The Chilling Trade Effects of Provisional Anti-dumping Duties: The Case of Korea[*]

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Abstract

Purpose – This study empirically analyzes the effects of provisional anti-dumping duties levied on imports by Korea following anti-dumping investigations. An anti-dumping duty is a legal tool that countries use to impose duties on imports to offset injurious dumping. This study verifies how effective the imposition of a provisional anti-dumping duty is and whether such duties have trade chilling effects on aggregate imports. Specifically, this study examines import trade diversion from named to unnamed countries caused by the imposition of provisional anti-dumping duties.

Design/methodology – This empirical analysis employs an econometric model of provisional anti-dumping measures for cases in which Korea imposed final affirmative anti-dumping measures. We construct a monthly panel dataset for each stage of anti-dumping investigation undertaken by Korea for all manufacturing industries during 1995–2013. We illustrate a stage-by-stage analysis of anti-dumping investigations from initiation, preliminary decision, imposition of provisional duty, final affirmative decision, and imposition of final affirmative duty on a monthly basis at the six-digit harmonized system code-level.

Findings – For cases in which provisional duties are imposed, the reduction in imports from named countries outweighs the increase in imports from unnamed countries. The substantial reduction in imports from named countries is large enough to offset the import diversion to unnamed countries, suggesting that import diversion in investigations is limited during the investigation period. Therefore, the use of provisional anti-dumping duties in Korea is effective, providing evidence of a chilling effect on aggregate imports.

Originality/value – Few studies examine the size of the effects on import trade diversion of the imposition of provisional anti-dumping duties. We contribute to the literature by disentangling separate trade effects for each phase of the anti-dumping investigation process and imposition of provisional duty.

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JEL Classifications: F13, F14, K33

1. Introduction

The use of import-restrictive trade remedy measures has increased significantly around the globe. Anti-dumping laws have become the most frequently used instrument of trade remedy for both developed and developing countries. Dumping occurs when an imported product is sold at less than its domestic fair market value. An anti-dumping duty is the legal framework countries use to place duties on imports in addition to the general duty to offset injurious dumping.

According to the World Trade Organization (WTO), following the 2008 global financial crisis, the number of anti-dumping initiations increased from 163 in 2010 to 249 in 2017.

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Combined with a global economic downturn, this increasing number of annual anti-dumping investigations initiated raises concern about the strategic use of anti-dumping petitions as an offensive weapon against trading partners.

Anti-dumping filings, however, do not directly guarantee the imposition of final affirmative duties. The outcomes of anti-dumping cases are classified into three types: final affirmative determination, final negative determination, and investigation terminated. Anti-dumping investigations are terminated either when they are suspended or the petition is withdrawn. It has become increasingly evident that the portion of terminated anti-dumping cases is not negligible.

Provisional anti-dumping measures aim to prevent injury caused during investigations.[1] Imports from named countries of the product under consideration often surge in anticipation of the imposition of the final anti-dumping duty on the initiated investigation.[2] The provisional anti-dumping measure is effective when there is an insubstantial amount of import diversion from named countries to unnamed countries so that the level of overall import values is maintained at a lower level during investigation period than the pre-investigation period. The provisional anti-dumping measure is ineffective when the restricted effect of imports from named countries is offset by increased imports from unnamed countries in the period of investigation. Therefore, empirical analysis of the effect of each provisional measure is meaningful to evaluate the effectiveness and importance of imposing the provisional measure.

The purpose of this study is to empirically analyze the pattern of import diversion induced by the imposition of provisional duties at the product level in Korea for all anti-dumping cases initiated by Korea during 1995–2013 and with final affirmation measures imposed. In this study, countries under anti-dumping investigation are referred to as "named countries," while those that were not under investigation are referred to as the "unnamed countries," closely following the distinction of Prusa (1996) between "named" and "non-named" countries.[3]

Following Vandenbussche and Zanardi (2010), we use the terminology "chilling effect" to describe a reduction of imports from anti-dumping measures compared to the pre-investigation period.[4] In this study, our empirical findings suggest evidence of a chilling effect on the aggregate imports for the cases in which provisional anti-dumping duties were imposed in the period of investigation.

The rest of this paper is organized as follows. A literature review is presented in the following Subsection 1.1. Korean anti-dumping procedures are also presented. Section 2 explains the separated trade effects for each investigation phase for the anti-dumping investigation and describes the study's data. Section 3 outlines the empirical specification of the imposition of a provisional anti-dumping duty model. The estimation results for the import trade diversion for each stage of the anti-dumping investigation period are also presented. Section 4 concludes.

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[1] A provisional measure refers to an effective legal action that imposes provisional tariffs within the scope of not exceeding provisionally calculated dumping margins, or that orders the provision of security deposits, such as provisional anti-dumping duties.

[2] The final affirmative anti-dumping duties levied on imports can distort import prices and import trade patterns.

[3] Konings, Vandenbussche and Springael (2001) use the term "named countries" to refer to importers named in an anti-dumping investigation, and "non-named countries" to refer to countries not named in the investigation.

[4] The "chilling" terminology is grounded in the legal literature. A detailed description is presented in Vandenbussche and Zanardi (2010).

1.1. Literature Review

The international trade literature has placed much focuson examining the effects of anti-dumping cases. Among trade remedy measures, anti-dumping is widely used, and the strategic effects of anti-dumping have received a lot of attention following Prusa (1992). Several studies have analyzed the effects of strategic use of anti-dumping measures, focusing on the threat of anti-dumping petitions and their impact on domestic and foreign firms' incentives to engage in collusion.

The hypothesis that a withdrawn anti-dumping petition would signal a collusive agreement between foreign and domestic firms is first investigated in Prusa (1992). The strategic behaviors among firms induced by anti-dumping petitions depend on the particular model specification. Prusa (1992) shows that withdrawn anti-dumping cases restrict trade by as much as the dumping duties levied using U.S. data for 1981–1982 showing that withdrawn cases had an effect on trade. Zanardi's (2004) econometric analysis supports the theoretical conclusions of Prusa (1992) for U.S. anti-dumping cases from 1980 to 1997. Anderson (1992) investigates the effects of voluntary export restraints and anti-dumping on the incentives of firms and government. The threat of an anti-dumping duty, however, forces foreign firms to behave more competitively, which is an inconsistent result tothat of Prusa (1992).

