

AN ANALYSIS OF THE DECISION TO FILE, THE DUMPING ESTIMATES, AND THE OUTCOME OF ANTIDUMPING PETITIONS

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The goal of this article is to identify industries filing successful petitions in good times according to demand, capacity utilization, concentration, and import-penetration ratio under the U.S. antidumping procedures and using U.S. data. Good times means that the domestic industry is facing increasing consumption prior to filing. This article examines:

- (a) the relation between the dumping estimates and the conditions facing the petitioning industry prior to filing;*
- (b) the relation between the dumping estimates and the outcome of the petitions; and*
- (c) the factors affecting the probability of filing, the dumping estimates, and the probability of success of a petition.*

The decision to file and the probability of success of petitions are estimated using univariate probit and a bivariate probit model with sample selection. The dumping estimates are analyzed using a Tobit model. The primary metal products and the stone and concrete industries are also analyzed separately. The empirical analysis indicates that the import-penetration ratio, capacity utilization, and the

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dumping estimates by the Department of Commerce (DOC) are the significant factors in explaining the outcome of the petitions. The import penetration ratio, the concentration level, and the interaction of concentration and capacity utilization are the significant factors in explaining the decision to file. The analysis shows that in case of high-capacity utilization (proxy for high demand), less concentrated industries are more likely to file, but highly concentrated industries are more likely to receive protection. The results also show that the level of concentration of the petitioning industry, import-penetration, and the dumping estimates provided by the petitioning industries explain the dumping margins—estimated by the DOC as the basis for the antidumping duty. This suggests that the relief or protection that the petitioning industry receives may not entirely be based on technical standards.

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I. INTRODUCTION

Although the antidumping law has been part of U.S. commercial law since 1921, it has assumed increased importance and caused controversy in recent years. Once the General Agreement on Tariffs and Trade (GATT) succeeded in reducing the level of tariffs and import quotas among developed countries, it became increasingly difficult for politicians to use tariffs or quotas to protect industries without provoking their trading partners. Meanwhile, the antidumping law, which is included in GATT as Article VI is a convenient tool to address “unfair trade practices.” The law allows countries to impose duties on imports from a particular country or countries to protect a domestic industry without the risk of a trade war or violation of an international trade agreement. The controversy arises from the use and possible abuse of this law.

Countries are allowed to impose duties under the antidumping law if there is both evidence of injury to the domestic industry caused specifically by imports and those imports are being sold at less than fair value (LTFV). Under the U.S. antidumping law, which is very similar to the GATT antidumping code, a petition is successful if:

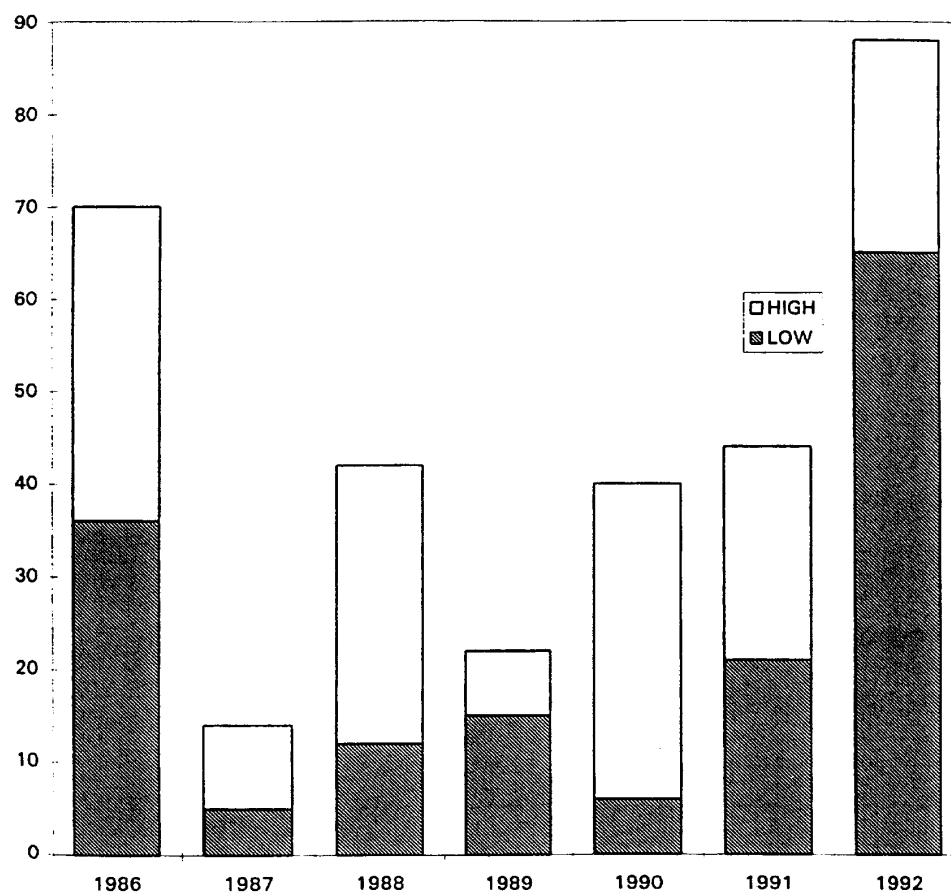
- (1) imports are sold at less than fair value (LTFV), which administratively involves comparing the import price and the price charged for the same product in the foreign market, and
- (2) those imports cause material injury to the domestic industry, which administratively involves examining several economic indicators such as capacity utilization, import penetration, profits, and consumption.¹

When material injury is found, a dumping duty equal to the difference between the foreign and domestic prices is levied. The decisions regarding the dumping margin and material injury are delegated to the Department of Commerce (DOC) and the International Trade Commission (ITC), respectively, and do not require presidential or congressional approval.

