

4. Data and Summary Statistics

Table 1 lists the variables and their data sources. The data on Korea's AD measures were extracted from the WTO Integrated Trade Intelligence Portal (WTO I-TIP), which provides information on trade remedies such as AD, SCM and SG, and non-tariff measures (NTMs). All information in WTO I-TIP is based on WTO members' notifications (Yotov et al., 2016). For AD measures, the Korean government provided information on durations in force and withdrawal, target countries, and products in the 6-digit Harmonized System (HS).

GDP growth rates of Korea were extracted from the World Bank's World Development Indicators (WDIs). FTAs and import value were extracted from the WTO Regional Trade Agreement (RTA) and the UN Commodity Trade Statistics (Comtrade) databases, respectively. The Korean Statistical Information Service

(KOSIS) provides RCA and TSI indices, value added, sales, and the number of employees using the 4-digit Korea Standard Industry Code (KSIC). As AD measures are based on the 6-digit HS, we converted them to the 4-digit KSIC with the correlation tables provided by the KOSIS.

Table 1. Variables and Data Sources

Variable		Explanation	Source
Defendant Variables	*AD*	Dummy for the termination of AD measures	WTO I-TIP
	Duration	Duration of AD measures after entering into force	
Macroeconomic Variable	*GDPGRR*	GDP growth rate of Korea	World Bank WDI
Trade-related Variables	*FTA*	Dummy for FTA between Korea and other countries	WTO RTA DB
	ln IMP	Import value of product subject to AD measures	UN Comtrade
Industrial Characteristics	*TC_TSI*	Change in TSI	KOSIS
	TC_RCA	Change in RCA	
	ln VA	Value added	
	ln SAL	Sales	
	ln EMP	Employments	
	IND	Industry dummies (steel, chemical, machinery, light industry)	

Table 2 reports the summary statistics. *AD*, *FTA*, *IND_ST*, *IND_ST, IND_CM*, *IND_MC*, *IND_LI* are dummies. The units of *GDPGRR*, *TC_TSI*, and *TC_RCA* are a percentage change. The unit of *Duration* is a year. The remains are translated to log values. We also estimated the correlation coefficients among independent variables and found no multicollinearity based on the fact that their means of VIF are less than 8.53.

Table 2. Descriptive Statistics

Variable	Number of Observation	Mean	Standard Deviation	Minimum	Maximum
AD	1,027	0.060	0.238	0.000	1
Duration	1,027	10.344	4.494	2.000	16.000
GDPGRR	1,027	3.343	1.510	0.790	6.800
FTA	1,027	0.419	0.493	0	1
ln IMP	1,027	12.271	5.965	0	19.586
TC_TSI	1,027	-0.050	2.203	-30.050	5.433
TC_RCA	1,027	0.035	0.0847	-0.286	0.335
ln VA	1,027	16.191	0.818	12.997	17.228
ln SAL	1,027	17.315	0.968	14.038	18.595
ln EMP	1,027	11.098	0.652	8.359	12.503
IND_ST	1,027	0.293	0.4554	0	1
IND_CM	1,027	0.351	0.477	0	1
IND_MC	1,027	0.037	0.188	0	1
IND_LI	1,027	0.318	0.466	0	1

IV. Empirical Results

Table 3 reports the baseline results of the Cox model. Columns (1) and (2) show the results with TSI and RCA as proxies for trade competitiveness, respectively. The coefficient estimates of *GDPGRR* are positive and statistically significant at the 1% level in all columns, implying that the hazards of terminating AD measures increased when Korea's GDP growth rate was higher. Although GDP growth lead to greater imports, which may cause more requests to extend protection, its effects on economic improvement with greater productivity dominated it and thus the overall economic development shortened the duration of AD measures in Korea during the 2006-2019 period.[8]

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[8] Also, we speculate that these different results, compared to Ahn and Shin (2011), come from the stage of AD measures, countries, and the sample period. Ahn and Shin (2011) considered the initiation of AD measures for major AD user countries such as the United States, the European Union, China, and India during the 1995-2009 period.

For trade-related variables, the coefficient estimates of FTA are significantly negative in all columns, supporting argument of Sudsawasd (2012) and of Bown and Tovar (2011). Although Korea's FTAs contain various WTO-plus provisions for AD measures, tariff reductions induced by FTAs may negatively affect the termination of AD measures as a protection tool among trade liberalization regimes. We speculate that the substitute effects of AD measures for tariff reductions dominated the complementary effects of WTO-plus provisions. In addition, AD provisions in Korea's FTA did not include any content for the termination and were not legally binding. AD provisions for cooperation in Korea's FTAs were mostly applied to initiation and investigation stages rather than the termination.

The coefficient estimates of *ln IMP* are statistically insignificant in all columns, implying that the increase in imports did not significantly affect the termination of AD measures. This is also inconsistent with our expectations, although Vermulst (2005) concluded that the effects of other circumstances on AD procedures can dominate those of dumped imports.