Staiger and Wolak (1994) estimate the trade impact of U.S. anti-dumping laws and the determinants of suit-filing activities from 1980 to 1985. The authors find that imports fell dramatically during the investigation period by the mere possibility of anti-dumping duties. Taylor (2004) shows that withdrawn petitions without a known settlement had no significant effects on trade in anti-dumping investigations in the U.S. between 1990 and 1997.

Prusa and Skeath (2002) analyze anti-dumping filing patterns for all anti-dumping cases filed and reported to the General Agreement on Tariffs and Trade/WTO between 1980 and 1998. Their results indicate that retaliatory motives were more important than economic motives for new anti-dumping users (South Africa, Brazil, and Mexico) while both economic and strategic motives were important for traditional anti-dumping users (Australia, Canada, the E.U., New Zealand, and the U.S.). Blonigen and Bown (2003) investigate U.S. anti-dumping filing behavior from 1980 to 1998 and find empirical evidence that U.S. industry was less likely to initiate petitions against firms from foreign countries that were more exposed to retaliation. Their results based on a nested logit model specification indicate that the domestic U.S. industry was concerned with the capacity of foreign dumping firms to petition for anti-dumping protection.

Krupp and Pollard (1996) examine the effects of anti-dumping action using disaggregated trade data at a monthly level from the U.S. chemistry industry over the period from 1976 to 1988 and provide evidence of investigation effects. According to Prusa (1996), anti-dumping duties substantially restricted the volume of trade from named countries during the period 1980 to 1988. Because of the diversion of imports, the overall volume of trade continued to grow even in cases that resulted in duties. Prusa (2001) provides evidence that U.S. anti-dumping duties levied between 1980 and 1984 caused the value of imports to fall, showing that anti-dumping actions would have distorted trade patterns even if duties had never been levied. The value of trade imports fell for anti-dumping cases that were rejected as well as for settled cases.

Veugelers and Vandenbussche (1999) first examine the effect of European anti-dumping policy on market structure. Usinga multi-stage model, they find that anti-dumping law can have both a pro-competitive and anti-competitive effect in their investigation of the incentives

for domestic and foreign firms to engage in collusion. Konings, Vandenbussche, and Springael (2001) empirically study the effects of European anti-dumping cases on trade diversion from named to unnamed countries in investigations between 1985 and 1990. They find that trade diversion in the E.U.'s anti-dumping policy is more effective at keeping imports out than that in the U.S..

Few studies empirically estimate the effects of anti-dumping measures by developing countries, such as India or China. Ganguli (2008) investigates anti-dumping cases in India, an active user of anti-dumping measures, between 1992 and 2002. The evidence indicates that Indian anti-dumping actions reduced imports from named countries as well as overall imports. Trade diversion from to unnamed countries mitigated the effects of effective use of Indian anti-dumping policy. Aggarwal (2011) assesses Indian anti-dumping from 1994 to June 2001 and finds a tendency for cheap imports to increase after the investigation begins in the expectation of an affirmative outcome. Park Soon-Chan (2009) shows that imports from named countries decreased as a result of Chinese anti-dumping initiation between 1997 and 2004.

However, little is known about the import trade diversion caused by the imposition of provisional anti-dumping duties. In this study, we measure the six-digit harmonized system (HS) code-level impact of various stages of anti-dumping investigations (initiation, preliminary, and final stages) constructing monthly panel data for all manufacturing industries. We analyze the impacts of provisional anti-dumping duty imposition, focusing on the trade chilling effect during the investigation period. Our contribution to the literature of import diversion induced by the imposition of provisional anti-dumping duty is to identify the separate import trade effects for each stage of the anti-dumping investigation process.

1.2. Korean Anti-dumping Procedure

Before reviewing the data in this study, we briefly describe the anti-dumping procedure in Korea. First, Korean domestic producers of like products can apply for the initiation of an anti-dumping investigation. At the time of application, of the total production amount by domestic producers that express assent or dissent, more than half must belong to domestic producers expressing assent. Furthermore, the total production amount of domestic producers that express assent must exceed 5% of total domestic production. The required information for an application includes the existence of dumped imports, material injury to a domestic industry, and a causal link between the dumped imports and the alleged injury (six investigation application forms must be submitted, three of which are confidential and three non-confidential). The completed formsare then submitted to the Korea Trade Commission (KTC) with evidence of the material injury caused by the dumped imports.

Second, within 2 months of receiving an application, the KTC determines whether there is a need to initiate an anti-dumping duty investigation. If a determination to initiate an investigation is made, a public notice is issued. Third, within 3 months of the date of initiation, the KTC must complete the preliminary determination of the investigation and prepare provisional measures. If the KTC makes an affirmative determination about the injury to the domestic industry, it must recommend that the Ministry of Economy and Finance (MOEF) impose a provisional anti-dumping duty equivalent to the investigated dumping margin. Finally, within 3 months of the preliminary determination, the KTC must make the final determination of whether the domestic industry has been materially injured and if the determination should be affirmative.

2. Anti-dumping Investigation: Separated Trade Effects for Each Phase

2.1. Data

The dataset that we construct comprises all Korean anti-dumping investigations initiated between 1995 and 2013. This resulted in 66 cases counted by product and 126 cases counted by product-defendant country. Table 1 reports the types of countries accused of dumping in the Korean domestic market between 1995 and 2013. For anti-dumping cases by product-defendant countries, about half are initiated against less developed countries. This pattern is very far from that of either the U.S. or E.U., where more than half of all anti-dumping cases are initiated against less developed countries (Konings, Vandenbussche and Springael, 2001; Prusa, 1996). While industrialized countries, such as Japan and the U.S., accounted for 47% of all anti-dumping investigations during 1995–2013, developing countries (excluding China) accounted for 30% of all anti-dumping investigations over the same period. Specifically, 21% of anti-dumping investigations were initiated against China.

Table 1. Anti-dumping Cases by Countries' Economic Status from 1995 to 2013: Number of Cases Filed by Korea

Type of country	Number of cases (%)
Industrialized countries*	59
	(47%)
Developing countries+	38
	(30%)
Nonmarket economies (excluding China)**	3
	(2%)
China++	26
	(21%)
Total	**126**

Note: Numbers in parentheses denote the percentage of the column total. *Spain, US, Canada, Japan, and Russia. +Taiwan, Thailand, Singapore, Argentina, Brazil, India, Indonesia, Pakistan, and Malaysia. **Bulgaria, Poland, and Vietnam (Korea classified Vietnam as a nonmarket economy before2009. In 2002, the KTC received an application from Korean producers for the initiation of an anti-dumping investigation into the imports of temporary lighters originating in Vietnam). ++ Korea classified China as a nonmarket economy before 2005.