The conventional wisdom is that industries seek and receive protection when facing decreasing demand and increased imports, because this implies injury through the loss of market share, a decline in sales and profits, and the consequent loss of jobs, that is, industries seek trade protection in bad times. Classifying the antidumping petitions filed between 1986 and 1992 according to the demand condition of each petitioning industry prior to filing, Figure I indicates that half of the petitions were filed by industries facing increasing demand and half facing decreasing demand. Increasing demand means that the

¹Another U.S. antidumping criterion is where a foreign firm sells its products below cost.

Figure I
Antidumping Petitions Classified According to Consumption
Levels Prior to Filing



consumption for the product in question has increased in the year prior to filing (high demand case). Decreasing demand means that consumption of the product has declined in the year prior to filing (low demand case).² Information on consumption facing the petitioning industry is obtained from the ITC reports on individual petitions.

²Consumption is measured in terms of dollar sales.

This article presents an investigation of the decision to file, the dumping margins estimated by the DOC, and the final outcome of the antidumping petitions. The goal is to analyze the demand for protection via the antidumping law, and identify industries filing petitions in good times according to demand, capacity utilization, concentration, and import-penetration ratio (good times refer to industries facing increasing demand prior to filing). This study also examines the relation between the dumping margin and the conditions of the petitioning industries prior to filing, and the determinants of the supply of protection; that is, the final outcome of the antidumping petitions.

The decision to file a petition and the outcome are estimated separately using simple probit models, and then jointly using a bivariate probit with sample selection. The sample used to estimate the outcome of the petitions is censored, because only those industries that file petitions can receive protection. A joint estimation of the two equations accounts for the potential correlation between filing and the outcome of antidumping petitions; that is, the filing decision is based on expectations about the outcomes. Also, the dumping margins estimated by the DOC are analyzed using a tobit model to take into account the fact that a significant proportion of the industries in the sample have zero dumping estimates.

The primary products and the concrete industries are the ones who filed the largest number of petitions between 1986 and 1992—the period of time under investigation in this article. That is why the estimates for these two industries are presented separately.

Identifying the conditions under which industries file an antidumping petition is important both to policy makers and to researchers interested in the impact of the antidumping law. This law was designed to protect industries that are injured as a result of increased imports, but it does more than that in practice. For example, the U.S. producers of 3.5-inch microdisks filed an antidumping peti-

tion against Japanese producers in 1988. Although consumption of this product increased 500 percent between 1985 and 1987, the petition was successful, and the weighted dumping margin was 43 percent (ITC final report on the case of 3.5-inch microdisks, case # 731-TA-389, 1989). This example raises questions about how the material injury standard is applied and which factors affect the outcome of the petitions. In addition, it raises questions about the factors affecting the filing behavior of industries, and whether industries are using the law to restrict imports and make more profits when facing favorable economic conditions. An empirical analysis of the demand for antidumping protection helps answer these questions.

This article proceeds as follows: Section II describes briefly the process of investigating an antidumping petition in the United States. Section III reviews prior empirical research. Section IV presents the hypotheses and the framework for the empirical approach used in estimating the demand and supply of protection via the antidumping law. Section V describes the data, and Section VI presents the econometric model. Section VII presents the results, and Section VIII concludes.

II. ADMINISTRATION OF THE ANTIDUMPING LAW

Congress delegated the administration of the antidumping law to two agencies. The International Trade Administration (ITA), which is part of the DOC determines whether the imports in question are being dumped. The ITC determines whether imports are causing material injury to the competing U.S. industry. Each case goes through four stages: a preliminary determination by the ITC, a preliminary determination by the ITA, a final investigation by the DOC for dumping, and a final determination of material injury by the ITC.

The ITC is an independent, quasi-judicial agency responsible for determining whether there is material injury. Material injury is defined in the law as harm that is not inconsequential, immaterial, or unimpor-

tant (Jackson, 1989). In addition to this vague definition, the ITC is directed to investigate several economic and financial factors using data for three years prior to filing. These factors include consumption, capacity utilization, imports, employment, profits, and sales. It is not enough to show that the performance of the industry has been deteriorating. The ITC needs to show in its investigation that the alleged dumped imports are causing or are likely to cause material injury to the domestic industry.

The ITA is responsible for determining whether dumping occurred and assessing the dumping duty. To do so, the ITA compares the import price to the price of a similar product in the foreign market during the past six months. If the foreign firm does not produce enough for consumption in its own market, the ITA compares the import prices to the price the foreign firm charges in a third market. If the data are not available, the ITA constructs its own estimates of the cost of production, usually based on data provided by the petitioning industry.

Once a petition is filed, the DOC has 20 days to determine whether the petition is in order, and it dismisses petitions that do not satisfy the legal requirements (which is very rare). Within 45 days, the ITC must conclude its preliminary investigation of material injury and notify the DOC. If the result of the preliminary investigation by the ITC is negative, the case is dismissed. If the ITC preliminary investigation is positive, the case resumes its course unless the petitioner decides to suspend or withdraw the case. The ITC found injury in the preliminary investigation in 73 percent of the cases filed between 1980 and 1992.

Within 160 days of the initial filing of the petition, the ITA must determine whether there is dumping in a preliminary investigation. If the ITA preliminary investigation is negative, this does not terminate the case. The case continues to the next stage which is the final investigation by the ITA and the ITC. If the ITA preliminary investiga-

tion is positive, the importer is required to post cash or a bond to cover the estimated dumping duties pending the final investigations under the suspension of liquidation requirement.

At any time during the investigation, the petitioning industry may withdraw the petition without providing explanation or incurring additional cost. Also, a petition may be suspended if an agreement is reached between the disputing parties through the DOC. In a suspension agreement, the foreign producer agrees to reduce its imports or raise its prices to eliminate the dumping. These agreements are monitored by the DOC, and a case may be reopened if the DOC finds that the foreign producer is not complying.