For variables of trade competitiveness, the coefficient estimates of *TC_TSI* are positive and statistically significant at the 1% level in column (1), while those of *TC_RCA* are statistically insignificant. RCA reflects Korean industries' market share in the world, while TSI denotes whether they specify more in imports or exports. Thus, we speculate that Korean authorities considered an industry's trade specification more than its global market share and conclude that they regulated AD measures as a trade remedy policy under the WTO ADA rather than as a protectionist measure. In other words, Korean authorities did not abuse the discretion in paragraph 2 of Article 52 of the Customs Act, which stipulates the need to consider the enhancement of a domestic industry's trade competitiveness in AD procedures.

For variables of other industrial characteristics, the coefficient estimates of *ln EMP* are positive and statistically significant at the 5% level while those of *ln VA* and *ln SAL* are statistically insignificant in all columns. Hence, among the factors reflecting injuries to domestic industries, only the increase in employment significantly induced the increase in the hazard of terminating AD measures. Vandenbussche et al. (2008) showed that various political and economic factors matter for AD measures. In Korea, employment problems emerged due to political and economic disputes over its free trade policies (Jang, 2020). Accordingly, we speculate that Korean authorities gave more attention to employment policies than other areas, such as sales and value added, when considering the termination of AD procedures.

Meanwhile, the WTO DSB's view on AD matters is that authorities are required to appreciate evidence as a whole, not a selective assessment (Becroft, 2014). Moore (2006) addressed that the impact on wages and employment, rather than profits and sales, may play an important role in its broader decision-making processes. Accordingly, the positive coefficient estimates of *ln EMP* as well as insignificant outcomes of others such as *ln VA* and *ln SAL* imply that Korean authorities' determinations were consistent with Article 11 of the WTO ADA. In other words, Korean authorities considered the most significant factor, employment, when estimating overall injuries to domestic industries.

Table 3. Hazard Regression: Baseline Results

	(1)	(2)
GDPGRR	**0.410*** (0.118)**	**0.429*** (0.122)**
FTA	**-0.689** (0.291)**	**-0.691** (0.320)**
ln IMP	-0.018 (0.023)	-0.027 (0.023)
TC_TSI	**0.294*** (0.101)**	
TC_RCA		-0.279 (2.050)
ln VA	-0.391 (0.865)	-0.392 (0.980)
ln SAL	-0.850 (0.615)	-0.880 (0.701)
ln EMP	**1.087** (0.496)**	**1.130** (0.483)**
Log pseudo-likelihood	-363.088	-366.685
Prob > Chi-sq	0.000	0.000
Observations	1,027	1,027

Notes: 1. *, **, *** denote significance at 1%, 5%, and 10% levels, respectively.
         2. Figures in parentheses are robust standard errors.

Table 4 adds four industry dummies (*IND_ST*, *IND_CM*, *IND_MC*, *IND_LI*) to the baseline regressions. In Table 4, we report columns (1) and (2) for steel, columns (3) and (4) for chemical, columns (5) and (6) for machinery, and columns (7) and (8) for

light industries. Columns (1), (3), (5), and (7) in Table 4 show the results with TSI, while columns (2), (4), (6), and (8) show those with RCA as proxies for trade competitiveness. The overall results for other control variables in Table 4 are very similar to those of the baseline in Table 3, except for *ln VA* in columns (1) and (2): when adding an industry dummy for steel in the regression, its coefficient estimates become statistically significant with the negative sign. Hence, in some parts we found that AD measures were valid even after injuries to domestic industry were recovered and used as a protectionist instrument. However, it is noted that the coefficient estimates of *ln VA* are statistically insignificant in most parts.

In Table 4, the coefficient estimates of *IND_ST* are negative and statistically significant at the 5% level in columns (1) and (2), implying that the hazard of terminating AD measures was less prominent in the steel industry. The world's steelmaking capacity has increased while each country's production share has declined in the last two decades (Mercier et al., 2021). Saltykova (2021) also showed that the steel industry has been facing negative events with the oversaturated market due to the high stocks of goods, trade wars, and tighter market competition. Mukherjee and Roy (2010) demonstrated that Korea's market share in the global steel industry decreased from 2002 to 2008 whereas China's and India's shares increased. Ahn and Shin (2011) concluded that AD investigations were mostly initiated in marginalized industries. As steel products are Korea's major export items, its loss of global market shares is an important clue of the economic downturn. The granting of AD measures can be interpreted as a response to changes in the structure of the global steel market with tighter competition (Oliveira, 2014). Consequently, we stipulate that Korean authorities recognized the need to maintain AD measures in the steel industry to sustain its production level during the worldwide oversupply.

Meanwhile, the coefficient estimates of *IND_MC* are positive and statistically significant at the 5% level in columns (5) and (6), implying that the hazard of terminating AD measures was more prominent in the machinery industry. We speculate that Korea authorities were less protective of machinery industries in its AD measures. Contrary to the situation of the steel industry, the global machinery market has shown the overall growth trend, the expanding range of market possibilities, and various opportunities from new product lines and consumers (Lorenz et al., 2020). The results in other industries, such as chemistry and light industries, are statistically insignificant due to the same situation.