Table 2 lists the Korean sectors that filed dumping complaints to the KTC. We first identify the cases with six-digit HS codes accused of dumping for each product and match them with their corresponding two-digit Korea Standard Industry Code (KSIC) by obtaining anti-dumping case reports from the KTC.[5] The KSIC, which is set by the Korea Statistical Information Office, is based on the International Standard Industrial Classification adopted by the UN. The first version of the KSIC was developed to secure the accuracy and comparability of the industry-related data. The KSIC was revised in December 2007, and the

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[5] For each investigated product, the anti-dumping case reports are collected from the KTC .

revisions came into effect in February 2008. The Korean chemical industry filed 21 of the 66 anti-dumping cases (32%) for cases counted by product.

Table 2. Sectors Involved in Anti-dumping Cases between 1995 and 2013: Number of Cases Filed by Korea

Sector	KSIC Rev.9	Cases (%)	
Manufacture of food products	10	2	(3%)
Manufacture of textiles, except apparel	13	1	(2%)
Manufacture of wood and of wood and cork products, except furniture	16	7	(11%)
Manufacture of pulp, paper, and paper products	17	5	(8%)
Manufacture of chemicals and chemical products, except pharmaceuticals and medicinal chemicals	20	21	(32%)
Manufacture of pharmaceuticals, medicinal chemicals, and botanical products	21	2	(3%)
Manufacture of rubber and plastic products	22	4	(6%)
Manufacture of other nonmetallic mineral products	23	3	(5%)
Manufacture of basic metal products	24	5	(8%)
Manufacture of fabricated metal products, except machinery and furniture	25	2	(3%)
Manufacture of electronic components, computer, radio, television and communication equipment and apparatus	26	1	(2%)
Manufacture of electrical equipment	28	5	(8%)
Manufacture of other machinery and equipment	29	5	(8%)
Manufacture of other transportationequipment	31	1	(2%)
Other manufacturing	33	2	(3%)
Total		**66**	

Table 3 provides a breakdown of anti-dumping cases by outcome, including the decision of whether to impose a provisional anti-dumping duty on the dumped imports. Between 1995 and 2013, 83 (47) cases of the 126 (66) cases counted by product-defendant countries (product) received an affirmative final decision. This result provides evidence of a sufficiently high probability of an industry's chance of receiving protection. Of the 47 affirmative cases, only 1 resulted in an export suspension undertaking; 3 in a price undertaking; 34 in a duty imposition; and 9 in both a price undertaking and a duty imposition.[6] Moreover, of these 47 cases, 23 resulted in the imposition of a provisional measure.

Anti-dumping duties typically end between 3 and 5 years after the start date. For the 23 cases in which provisional duties were imposed, measures lasted for 3 (5) years in 9 (14) cases. For the 24 cases in which provisional duties were not imposed, measures lasted for 3 (5) years for 15 (8) cases.

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[6] When several countries were defendants, anti-dumping investigation cases resulted in the imposition of a duty or price undertaking.

Table 3. Summary of Anti-dumping Cases from 1995 to 2013: Number of Cases Filed by Korea

Outcome	Classification 1: Product-defendant country	Classification 2: Product
Rejected	2	2
	(2%)	(3%)
Withdrawn	23	9
	(18%)	(14%)
Preliminary decision: Negative	14	7
	(11%)	(11%)
Final decision: Negative	+4	1
	(3%)	(1%)
Final decision: Affirmative	83	*47
	(66%)	(71%)
Provisional duty imposed	38	23
	(30%)	(35%)
Provisional duty not imposed	45	24
	(36%)	(36%)
Total	**126**	**66**

Note: Numbers in parentheses denote the percentage of the column total. +In 1997, the initiation of an anti-dumping investigation into imports of medium density fiberboard originating in the U.S. resulted in a negative final determination of dumping. In 1999, the initiation of an anti-dumping investigation into imports of alkali manganese batteries originating in the U.S. resulted in a negative final determination of dumping. In 2002, the initiation of an anti-dumping investigation into imports of Portland cement originating in China resulted in a negative final determination of dumping. Also in 2002, the initiation of an anti-dumping investigation into the imports of temporary lighters originating in Vietnam resulted in a negative final determination of dumping. *In 1997, the initiation of an anti-dumping investigation into imports of an industrial air handling unit originating in Liechtenstein resulted in an export suspension undertaking.

Fig. 1 exhibits some of the interesting features of the imposition of provisional anti-dumping measures in Korea. After 2008, in the cases that resulted in affirmative final measures, the KTC did not impose provisional anti-dumping duties on dumped imports.

The main objective of the empirical analysis is to measure import trade diversion in response to anti-dumping investigations for each stage of the anti-dumping investigation process. Since each stage lasts a fraction of a year, the length of each stage in months must first be identified.

To help us obtain a more detailed picture of the stage-by-stage import trade diversion pattern during the investigation period, we separate the investigation period as follows. First, for cases in which provisional anti-dumping duties are imposed, we use *initiation* to *preliminary decision*; *preliminary decision* to *provisional measure*; *provisional measure* to *affirmative AD decision*, and *affirmative AD decision* to *affirmative AD measure imposed*. Second, for cases in which provisional anti-dumping duties are not imposed, we use *initiation* to *preliminary decision*; *preliminary decision* to *affirmative AD decision*; and *affirmative AD decision* to *affirmative AD measure imposed*. We find this new approach to be more appealing, as it provides an analysis of import trade diversion for each phase.

Fig. 1. Anti-dumping Cases in Which Affirmative Final Measures Were Imposed by Korea
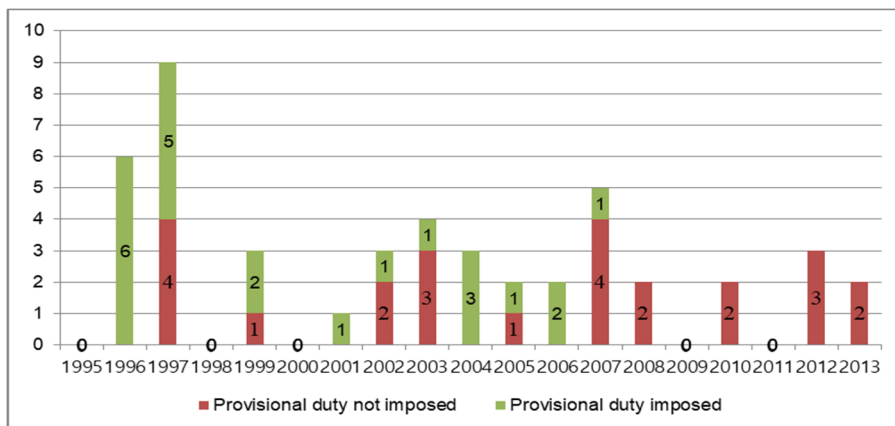
Note: We count the cases by product in which the initiation year falls anywhere between 1995 and 2013. After 2008, in the cases that resulted in affirmative final measures, the KTC did not impose provisional anti-dumping duties on dumped imports.