Within 75 days of its initial investigation, the ITA must make a final decision. If it does not conclude that dumping has occurred, the case is terminated. The ITA found dumping in the final investigations in 93 percent of the cases between 1980 and 1992. The ITC must make its final decision within 45 days of the ITA final decision. If the ITC final determination does not find dumping, the case is terminated. The ITC found material injury in 66 percent of the cases filed between 1980 and 1992 (CBO study, 1994).

III. LITERATURE

The literature addresses the determinants and impacts of antidumping petitions. One central question investigated is the degree of discretion of the ITC decisions regarding material injury. There is no consensus in the literature on the factors affecting the outcome of the antidumping petitions. Hansen (1990) analyzed the factors affecting the demand for and supply of trade protection for U.S. industries from 1974 to 1984 using a nested logit model. In a careful study of nontariff barriers (this includes antidumping and escape clause petitions), Hansen concluded that trade protection is subject to domestic forces similar to those affecting other regulatory policy areas.

Goldstein and Lenway (1989) tested the hypothesis that Congress and constituent interests affect ITC decisions (see also Goldstein 1993). They used logit analysis to examine congressional influence on ITC decisions concerning escape clauses for the period 1960–1984. Only the coefficients on capacity utilization and profits are statistically significant and have the expected signs. They concluded that the ITC is not directly influenced by political forces.

Moore (1992) investigated the decisions of ITC commissioners regarding antidumping petitions to test whether the ITC decisions are immune to political influences. He found that a decline in production and an increase in the level of imports are significant factors in affirmative findings of injury. He also concluded that industries with plants in the states of the Senate trade subcommittee members are more likely to receive an affirmative finding in the final determination. This last result should be treated with caution as the author notes that industries in the districts of members of the House trade subcommittee are more likely to get a negative finding.

Finger, Hall, and Nelson (1982) examined the hypothesis that the less-than-fair-value (LFV) mechanism (the antidumping law) demonstrates the characteristics of a technical track, while the escape clause mechanism is a more political track. The antidumping petition requires both the finding of injury and less than fair value pricing (dumping), whereas escape clause petitions require only the finding of injury. For the LFV pricing determination, none of the political variables is significant, while the technical factors are significant and have the expected sign.

Anderson (1993) compared models of ITC decision making based on agency discretion with models based on statutory requirements. None of the political factors he considered is significant in explaining the probability of an affirmative finding. The author concluded that statutory requirements appear to be the primary force underlying the

ITC decisions, because the statutory model performed better in terms of the percentage of correct predictions.

Another empirical question is the effect of the antidumping law on the volume of trade. Staiger and Wolak (1994b) estimated the trade impact of U.S. antidumping law and the determinants of petition filing between 1980–1985. They found evidence of trade restrictions associated with the investigation suspension effects and little evidence related to cases in which the petition is simply withdrawn before a final determination.³

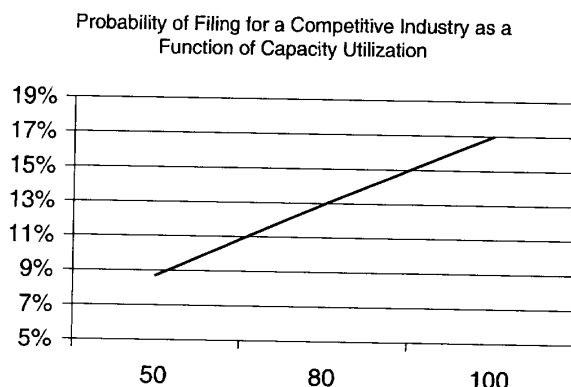
IV. EMPIRICAL ANALYSIS

What determines an industry's decision to file an antidumping petition? What factors affect the dumping margin estimated by the DOC and the final outcome of the petition by the ITC? The following empirical analysis presents estimates of the factors affecting the decision to file antidumping petitions, the dumping margin, and the probability of receiving protection.

First, consider the decision to file an antidumping petition. A domestic industry may file a petition in response to an increase in the level of imports sold at prices lower than the price charged in the foreign market. But, an industry may file to gain a larger market share and increase its profits by restricting imports. This article identifies the motives behind the decision to file an antidumping petition. The conventional wisdom implies that firms seek protection when facing declining demand. The reason is that the decline in demand (consumption) means lower sales and profits and possibly loss of jobs. However, data on antidumping petitions filed between 1986 and 1992

³At any point after the DOC's preliminary determination, the investigation may be terminated by the petitioner or may be suspended by the DOC. Suspension occurs if the foreign firms subject to the dumping petition reach an agreement with the DOC to eliminate LTFV sales to the United States or cease exporting.

Figure II
Probability of Filing Is Calculated for an Industry with $HHI = 600$,
Import Ratio = 50 Percent, and Change of Capacity Utilization = 0.



tell a different story. If we classify the antidumping petitions according to the demand facing the petitioning industries, as in Figure II, the data show that there are as many petitions filed in the case of increasing demand as there are when demand is decreasing.⁴ An industry may find the option to restrict imports appealing, if it has an ability to affect market prices.

One key element in the decision to file has to do with the level of concentration of the domestic industry—the domestic market structure. Consider the extreme case of a monopolist. A monopolist would file a petition to restrict imports regardless of whether he or she is facing increasing demand for his or her products(s) or not. In this case, any entrant to the market is taking away from the monopolist's supracompetitive profits, and his or her ability to set high prices. In general, a highly concentrated industry has an incentive to file a petition and restrict imports, as the success of the petition translates into an even bigger market share and more profits. In other words, an

⁴The term good times is used to refer to the case when an industry faces increasing demand in the year prior to filing. The term bad times is used to refer to the case when an industry is facing decreasing demand in the year prior to filing.

industry in which firms have the ability to set prices and reduce output is an industry that is more likely to file an antidumping petition.

Does this mean that only highly concentrated industries would file antidumping petitions? The answer is no, as there are other factors that determine the filing decision and some of these factors interact with the level of concentration of the industries. A low-concentration industry may also file, only if it is facing high demand and high-capacity utilization. If capacity is constrained, the domestic industry stands to gain from restricting imports relative to the case when there is excess capacity and low demand. Implicit in this argument is the assumption that high-concentration industries have more control over setting prices than low-concentration industries.