Table 4. Hazard Regression: Including Industry Dummies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDPGRR	0.348***	0.376***	0.409***	0.428***	0.406***	0.430***	0.411***	0.428***
	(0.115)	(0.114)	(0.120)	(0.124)	(0.118)	(0.124)	(0.118)	(0.124)
FTA	-0.675**	-0.671**	-0.696**	-0.698**	-0.571*	-0.546	-0.689**	-0.693**
	(0.275)	(0.292)	(0.293)	(0.327)	(0.301)	(0.343)	(0.293)	(0.324)
ln IMP	-0.008	-0.013	-0.018	-0.027	-0.022	-0.034	-0.019	-0.028
	(0.026)	(0.025)	(0.024)	(0.023)	(0.023)	(0.022)	(0.024)	(0.023)
TC_TSI	0.266**		0.294***		0.269***		0.293***	
	(0.123)		(0.101)		(0.0953)		(0.0998)	
TC_RCA		-0.760		-0.360		0.429		-0.329
		(2.158)		(2.094)		(2.030)		(2.021)
ln VA	-2.670*	-2.771*	-0.530	-0.483	-0.578	-0.795	-0.498	-0.449
	(1.379)	(1.469)	(1.297)	(1.270)	(0.867)	(1.053)	(0.988)	(1.121)
ln SAL	2.388	2.639	-0.734	-0.800	-0.507	-0.407	-0.811	-0.864
	(1.718)	(1.755)	(1.073)	(1.052)	(0.613)	(0.743)	(0.640)	(0.716)
ln EMP	-0.053	-0.198	1.075**	1.113**	0.785	0.883*	1.103**	1.139**
	(0.830)	(0.819)	(0.532)	(0.549)	(0.515)	(0.499)	(0.490)	(0.488)
IND_ST	-2.783**	-3.036**						
	(1.322)	(1.278)						
IND_CM			0.088	0.069				
			(0.581)	(0.571)				
IND_MC					1.135***	1.310**		
					(0.432)	(0.538)		
IND_LI							-0.131	-0.080
							(0.590)	(0.664)
Log pseudo-likelihood	-358.316	-360.826	-363.062	-366.669	-360.746	-363.760	-363.038	-366.667
Prob > Chi-sq	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027

Notes: 1. *, **, *** denote significance at 1%, 5%, and 10% levels, respectively.

　　　2. Figures in parentheses are robust standard errors.

V. Conclusion

In this paper, we have empirically examined what factors affected the termination of AD measures in Korea during the 2006-2019 period. Based on our meticulous literature review and considering the articles of the WTO ADA and the Customs Act of Korea, we set up related variables and regression models for our empirical analyses.

The estimation results of the Cox model show that the GDP growth rate, employment, and TSI as a proxy for trade specification in domestic industries had positive effects on the hazard of terminating AD measures. These results imply that, on one hand, Korean authorities mainly considered the economic performances of domestic industries when dealing with the termination of AD measures and thus used them as instruments for trade remedies under Article 11 of the WTO ADA and Article 52 of the Customs Act. On the other hand, the empirical results also show that FTAs that reduced tariffs had negative effects on the hazard of terminating AD measures. These results imply that Korean authorities seemed to use AD measures as a substitute for tariff reductions by FTAs; as a result, they emerged as a protection tool among trade liberalization regimes. By industry, the hazard of terminating AD measures was less prominent in the steel industry, implying that Korean authorities seemed to pursue a sustainable level of steel production given the overcapacity in the world market, thereby considering AD measures as a protectionism tool. Meanwhile, the hazard of terminating AD measures was more prominent in the machinery industry, implying that Korean authorities were less protective and had more open-door policies regarding it.

An AD measure is not necessarily a protectionist tool when it is effectively controlled by the WTO ADA. Through legal and empirical analyses, we found that AD measures in Korea had properties of a proper trade remedy policy, following Article 11 of the WTO ADA, and at the same time served as a protectionism tool to sustain its domestic industries based on industrial characteristics and other trade policies. Our results imply that the AD provisions of Korea's FTAs did not affect Korean authorities' positive decision on the termination of AD measures, although they had some WTO-plus contents. In other words, Korea's FTAs played a weak role in the review process for AD measures. In the Mega FTA negotiations, rules and regulations in global economic governance are important issues (Chen et al., 2019). Hence, the Korean government should adopt more effective provisions for review procedures to mitigate abuses of AD measures as a protectionism tool in future trade negotiations.

The paper has several limitations in its econometric specifications. First of all, we did not consider characteristics of exporting countries such as their GDPs, import penetrations, and cumulative numbers of AD measures at this time. We recognize that they are also important variables, especially as political factors, and thus the estimation results may suffer from the potential endogeneity problem. In this paper, we focus on various characteristics of domestic industries according to our research objectives based

on the WTO ADA and the Korean Customs Act. Also, countries that Korea imposed AD measures were very limited such as the United States, the European Union, China, and Japan. Meanwhile, it will be an interesting issue whether and how various characteristics of target countries may affect the termination of AD measures in Korea, especially focusing on political factors. We will leave these issues to future work.

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