For each investigated product, monthly import trade data for Korea by source country are from the Korea International Trade Association. Six-digit HS codes are used to identify the import trade value of each anti-dumping case. The year of initiation of the Korean anti-dumping investigations falls between 1995 and 2013. Following Prusa (1996), we denote this year as t0. To measure the trade chilling effect, import values during the pre-investigation period are also considered. t0-1 denotes the year before the investigation period, and t0-2 denotes the second year before the investigation.[7]

2.2. Cases in Which Provisional Anti-dumping Duties Were Imposed

Between 1995 and 2013, there were affirmative final decisions for 47 of 66 cases counted by product. Of these, only 23 resulted in the imposition of a provisional measure between the preliminary stage and the final stage of the investigation. The average investigation period for all 23 cases was 306 days (about 10 months).

As shown in Table 4, the average import share for named countries (unnamed countries) in t0-1was about 0.434 (0.566), and it declined (increased) to 0.402 (0.598) in t0. During investigation period t0, the average import value for named and unnamed countries was smaller than that in t0-1. Surprisingly, the overall import value in the investigation period t0 was 14.1% less than that int0-1.

This empirical evidence leads us to discuss the import diversion pattern during the investigation period when provisional measures are imposed. As shown in Fig. 2, in the stage of *provisional measure* to *affirmative AD decision*, the average monthly import value is 38.9% less than that in the stage of *preliminary decision* to *provisional measure* for named countries. Import diversion from named to unnamed countries becomes clearer for unnamed countries' import values, showing a 17.0% rise. However, overall imports decreased by 10.5%. The reduction in import values from named countries outweighed the increase in import values

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[7] To recognize potential outliers during the investigation period, we collect the pre-investigation import values from named countries during **t0-1** and **t0-2**.

Table 4. Korean Anti-dumping Cases: Provisional Measures Imposed

Stage	Pre-investigation		During investigation			
	2 years ago	1 year ago	t0			
	t0-2	t0-1	Initiation to preliminary decision	Preliminary decision toprovisional measure	Provisional measure toaffirmative AD decision	Affirmative AD decision toaffirmative AD measure imposed
Average investigation period	1 year	1 year	130 days	39 days	92 days	45 days
Average named countries' import share	0.4620	0.4340	0.4387	0.5375	0.3383	0.2952
Aggregated named countries' import value ($1000)	674900	720216	282853	92699	139717	57305
Aggregated unnamed countries' import value ($1000)	786962	938322	361862	79755	273255	136814
Aggregated overall import value ($1000)	1461862	1658538	644715	172454	412972	194119

Note: In cases in which provisional anti-dumping duties were imposed, weighted average values are calculated based on 23 cases in which the year of initiation falls anywhere between 1995 and 2013. After 2008, in the cases that resulted in affirmative final measures, the KTC did not impose provisional anti-dumping duties on dumped imports.

Fig. 2. Separable Import Diversion Effects During the Investigation: Provisional Measures Imposed
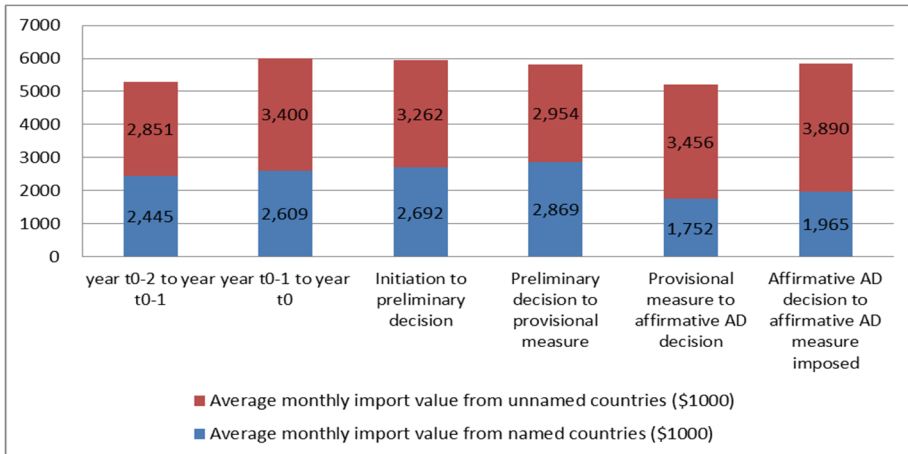
Note: All values are calculated based on 23 cases in which the year of initiation falls anywhere between 1995 and 2013). Each observation is weighted by dividing all values by the level of overall import value at each stage. Year t0-2 means 2 years before the year of initiation. Year t0-1 means 1 year before the year of initiation. Year t0 means the year of initiation.

from unnamed countries, providing evidence of a chilling effect on aggregate imports. During the stage of *affirmative AD decision* to *affirmative AD measure imposed*, import trade values from both named and unnamed countries increased by 12%, but the average monthly overall imports was smaller than that in t0-1, implyingthe presence of atrade chilling effect.

2.3. Cases in Which Provisional Anti-dumping Duties Were Not Imposed

Between 1995 and 2013, 47 of the 66 cases when we count by product received an affirmative final decision. In addition, no provisional measures were imposed between the preliminary stage and the final stage of the investigation for 24 of the 47 affirmative cases. The average investigation period for all 24 cases was 338 days. Of these, 1 case is excluded from our dataset and the remaining 23 cases are used in the analysis.[8]

As shown in Table 5, the average import share for named countries (unnamed countries) in t0-1 was about 0.525 (0.475), and it declined (increased) to 0.496 (0.504) in t0. The average import value in the investigation period t0 was larger than that in t0-1 for both named and unnamed countries. For the cases in which provisional anti-dumping duties were not imposed, the overall import value in the investigation period t0 was 8% greater than that in the pre-investigation period t0-1.