Think of the antidumping law as a costly option that may be used by the domestic industry to reduce imports. The question is, what are the economic conditions and the market structure that would be conducive to filing a petition? The first hypothesis is that *highly concentrated industries are more likely to file. But, less-concentrated industries will also file, but only when facing high consumption (demand)*. The intuition is that an industry consisting of many firms with small market share and little control over prices would not be as willing to incur the cost of filing a petition unless demand for its products is increasing and/or it is capacity-constrained. In the case of excess capacity, competition will drive prices down to marginal cost. Under the assumption of constant marginal costs, restricting imports does not increase profits. When capacity-constrained, even a perfectly competitive industry has an incentive to restrict imports and benefit from higher prices and profits. This hypothesis suggests that there is a strong association between the level of concentration of the domestic industry, demand, and the decision to file an antidumping petition.

To test this hypothesis, concentration (predicted sign is positive), the change in capacity utilization prior to filing (predicted sign is negative), and an interaction term of capacity utilization and a dummy variable for low-concentration industries (predicted sign is positive)

are included as explanatory variables of the decision to file. Low-concentration industries are defined in the sample as industries with a concentration level below the median.

The second hypothesis is that *an industry anticipates the factors affecting the ITC decision and incorporates these factors in its decision to file*. The ITC analyzes a plethora of economic and financial data on each antidumping case trying to determine whether imports are causing injury to the domestic industry.

The economic variables used in earlier studies include imports, market share, profits, and capacity utilization (see Goldstein and Lenway, 1989; Hansen, 1990; Moore, 1992). The null hypothesis is that a high import-penetration ratio, low profits, and low capacity utilization increase the probability of success of a petition. The economic variables used in this study are the import-penetration ratio (predicted sign is positive), the percentage change in demand (predicted sign is negative), and the percentage change in capacity utilization (predicted sign is negative).

The third hypothesis relates to the determination of the dumping margin estimated by the DOC. The dumping margin is determined as the difference between the prices charged in the foreign and domestic markets for the same product. *The null hypothesis is that the DOC bases its calculation of the dumping margin on the statutory requirements*. The variables used to test this hypothesis are the dumping margin estimated by the industry (predicted sign is zero), concentration (predicted sign is zero), capacity utilization (predicted sign is zero), and the percentage change in demand (predicted sign is negative). If the DOC bases its decision entirely on the statutory requirements, then only the change in demand would be significant. The null hypothesis is that the lower the change in demand facing the petitioning industry, the greater the difference between the domestic and lower prices, and hence the higher the dumping margin.

The final hypothesis is *whether the size of the petitioning industry affects the outcome of the petitions (the supply of protection)*. The

variables used to account for the size of the petitioning industry are employment, coverage, and concentration. The size of the industry is used as a proxy for the ability of the industry to exert pressure on the ITC and affect the final outcome of the petition. These variable are similar to the ones used by Hansen (1990) and Moore (1992), except for coverage.

Coverage refers to the number of states in which the petitioning industry operates. The larger the number of states where the petitioning industry operates, the more likely that the petition will receive attention from politicians representing these states, and the higher the probability of success of the petition. This variable is referred to as coverage. The intuition is that the broader the coverage of legislative districts in which the industry operates, the greater the political pressure. The broader the coverage, the more likely a petition is to be accepted. This hypothesis predicts that less-concentrated industries have greater influence than more concentrated ones.

On the other hand, Olson's theory of collective action predicts that the more concentrated the industry is, the lower the cost of organizing, and hence the greater the political pressure it generates to receive protection.

V. DATA

Table I presents summary statistics for the data. Data on all industries are collected for 360 industries at the four-digit Standard Industrial Code (SIC) level for the period 1986 to 1992. Additional data on the petitioning industries are collected from the published ITC reports on each antidumping case. The explanatory variables are employment, concentration ratio, capacity utilization, and import-penetration ratio.

Some variables are only available for industries that file. These are the dumping margin estimated by the DOC and the dumping estimate by the industry. These variables are not observed unless a petition is

Table I

Descriptive Statistics Based on the Entire Sample N = 2664, T = 1986-1992			
Variables	Mean	Median	Std. Dev.
Filing	0.0698	0	0.2548
Employment	299.32	28.7	2017.2
Concentration	721.68	501	659.53
Capacity utilization	78.28	80	10.7
Change in capacity utilization	0.0143	0	0.1568
Import-penetration ratio	16.33	12	17.5
1/number of firms	0.0094	0.004	0.0185
Descriptive Statistics Based on the Petitioning Industries Only N = 186, T = 1986-1992			
Variables	Mean	Median	Std. Dev.
Outcome	0.4838	0	0.501
Employment	521.15	50.3	1629.7
Concentration	622.01	549	458.05
Capacity utilization	80.925	82	9.07
Change in capacity utilization	0.0062	0	0.0806
Import-penetration ratio	20.118	14	17.086
1/number of firms	0.0061		0.0000637
Dumping margin estimated by the DOC	30.37	26	35.37
Dumping estimate by the petitioning industries	102.7	49	179.92
Change in demand	0.04	0	0.24
Coverage	7.02	8	3.42

filed. In addition, the rate of change in demand and the number of states in which the industry operates are available only for industries that filed.

In the econometric analysis, the data are pooled across industries and over time. There are instances in which the industry files more than once in the same year. For example, suppose that industry *i* files twice in the same year against Japanese and German producers of a certain product. The ITC would consider the total imports from all the foreign importers in making its decision, as well as the separate import-penetration ratios from each foreign producer. However, it is

not uncommon for the ITC to find dumping from, say, the German but not the Japanese producers. An industry would then file one petition against several countries, and receive different findings for different foreign producers. Each petition against a foreign producer would receive a different dumping estimate by the DOC, a different dumping estimate by the industry, and a separate finding by the ITC. Petitions filed against multiple foreign producers are thus treated as separate cases.