Figure 3 depicts substantial import diversion in the stage of *affirmative AD decision* to *affirmative AD measure imposed*. Between the stage of *preliminary decision* to *affirmative AD decision* and *affirmative AD decision* to *affirmative AD measure imposed*, the average monthly import values increased by 13.8% for unnamed countries. At the same time, the average monthly import values for named countries increased even more by 32.4%, and overall imports increased by 22.4%. Unlike the cases in which provisional anti-dumping duties were imposed, the average monthly overall imports were larger in the investigation period than in t0-1.

Table 5. Korean Anti-dumping Cases: Provisional Measures Not Imposed

Stages	Pre-investigation		During investigation		
	2 years ago	1 year ago	t0		
	t0-2	t0-1	Initiation to preliminary decision	Preliminary decision toaffirmative AD	Affirmative AD decision toaffirmative AD measure imposed
Average investigation period	1 year	1 year	142 days	143 days	52 days
Average named countries' import share	0.4515	0.5247	0.5124	0.4591	0.5320
Aggregated named countries' import value ($1000)	1147821	1482717	655593	536872	321155
Aggregated unnamed countries' import value ($1000)	1394413	1342898	623807	632518	282484
Aggregated overall import value ($1000)	2542234	2825615	1279400	1169390	603639

Note: In cases in which provisional anti-dumping duties were not imposed, weighted average values are calculated based on 23 cases in which the year of initiation falls anywhere between 1995 and 2013.

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[8] In 1997, the KTC received an application from Korean producers to initiate an anti-dumping investigation into imports of industrial air handling units originating in Liechtenstein. However, this case is excluded, as it resulted in an export suspension undertaking.

Fig. 3. Separable Import Diversion Effects During the Investigation: Provisional Measures Not Imposed
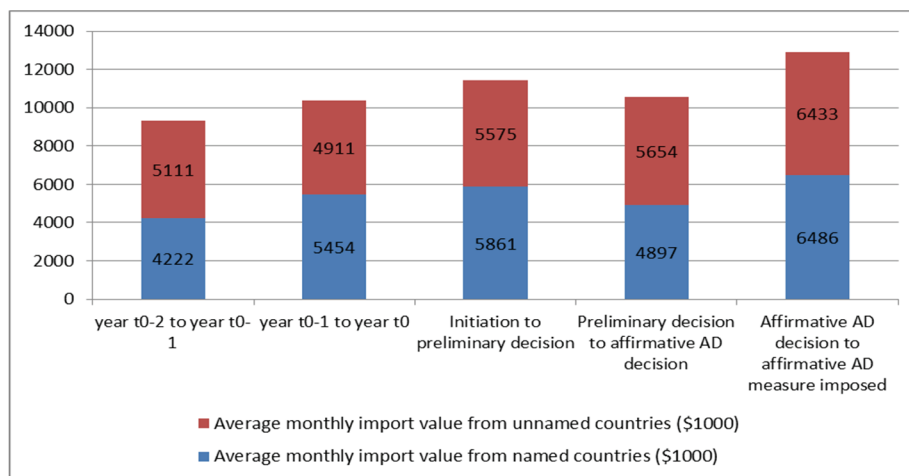
Note: All values are calculated based on 23 cases in which the year of initiation falls anywhere between 1995 and 2013. Each observation is weighted by dividing all values by the level of overall import value at each stage. Year t0-2 means 2 years before the year of initiation. Year t0-1 means 1 year before the year of initiation. Year t0 means the year of initiation.

3. Econometric Model and Estimation

This section tests whether the imposition of provisional duties has trade chilling effects on aggregate imports in the investigation period using import data at country level.[9] We conjecture that the effectiveness of provisional anti-dumping duties depends on the level of import diversion from named to unnamed countries during the investigation. It is of interest to examine whether and to what extent the imposition of a provisional duty affects the level of import diversion from named to unnamed countries for each stage of the anti-dumping investigation period. We control for factors that affect import flows, including the number of HS codes that are covered by the investigation case and time- and sector-specific effects, using two models[10]: a trade chilling effect model for the cases in which final affirmative anti-

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[9] A reviewer points out that the analysis of change in imports from a country as a whole may lead to a misleading outcome in that the anti-dumping duty is not a country-wide measure, but a firm-specific measure. Strategic competition between exporters and importers and domestic firms has been analyzed theoretically (Anderson, 1992; Fischer, 1992; Staiger and Wolak, 1991). More detailed firm-level information on domestic producers, importers, and foreign exporters for each dumped product is needed to address a potential problem that could arise in country-level data. Firm-level data collection of Korean firms is accessible only from a commercial database sold under the name KISLINE published by NICE Information Service. Given limited access to this micro-level dataset, the analysis based on firm-specific data cannot be applied to this study.

[10] There may be concern about other factors that affect the level of overall import values, such as macroeconomic trends, specifically, that trade would collapse during the 2008–2009 financial crisis. The world economy in 2008–2009 experienced its most severe financial shock and world trade collapsed immediately after the financial crisis. However, none of the 23 cases in which the provisional duty was imposed occurred during the global financial crisis period. After 2008, in the cases that resulted in affirmative final measures, the KTC did not impose provisional anti-dumping duties on

dumping measures were imposed in Subsection 3.1 and a stage-by-stage import diversion pattern and chilling effect model for the cases in which provisional anti-dumping duties were imposed in Subsection 3.2.

3.1. Pooled Model: Does the Imposition of Provisional Anti-dumping Duties Lead to Import Diversion during an Investigation?

Following Prusa (1996), we present the econometric model of provisional anti-dumping measures for the cases in which *final* affirmative anti-dumping measures were imposed by Korea. We observe import values for anti-dumping investigation case i identified with six-digit HS codes accused of dumping for each product in month $t = 1,..,T$ during the investigation period. g denotes the country group, that is, named, unnamed, and overall. The error term ε is assumed to be independent and identically distributed (*i.i.d.*). We assume the following log-log relationship:

$$\text{Ln(import)}_{i,t_j}^{g} = \beta_0 + \beta_1 \text{Ln}(import)_{i,t_{0-1}}^{g} + \beta_2 \text{Ln}(provduty)_{i,t_j}^{g}$$

$$+ \beta_3 \text{Ln}(provduty)_{i,t_j}^{g} \cdot \text{Imposition}_{i,t_j}^{g} + \beta_4 \text{HS}_i^{g} + \varepsilon_{i,t_j}^{g} \qquad (1)$$

where $\text{Ln(import)}_{i,t_j}^{g}$ is the logarithm of import values for case i at time t_j (t = 1,2…,T months following initiation) for country group g; $\text{Ln(import)}_{i,t_{0-1}}^{g}$ is the logarithm of import values for case i in the year prior to initiation, **t0-1**, for country group g;[11] and $\text{Ln}(provduty)_{i,t_j}^{g}$ is the logarithm of the size of the provisional duty for case i at time t_j (t = 1,2…,T months following initiation) for country group g.[12]

Given that the estimated effect of import diversion in the investigation period may depend on the imposition of the provisional anti-dumping duty, we can use an interactive dummy variable to account for this intuition, $\text{Ln}(provduty)_{i,t_j}^{g} \cdot \text{Imposition}_{i,t_j}^{g}$. Here, the effect of the imposition of provisional duties on import values during the investigation period is measured by $\beta_2 + \beta_3$, where $\text{Imposition}_{i,t_j}^{g}$ is a dummy variable that takes the value of 1 for the observation if there is a provisional duty imposed for case i at time t_j (t = 1,2…,T months following initiation) and 0 otherwise for country group g. Furthermore, HS_i^{g} is the logarithm ofthe number of HS codes that are covered by investigation in case i.[13]

We attempt to fit a regression to the pooled data from all 46 cases in which the year of

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dumped imports.

[11] The use of the logarithm of the average monthly import values for case i between the year prior to initiation and the initiation year does not change the estimation results.

[12] Recall that within 3 months of the date of initiation, the KTC must complete the preliminary determination of the investigation and prepare provisional measures. If the KTC makes an affirmative determination about an injury to the domestic industry, it must recommend that the MOEF impose a provisional anti-dumping duty equivalent to the investigated dumping margin. The size of theprovisional duty is calculated by using the weighted average for each case i in which the weights are constructed to be proportional to each named country's import share.

[13] The correlation between the variables employed in the empirical analysis is measured using Pearson correlation coefficients, and the estimated coefficients for the number of countries in case i and the number of HS codes that are subject to investigation in case i are statistically significant. As there are no inarguable tests of whether multicollinearity is a problem, a robustness test is conducted. Dropping a variable—either the number of countries in case i or the number of HS codes that are subject to investigation in case i—does not completely reverse the estimates of the effects. Thus, we proceed with the chosen variables.

initiation varies between 1995 and 2013. The model specifications are compared, and the estimation results are presented in Table 6 for (1) named countries, (2) unnamed countries, and (3) countries overall.[14] Sector dummies are included in equation (1).[15] Year dummies are dropped from our estimation.[16]

In column (1) of Table 6, the coefficient of interest, $\text{Ln}(provduty)_{i,t_j}^g$, is not statistically significant. Interestingly, the point estimate of the interaction effect of $\text{Ln}(provduty)_{i,t_j}^g$ and its imposition dummy variable, $\text{Imposition}_{i,t_j}^g$, is negative (-0.1164) and statistically significant. This finding indicates that imports in the investigation period from named countries decrease when a provisional duty is imposed. This negative sign on the imposition of a provisional duty on named countries' imports is expected, since an imposed provisional duty would raise consumer prices in the Korean market, reducing demand for imports from named countries.

Based on the estimates in column (2) of Table 6, the estimated effect of the size of a provisional duty for imports from unnamed countries is negative and statistically significant at the 10% level. Here, the effect of the size of provisional duties on imports for unnamed countries is estimated at -0.1276. We find weak evidence indicating that the lower the provisional duties, the greater the import diversion from named countries to unnamed countries, specifically during the investigation period. The estimated effect is measured as -0.0737 (-0.0737 = -0.1276 + 0.0539) for cases in which a provisional duty is imposed. The coefficient on the interaction term is positive and statistically significant at the 10% level, which indicates that the negative impact of the size of a provisional duty on imports from unnamed countries is smaller for cases in which a provisional duty is imposed in the investigation period. In column (3), the estimate of the interaction effect of $\text{Ln}(provduty)_{i,t_j}^g$ with its imposition dummy variable $\text{Imposition}_{i,t_j}^g$ is negative (-0.0659) and statistically significant, which indicates a reduction in overall imports in the investigation period.

Another consideration in the estimation of the provisional anti-dumping duty in the period of investigation is the number of HS codes that are subject to the investigation. The coefficients of HS_i^g are positive and significant under specifications (2)–(3) at the 5% level, while the coefficient of HS_i^g under specification (1) is negative and statistically insignificant. The point estimate results suggest that the more HS codes covered by the anti-dumping investigation, the higher the amount of imports from unnamed countries. This finding

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[14] The reviewers raise a multicollinearity concern for the empirical specification of the model in equation (1). The $\text{Ln}(provduty)_{i,t_j}^g$ variable is interacted with imposition of the provisional anti-dumping duty dummy variable to observe whether there are differing duty effects by imposition of a provisional anti-dumping duty. Similar to the U.S. anti-dumping process described in Prusa (1996), the provisional anti-dumping duty level is estimated by the KTC while the MOEF can institute a provisional anti-dumping measure. Article 53 of the Customs Act of Korea stipulates that there are three situations in which the MOEF can order such a measure: (1) when an investigation has already begun in order to determine whether to impose anti-dumping duties or not; (2) where there is sufficient evidence to presume that both dumping and material injury exist; and (3) to prevent any injury that could arise during the investigation period. The KTC decides whether to initiate an investigation, make an affirmative determination, and recommend the imposition of any provisional measures. For robustness, a regression model without the interacted variable is estimated. The estimation results are presented in the Appendix.

[15] A test of the hypothesis that the dummy variables have no collective influence on the dependent variable at the 5% significance level is conducted for sector dummy variables. The F-statistics and p-values associated with the test of overall significance indicate that the sector dummy variables are collectively significant.

[16] A test of joint significance for year dummy variables fails to reject the hypothesis that these independent variables have no collective influence on the dependent variable at the 5% significance level .

indicates that import diversion to unnamed countries increases the number of HS codes that are covered by the investigation for cases that resulted in affirmative final measures.

In summary, during the investigation period, provisional duties appear to substantially reduce imports from named countries only when the case resulted in the imposition of provisional duties. Although the imposition of provisional duties during the investigations leads to import diversion from named countries to unnamed countries, overall imports nevertheless decrease in cases in which a provisional duty is imposed. Thus, we can infer that a reduction in imports from named countries outweighs the increase in imports from unnamed countries, suggesting that import trade diversion in cases with imposed provisional duties is *limited* during investigations.