The total number of petitions is 2664. The number of industries is not equal for each year, as some industries appear more than once for the same year.

Table I shows that the average filing rate is about 7 percent. One factor that helps explain the low percentage of industries that file is that there are certain industries like the textile industry that are protected by import quotas and thus do not use the antidumping law.

The rate of success of the petitions filed in the sample is 48 percent. Note that the average number of employees for industries that file (mean is 521,000) is higher than that for the entire sample (mean is 299,000) and the difference is statistically significant. Also, the average import-penetration ratio and the number of firms for petitioning industries are higher than the entire sample, and the differences are statistically significant.

Note that the average dumping margin determined by the DOC (mean 30%) is much lower than the dumping estimate given by the industry (mean 103%). Between 1980 and 1992, the ITC preliminary investigation resulted in approval of 73 percent of the cases, while its final investigations found injury in only 63 percent of the cases (CBO, 1994). By the time the petitions reached the final stage, the foreign producers would have had ample time to respond and provide their own data.

The decision to file, the dumping margin estimated by the DOC, and the outcome of the petitions are the dependent variables. Because the ITC makes the final decision after the DOC determines the

dumping margin, only petitions accepted by both the ITC and the DOC are considered successful. A negative final decision by the DOC or the ITC results in the termination of the investigation.

Table II shows the outcome of the 320 petitions filed between 1986 and 1992. About half the petitions filed received protection, 5 percent of the petitions are withdrawn, and 1 percent were suspended. Data on all the petitions filed are not available. The petitioning industries sometimes request that information not be released regarding the performance of the industry, and this caused cases to be

Table II
Summary of Antidumping Petitions 1970-1992

Antidumping Petitions 1970-1992			
Year	Total	Average	% of Successful Petitions
1970-1978	206	22.9	31
1970-1974	112	22.4	42
1975-1979	94	23.5	18
1980-1985	300	50	27
1986-1992	320	46	54

Sources: 1970-78, Prussa (1988)

1980-1992, data collected by the author from the ITC annual reports.

Details of the Outcome of the Petitions for the Period 1986-1992

Year	Petitions	Preliminary	Affirmative	Withdrawn	Suspended
1986	70	53	35	9	0
1987	14	12	8	0	1
1988	42	38	18	0	0
1989	22	17	14	3	0
1990	40	27	17	2	0
1991	44	25	19	3	2
1992	88	80	62	0	0
Total	320	252	173	17	3
% of Total		78.8%	68.7%	9.8%	17.6%

Source: ITC annual reports.

Table III
Filing Classified According to Industries

2-digit SIC Code	Industry	# of Petitions	# of Successful Petitions	Mean Dumping Margin by the DOC	Mean Dumping Estimate by the Industry
33	Primary metal products	60	33	36	71
32	Stone & concrete products	44	13	27	53
35	Machinery	14	13	43	115
26	Paper & allied products	9	0	45	71

Source: ITC annual reports for the years 1986–1992.

eliminated from the data set. In addition, there is no information available on any of the withdrawn or suspended petitions. A complete data set is available for 186 of the 320 petitions. This problem is common in prior empirical research (see Moore, 1992).

Table III presents a summary of the industries that filed the largest number of petitions in the sample classified according to the two-digit SIC code, which is more general than the four-digit SIC classification. At the top of the list are the producers of primary metal products. These industries filed 60 petitions between 1986 and 1992. Most of these petitions were filed in 1992 by the steel industry. Next is the stone and concrete products industry which filed 43 petitions, 13 of which were successful. The paper and allied products industries filed nine petitions and none was successful.

The data source for employment is the Department of Labor's "Trade and Employment" reports. The data source for capacity utilization is the Department of Commerce's "Survey of Plant Capacity" reports. The data source for the import-penetration ratio is the Department of Commerce's "U.S. Commodity Exports and Imports as Related to Output" reports. The Herfindahl-Hirschmann Index (HHI) is used to measure concentration, and the concentration ratio is reported by the Bureau of the Census. The data sources for information on the petitioning industries and the decisions made by the ITC and

the DOC are the reports published by the ITC on each antidumping investigation.⁵ The data in these reports are recorded according to the Tariff Schedule of the United States (TSUS), while data reported by the Bureau of the Census and the DOC are according to the four-digit SIC codes. Conversion tables provided by the U.S. Foreign Trade Statistics (1980) were used to match the two sources of data.⁶

VI. ESTIMATION

The Decision to File

The decision to file is first estimated using a simple probit. The probit model is specified as follows:

$$y_{if}^* = \beta'_s X_{if} + \epsilon_{if}$$

$$y_{if} = 1 \text{ if } y_{if}^* \geq 0,$$

$$y_{if} = 0 \text{ if } y_{if}^* < 0.$$

$$\epsilon_{if} \sim N(0, 1)$$

$\text{prob}(y_f = 1) = \Phi(\beta'_f X_{if})$, where y_{if} is an indicator that takes the value one if an industry files and zero otherwise (in the case of estimating the outcome of the petitions, y_{is} would take the value one if a petition is successful and zero otherwise). X is a vector of exogenous variables that affect the decision to file. The variable y_{if}^* represents the unobservable decision standard used by the petitioning industry, and β_f is a vector of coefficients.

⁵The ITC reports on individual petitions are obtained using the Lexis-Nexis search tool.

⁶The author contacted the Bureau of Census to inquire about more recent conversion tables, but the bureau no longer publishes these tables. The description of the types of activities associated with the codes was used to help match the TSUS and the SIC codes.