Table 6. Regression Results from Pooled Models

Variable	(1) Import values from named countries	(2) Import values from unnamed countries	(3) Overall import values
Dependent variable: $\text{Ln(import)}_{i,t_j}$			
$\text{Ln(import)}_{i,t_0-1}$	0.8381***	0.7206***	0.8641***
	(0.0481)	(0.0400)	(0.0466)
$\text{Ln}(provduty)_{i,t_j}$	-0.0205	-0.1276*	0.0536
	(0.0695)	(0.0725)	(0.0556)
$\text{Ln(provduty)}_{i,t_j} \cdot \text{Imposition}_{i,t_j}$	-0.1164***	0.0539*	-0.0659***
	(0.0303)	(0.0306)	0.0230
HS_i	-0.0181	0.1376***	0.0513**
	(0.0366)	(0.0252)	(0.0216)
Constant	1.5753***	2.7249***	1.1420**
	(0.5087)	(0.4574)	(0.5059)
KSIC sector dummies	Yes	Yes	Yes
No. observations	471	481	489
Adj. R-sq	0.7648	0.8235	0.8619

Notes: 1. For all model specifications, we attempt to fit a regression to the pooled data from all 46 cases in which the year of initiation falls anywhere between 1995 and 2013. After 2008, in the cases that resulted in affirmative final measures, the KTC did not impose provisional anti-dumping duties on dumped imports.
2. Robust standard errors in parentheses.
3. Significance levels: *$p<0.1$, **$p<0.05$, ***$p<0.01$.

3.2. Does the Imposition of a Provisional Duty Determine the Diversion Pattern?

As discussed in Subsection 3.1, we confirm that the restricted effect of imports from named countries induced by the imposition of provisional anti-dumping duties is large enough to offset increased imports from unnamed countries, and hence, there is a chilling effect on overall imports to the Korean market. However, the separable effects for each stage of the anti-dumping investigation period are ambiguous. Thus, we present a model specification to illustrate a stage-by-stage analysis using monthly data to disentangle separate trade effects for

each phase of the anti-dumping investigation process and imposition of provisional duty.

Following Prusa (1996), we present the econometric model for cases in which *provisional* anti-dumping duties were imposed by Korea. We observe import values for anti-dumping investigation case *i* identified with six-digit HS codes for which there are accusations of dumping for each product in month $t = 1,..,$ T during the investigation period. *g* denotes the country group, that is, named, unnamed, and overall. The error term ε is assumed to be *i.i.d*. We assume the following log-log relationship:

$$\text{Ln(import)}^g_{i,t_j} = \beta_0 + \beta_1 \text{Ln}(import)^g_{i,t_{0-1}} + \beta_2 \text{Ln}(provduty)^g_{i,t_j}$$
$$+\beta_3 \text{prelim}_{to_{provduty}}{}^g_{i,t_j} + \beta_4 \text{provduty}_{to_{finaldecision}}{}^g_{i,t_j}$$
$$+\beta_5 \text{finaldecision\_to\_finalimposed}^g_{i,t_j} + \beta_6 \text{HS}^g_i + \varepsilon^g_{i,t_j} \qquad (2)$$

where $\text{Ln(import)}^g_{i,t_j}$ is the logarithm of import values for case *i* at time t_j (t=1,2…,T months following initiation) for country group *g*; $\text{Ln(import)}^g_{i,t_{0-1}}$ is the logarithm of import values for case *i* in the year prior to initiation, t0-1, for country group *g*; and $\text{Ln}(provduty)^g_{i,t_j}$ is the logarithm of the size of the provisional duty for case *i* at time t_j(t=1,2…,T months following initiation) for country group *g*.[17] $\text{prelim\_to\_provduty}^g_{i,t_j}$ is a dummy variable that takes the value of 1 for the stage of *preliminary decision* to *provisional measure* for case *i* at time t_j (t=1,2…,T months following initiation) and 0 otherwise for country group *g*. $\text{provduty\_to\_finaldecision}^g_{i,t_j}$ is a dummy variable that takes the value of 1 for the stage of *provisional measure* to *affirmative AD decision* for case *i* at time t_j (t=1,2…,T months following initiation) and 0 otherwise for country group *g*. $\text{finaldecision\_to\_finalimposed}^g_{i,t_j}$ is a dummy variable that takes the value of 1 for the stage of *affirmative AD decision* to *affirmative AD measure imposed* for case *i* at time t_j (t=1,2…,T months following initiation) and 0 otherwise for country group *g*. Furthermore, HS^g_i is the logarithm of the number of HS codes that are covered by investigation in case *i*.[18]

We attempt to fit a regression to the data from 23 cases in which provisional duties were imposed, in which the year of initiation varies between 1995 and 2013. The estimates of the three models of provisional anti-dumping duty effects are presented in Table 7 for (1) named countries, (2) unnamed countries, and (3) overall. Sector dummies are included in equation (1).[19] Year dummies are dropped from our estimation.[20]

In column (1) of Table 7, the estimated coefficient for the size of the provisional duty is positive and statistically significant at the 10% level for imports from named countries. Thus, we can infer that imports from named countries increase for cases with high duties in the investigation period. The separable stage effects are negative, and in particular, the stage dummy variables following the imposition of provisional duties are statistically significant. The coefficients for both $\text{provduty\_to\_finaldecision}_{i,t_j}$ and $\text{finaldecision\_to\_finalimposed}_{i,t_j}$ are negative and statistically significant at the 5% level, indicating that imports from named countries decrease once provisional duties are imposed. From the comparison of the magnitude of these coefficients, one possible inference is that imports from named countries sharply decrease right after a provisional duty is imposed during the stage of *provisional*

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[17] The estimation results using the maximum size of the provisional duty for each case *i* are available upon request from the author.

[18] See footnote 13.

[19] See footnote 15.

[20] See footnote 16.

measure to *affirmative AD decision*. This negative impact of the imposition of a provisional duty on imports from named countries lasts until the next stage of *affirmative AD decision* to *affirmative AD measure imposed*.

In column (2) of Table 7, the coefficient of the size of provisional duties for imports from unnamed countries during the investigation is estimated to have a negative sign and to be statistically significant at the 5% level. We find that in the investigation period, a provisional duty is positively related to imports from named countries but negatively related to imports from unnamed countries for the cases in which a provisional duty is imposed. This finding indicates that the higher the provisional duty, the lower the import diversion from named countries to unnamed countries, specifically in the investigation period. The separable stage effects are less robust for unnamed countries. The last-stage dummy variable during the investigation, $finaldecision\_to\_finalimposed_{i,t_j}$, has an expected positive sign and is statistically significant at the 5% level, indicating the presence of import diversion from named countries to unnamed countries at the stage of *affirmative AD decision* to *affirmative AD measure imposed*. This positive impact of the imposition of a provisional duty on imports from unnamed countries lasts for a shorter time than that for named countries.

Table 7. Regression Results from Cases in Which Provisional Duties Were Imposed

Variable	(1) Import values from named countries	(2) Import values from unnamed countries	(3) Overall import values
Dependent variable: $Ln(import)_{i,t_j}$			
$Ln(import)_{i,t_{0-1}}$	0.5668***	0.6685***	0.7596***
	(0.0954)	(0.0490)	(0.0667)
$Lnprovduty_{i,tj}$	0.3091*	-0.4441**	-0.2961***
	(0.1592)	(0.1740)	(0.1049)
$prelim\_to\_provduty_{i,tj}$	-0.0189	-0.0653	-0.1279
	(0.1737)	(0.1911)	(0.1689)
$provduty\_to\_finaldecision_{i,t_j}$	-0.5629***	0.1138	-0.2787***
	(0.1158)	(0.1314)	(0.0906)
$finaldecision\_to\_finalimposed_{i,t_j}$	-0.4239**	0.4868***	-0.2062
	(0.1788)	(0.1765)	(0.1346)
HS_i	-0.1551	0.0472	0.0866
	(0.1055)	(0.1168)	(0.0902)
Constant	2.0025***	3.8743***	2.7893***
	(0.7100)	(0.8529)	(0.7103)
KSIC sector dummies	Yes	Yes	Yes
No. observations	218	225	233
Adj. R-sq	0.6597	0.8123	0.7852

Notes: 1. For all three models, we attempt to fit a regression to the data from 23 cases with provisional duties imposed in which the year of initiation falls anywhere between 1995 and 2013.
2. Robust standard errors in parentheses.
3. Significance levels: *$p<0.1$, **$p<0.05$, ***$p<0.01$.

In column (3) of Table 7, the coefficient of the size effect of provisional duties on overall imports during the investigation is estimated to have a negative sign and to be statistically significant at the 5% level, which indicates that overall imports decrease with higher duties. Surprisingly, the separable stage effects for overall imports are all negative, and in particular, the dummy variable for the stage following the imposition of a provisional duty, provduty_to_finaldecision$_{i,t_j}$, is statistically significant at the 5% level, indicating a chilling effect on aggregate imports. For cases in which provisional duties are imposed, the reduction in imports from named countries outweighs the increase in imports from unnamed countries, suggesting that import diversion in the investigation period is *limited* during the stage of *provisional measure* to *affirmative AD decision*. In other words, the substantial reduction in imports from named countries is large enough to offset most of the import diversion to unnamed countries; thus, overall imports decrease immediately after a provisional duty is imposed during the stage of *provisional measure* to *affirmative AD decision*.

4. Conclusion

This study analyzes the effects on anti-dumping investigations on trade between 1995 and 2013 to determine whether aggregate imports can be affected by anti-dumping policy. We construct a panel of monthly data for each stage of anti-dumping investigation undertaken by Korea on manufactured products.

First, we show that the imposition of provisional anti-dumping duties reduces imports from named countries. The substantial reduction in imports from named countries is large enough to offset the import diversion to unnamed countries.

Our empirical evidence indicates that for cases in which provisional duties are imposed, the reduction in imports from named countries outweighs the increase in imports from unnamed countries. Therefore, overall imports to the Korean market decrease. Import trade is restrained by more cases resulting in provisional duties imposed.

Second, we examine how the imposition of a provisional duty might determine the diversion pattern during investigations. To disentangle separate trade effects for each phase of the anti-dumping investigation process and imposition of provisional duty, we present a model specification to illustrate a stage-by-stage analysis using monthly data. The results suggest that the amount of import diversion from named to unnamed countries is less significant right after the imposition of a provisional anti-dumping duty equivalent to the investigated dumping margin, indicating that import diversion in investigations is limited during the stage of *provisional* measure to *affirmative* AD decision. In summary, overall imports decrease immediately after a provisional duty is imposed. In other words, imposed provisional duties were effectively used to restrict imports during the investigation period.

This study concludes by providing implications for regulatory anti-dumping policy and practice. The anti-dumping duties system plays an important role in protecting domestic industries from dumped imports amid rapid market opening and trade liberalization. The abuse of anti-dumping measures is increasing owing to the obscurity of the current international anti-dumping norm, which has been the basis for the anti-dumping system in major fields, such as the determination of dumping acts and damages, initiation and carrying out of investigations, calculation of dumping margins, and setting deadlines for anti-dumping duties. Therefore, it is necessary to emphasize that the characteristics of the national system should be well understood as a basis for how export companies should respond.

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Appendix

Table A. Robustness Check: Regression Results from Pooled Models

Variable	(1) Import values from named countries	(2) Import values from unnamed countries	(3) Overall import values
Dependent variable: Ln(import)$_{i,t_j}$			
Ln(import)$_{i,t_{0-1}}$	0.837***	0.721***	0.864***
	(0.048)	(0.040)	(0.047)
Ln($provduty$)$_{i,t_j}$	-0.037	-0.121*	0.0451
	(0.069)	(0.072)	(0.054)
Imposition$_{i,t_j}$	-0.399***	0.194*	-0.239***
	(0.105)	(0.111)	(0.078)
HS_i	-0.0182	0.138***	0.0503**
	(0.037)	(0.025)	(0.022)
Constant	1.629***	2.705***	1.164**
	(0.504)	(0.455)	(0.503)
KSIC sector dummies	Yes	Yes	Yes
No. observations	471	481	489
Adj. R-sq	0.764	0.824	0.862

Notes: 1. For all model specifications, we attempt to fit a regression to the pooled data from all 46 cases in which the year of initiation falls anywhere between 1995 and 2013. Since 2008, in the cases that resulted in affirmative final measures, the KTC has not imposed provisional anti-dumping duties on dumped imports.
2. Robust standard errors in parentheses.
3. Significance levels: *p<0.1, **p<0.05, ***p<0.01.