Table IV
The Decision to File

Probit Estimates	Number of Observations = 2664		
	Chi ² (4) = 40.51		
Log likelihood = -654.19			
The dependent variable is a dummy that takes the value 1 if an industry files			
	Coefficient	dF/ dx	z
Concentration	0.000265	0.00003	2.735
Capacity utilization times dummy for less concentrated	0.00844	0.001	5.017
Import-penetration ratio	0.0056	0.00071	2.864
Change in capacity utilization	-0.0163	-0.021	-0.596
Constant	-2.22		-13.72

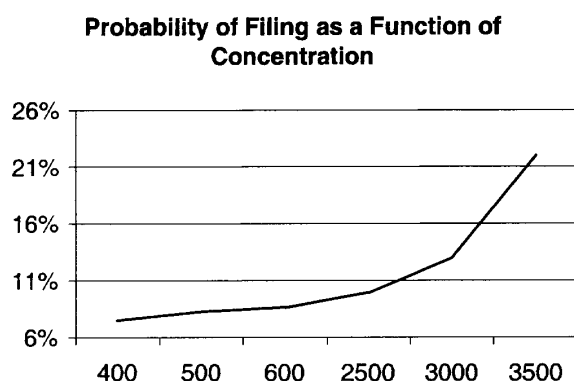
Predicted probability of filing = 6 percent evaluated at the average.

Each petitioning industry compares the benefits of filing a petition and gaining protection from imports to the cost of filing a petition, and decides to file if the benefits exceed the cost. The parameters of the industry's decision are not observed. All we can observe is whether an industry files or not.

The filing decision depends on industry characteristics that are also used by the ITC to determine the outcome of the petitions. The vector X_{if} includes the import-penetration ratio, the percentage change in capacity utilization, the concentration ratio, an interaction term of the capacity utilization, and a dummy that takes the value one if it is a low-concentration industry. The dummy takes the value one if concentration is below the median.

Table IV presents the results of the probit estimation. The import-penetration ratio, capacity utilization, and the interaction term of capacity utilization and concentration are the statistically significant factors in the decision to file. This means the higher the import-penetration ratio, the more likely an industry will file. More concentrated industries are more likely to file a petition. The intuition is that more concentrated industries are more likely to affect prices, and

Figure III
HHI Is Measured on the X-Axis. The Probability of Filing Is
Calculated Assuming that Import Ratio is 50 Percent and The
Change in Capacity Utilization Is 0.



hence have economic incentives to file more often than less-concentrated industries.

In the case of less-concentrated industries, the higher the capacity utilization, the more likely the industry will file. To illustrate this result, the probability of filing $\frac{dP}{dX_i}$ is estimated by evaluating $\Phi(X\beta)$ for industries with low concentration, and multiplying it by the β coefficients. Figure II shows that the probability of filing for a competitive industry is increasing in capacity utilization. In addition, a less-concentrated industry ($HHI = 400$) facing a 50-percent import-penetration ratio would file with probability 7.9 percent, if its capacity utilization is 50, but would file with probability 16 percent, if its capacity utilization increased to 100. The probability of filing doubles as the capacity utilization of low-concentration industry doubles.

Figure III shows the probability of filing is an increasing function of the level of concentration of the domestic industry. The probability of filing is calculated under the assumption that the import ratio is 50, and the change in capacity utilization is zero. As the import-penetration ratio increases, the probability of filing shifts up, indicating a higher probability of filing at each level of concentration.

A highly concentrated industry ($\text{HHI} = 3000$) facing an import-penetration ratio of 50 percent would file with probability 12 percent, while the probability of filing reduces 6 percent for an industry facing the same import ratio but a lower concentration ($\text{HHI} = 1500$). Also, a highly concentrated industry ($\text{HHI} = 3000$) facing an import-penetration ratio of 50 percent would file with probability 31 percent if facing decreasing capacity utilization, but file with probability 7 percent if capacity utilization is increasing.

The Outcome of the Petitions

According to the antidumping law, the ITC determines material injury based on information about the condition of the petitioning industry. To determine whether imports caused material injury to the domestic industry, the ITC examines the import-penetration ratio and the dumping margin estimated by the DOC. In addition, the ITC examines other measures of the performance of the industry, such as profits and capacity utilization. If the ITC decides that these indicators exceed a certain level, a petition is successful and a dumping duty is levied.

The probit model is estimated as follows:

$$y_{is}^* = \beta_s' X_{is} + \epsilon_{is}$$

$$y_{is} = 1 \text{ if } y_{is}^* \geq 0$$

$$\epsilon_{is} \sim N(0, 1)$$

The decision standard, y_{is}^* , used by the ITC is not observed. What is observed is the outcome, y_{is} , for each industry i .

The outcome of the petitions depends on the import-penetration ratio (predicted sign is positive), the dumping margin estimated by the DOC (predicted sign is positive), the dumping margin estimated by the petitioning industry (predicted sign is positive), employment (predicted sign is zero), and the percentage change in capacity utilization

(predicted sign is negative), coverage (predicted sign is zero), and the change in demand (predicted sign is negative).

Table V shows that the import-penetration ratio, the dumping margin by the DOC, and the percentage change in demand are the significant factors in explaining the outcome of the antidumping petitions. Employment and concentration have the correct sign, but neither estimate is statistically significant.

The probability of success of a petition filed by the two types of industries—high- and low-concentration industries—facing increasing demand is calculated. The probability of success of the petition of the low-concentration industry is 8 percent, while it is 12 percent for the high-concentration industry facing the same import-ratio, capacity utilization, demand, and so on. If the petitioning industry is facing low demand, the probability of success of the petition rises to 89 percent in the case of low-concentration industry, and 93 percent in the case of highly concentrated industry. These simple probability calculations imply that the supply of protection is increasing in the level of

Table V
The Outcome of the Antidumping Petitions

Probit estimates		Number of observations = 186	
		Chi ² (8) = 40.82	
Log likelihood = − 108.42			
The dependent variable is a dummy that takes the value 1 if a petition is successful			
Outcome of the Petitions	Coefficient	$\overline{dF/dx}$	z
Concentration	0.000078	3.1E-05	0.359
Import-penetration ratio	0.0334	0.01334	4.133
DOC dumping margin	0.00876	0.0035	2.845
Industry's dumping estimate	− 0.0000264	− 1.1E-05	− 0.021
Capacity utilization	0.0148	0.0055	1.157
Employment	0.0000016	4E-07	0.03
Coverage	− 0.004	− 0.002	− 0.11
Percentage change in demand	− 1.32	− 0.525	− 2.787
Constant	− 1.85		− 1.798

Predicted probability of success = 49 percent evaluated at the average.

concentration of the petitioning industry, regardless of the level of demand facing the industry prior to filing.

The Dumping Margin Estimated by the DOC

To calculate the dumping margin, the DOC compares foreign and domestic prices. Given foreign prices, the lower the domestic demand, the larger the gap between foreign and domestic demand is, and the higher the dumping margin estimated. If prices are not available, the department estimates the cost and profit markup of the foreign producer(s).

In this article, the dumping margin estimated by the DOC is measured as a function of the dumping estimate provided by the petitioning industry, the concentration ratio, capacity utilization, the change in capacity utilization, and import-penetration ratio. If the determination of the margin is based entirely on technical standards, then factors such as concentration ratio, capacity utilization, estimates provided by the industry, and even import-penetration ratio would not impact the dumping estimate. Only the change in capacity utilization is expected to affect the DOC estimates to the extent that this factor is a proxy for the demand facing the petitioning industry.

The problem is that the dumping estimate is only observed for industries that file, that is, the dependent variable is censored. To overcome the problems associated with running a regression where the dependent variable has zero values, a tobit model is used.

Table VI shows that the dumping estimate by the petitioning industry, the capacity utilization, the import-penetration ratio, and the number of petitions filed by an industry have positive and statistically significant impact on the DOC estimates. In addition, the change in capacity utilization has a negative impact, although it is not statistically significant. The estimation of the factors affecting the DOC dumping margins show that the decision may not entirely be based on technical standards.

*Estimates for the Primary Metal Products Industry
and the Concrete Products Industry*

Separate estimates of the decision to file and the outcome are analyzed for the two industries with the largest number of petitions. Table VII presents the results for the primary metal products industry which filed 60 petitions. Most of the petitions within this group are filed by the steel industry. It is still the case that the concentration, capacity utilization, and the import-penetration ratio are the statistically significant factors in explaining the decision to file. In contrast to the estimates of the decision to file using the entire sample (Table IV), the change in capacity utilization has a much larger impact on the probability of filing ($dF/d\Delta KU = -0.462$ for the metal industry, and $dF/d\Delta KU = -0.021$ for the entire sample of industries, where KU is capacity utilization).

The level of concentration of the primary metal producers is a statistically significant factor in explaining the probability of success of a petition, although it is not significant when using the entire sample of petitioning industries. The probability of success of a petition filed

Table VI
The Dumping Margin Estimated by the Department of Commerce

Tobit Estimates	Number of Observations = 2663	
	Chi ² (5) = 259.61	
Log Likelihood = − 1131		
The dependent variable is the dumping estimate by the DOC		
Dumping Margin	Coefficient	z
Concentration	− 0.0118	− 1.983
Import-penetration ratio	0.3417	1.915
Industry's dumping estimate	0.879	11.87
Capacity utilization	1.167	3.148
Percentage change in capacity	− 33.54	− 1.137
Constant	− 228.7	− 6.787

Table VII
Probit Estimates for the Primary Metal Products Industry

	Decision to File		Outcome of the Petitions	
	Coeff.	dF/ dx	Coeff.	dF/ dx
Concentration	0.00117 [3.628]	0.00036	0.0038 [2.112]	0.0015
KU times dummy for low HHI	0.0384 [5.725]	0.01184	—	—
Import-penetration ratio	0.0181 [2.759]	0.0056	0.0345 [1.7]	0.014
DOC dumping margin	—	—	0.014 [1.959]	0.0055
Industry's dumping estimate	—	—	-0.00289 [-.719]	-0.0011
Capacity utilization	—	—	0.0627 [1.009]	0.024
Change in capacity utilization	-1.496 [-1.436]	-0.462	—	—
Employment	—	—	-0.00007 [-.830]	-0.000027
Coverage	—	—	-0.022 [-.306]	-0.0084
Percentage change in demand	—	—	-2.722 [-2.081]	-1.053
Constant	-4.14	—	-7.83	—

Number of observations = 204 for the filing equation, = 60 for the outcome equation

Predicted probability of filing is 24 percent and probability of success is 60 percent (evaluated at the average)

by the metal industry is thus increasing in concentration, import-penetration ratio, the dumping estimate by the DOC, and the percentage change in demand.

Table VIII presents univariate probit estimates for the stone and concrete products industry. The estimates show that the level of concentration is statistically significant in explaining the probability of filing, but not the probability of success of the petition. Except for the change in capacity utilization, which has a positive sign and is not

Table VIII
Probit Estimates for the Stone and Concrete Products Industry

	Decision to File		Outcome of the Petitions	
	Coeff.	dF/ dx	Coeff.	dF/ dx
Concentration	0.00082 [1.95]	0.0002	0.00059 [1.414]	0.00023
KU times dummy for low HHI	0.0277 [3.49]	0.00679	—	—
Import-penetration ratio	0.01641 [3.276]	0.004	0.0144 [.833]	0.0056
DOC dumping margin	—	—	0.00018 [.029]	0.0000711
Industry's dumping estimate	—	—	0.00086 [.201]	0.000338
Capacity utilization	—	—	-0.0194 [- .633]	-0.0076
Change in capacity utilization	0.7622 [1.014]	0.1868	—	—
Employment	—	—	0.00000933 [.122]	0.0000036
Coverage	—	—	0.069 [.977]	0.027
Percentage change in demand	—	—	-1.24 [- 1.044]	-0.487
Constant	-3.41		0.396	—

Number of observations = 203 for the filing equation, = 44 for the outcome equation

Predicted probability of filing = 16 percent and probability of success = 43 percent (evaluated at the average)

statistically significant, the factors affecting the decision to file are similar to the ones affecting the entire sample. None of the variables used to explain the outcome is statistically significant, but all have the expected signs.

Sample Selection Bias

Estimates obtained from the single logit or probit equations will not be problematic if the population of interest is the set of petitions

filed only. These estimates show the effects of the characteristics of industries on the outcome, given that a petition is filed, and thus are inconsistent estimates of the parameters of the population of all industries that could have filed a petition. The decision to file a petition must be addressed jointly with the probability of receiving protection, because data on the outcome of the petitions are nonrandomly selected from the entire set of industries that can file these petitions.

If the main interest is understanding how the ITC makes its decision given the petitions filed, a simple logit or probit will suffice. This article, however, is interested in understanding all aspects of the antidumping law; the decision to file, the dumping estimates by the DOC, and the outcome of the petitions. Thus, the results obtained by running a logit or a probit on the outcome equation alone will be problematic due to the effects of the selection process. Each industry decides whether to file a petition based on its expected profits less the cost of filing. Assuming that industries are forward-looking-profit-maximizers agents, they anticipate how the ITC and the DOC make their decisions and take these factors into account when deciding whether to file. This means that the petitions that reach the ITC and the DOC are not random samples, but are self-selected based on the factors whose impacts need to be assessed (Hughes and Snyder, 1989).

To illustrate the selection bias problem, consider a univariate probit to estimate the decision to file a petition. It is specified as follows:

$$y_{if}^* = \beta_f' X_{if} + \epsilon_{if}$$

$$y_{if} = 1 \text{ if } y_{if}^* \geq 0$$

$$\epsilon_{if} \sim N(0, 1)$$

$$\text{prob}(y_f = 1) = \Phi(\beta_f' X_{if}),$$

where y_{if}^* is the unobservable expected profits net of costs of industry i in case of filing. The variable y_{if} is an indicator that takes value 1 if an industry files and zero otherwise, β_f is a vector of coefficient estimates, and X_{if} is a vector of explanatory variables that affect the decision to file. Suppose that the import-penetration ratio turns out to be a significant factor in explaining the decision to file.⁷ In this case, the error term in both probit equations (the outcome and the filing equations) might contain some common omitted variables. This means that the correlation between ϵ_{if} and ϵ_{is} might not be equal to zero. Thus, the coefficients β_f would be inconsistent.

Heckman (1979) addressed the problem of selection bias for a non-dichotomous variable and the following is based on his work. The outcome function may be written as

$$E(y_{is}^* | X_{is}) = \beta'_{is} X_{is} + E(\epsilon_{is} | \text{industry } i \text{ files}).$$

The problem is that the conditional mean of ϵ_{is} is not zero. The second term of this equation can be written as

$$\begin{aligned} E(\epsilon_{is} | \text{industry } i \text{ files}) &= E(\epsilon_{is} | X_{is}, y_{if}^* \geq 0) \\ &= E(\epsilon_{is} | X_{is}, \epsilon_{if} \geq -\beta'_{if} X_{if}). \end{aligned}$$

In case of independence between ϵ_{is} and ϵ_{if} , the conditional mean of ϵ_{is} is zero. If not, then

$E(y_{is}^* | X_{is}) = \beta'_{is} X_{is} + E(\epsilon_{is} | \epsilon_{is} \geq -\beta'_{if} X_{if})$. Assuming that ϵ_{is} and ϵ_{if} are bivariate standards normally distributed with correlation ρ :

$$E(\epsilon_{is} | \epsilon_{if} \geq -\beta'_{if} X_{if}) = \rho \frac{\phi(z)}{1 - \Phi(Z)},$$

where $Z = -\beta'_{if} X_{if}$.

⁷ It is expected that the import-penetration ratio is also a main factor in affecting the outcome of the petitions, because it is a clear indication of injury.

A simple logit or probit will not explain whether changes in the probability of receiving protection is due to changes in the ITC decision policy or due to changes in the characteristics of the industries that selected to file. To answer this question, the outcome of the petitions and the decision to file must be jointly estimated.

Industries realize that the outcome of a petition depends on several economic factors affecting the performance of the industry and possibly some political factors. The factors that affect the outcome of the petition, such as employment, import-penetration ratio, and capacity utilization are expected also to affect the decision to file. The petitioning industries do not have perfect information about the ITC decision process, and thus some petitions do not receive protection.

Bivariate Probit with Selection

This section presents joint estimates of the decision to file by industries and the outcome of the petitions using a bivariate probit. The outcome, y_{is} , of a petition is observed only when filing, y_{if} , equals one. Thus, in estimating a bivariate probit model, the data on outcomes are nonrandomly selected from the set of industries. The following derivation of the appropriate model is based on Greene (1993). This model was first suggested by Wynand Van De Ven and Bernard M. S. Praag (1981).

Define $P_{11} = \Phi_2(\beta_f' X_f, \beta_s' X_s, \rho)$ as the probability that an industry files and a petition is successful, where ρ is the correlation coefficient, P_{10} , as the probability that a petition is filed but is not successful, $P_1 = \Phi(\beta_f' X_f) = P_{11} + P_{10}$ as the probability that a petition is filed, and P_{00} as the probability that no petition is filed and no protection is granted. Define Φ_2 as the bivariate normal distribution and Φ as the univariate distribution. Only three probabilities can be estimated in this model as there are no cases in which a petition is not filed and a dumping duty would have been imposed. The sum of these probabilities must add to one. The other restriction is that the proba-

bility that a petition is filed and not successful plus the probability that a petition is filed and is successful must add up to the probability that a petition is filed. These restrictions are:

$$P_{11} + P_{10} = P_1 = 1 - P_{00}$$

$$P_{00} + P_{11} + P_{10} = 1$$

The formulation of the two-equation model with sample selection thus is

The filing equation:

$$y_{if}^* = \beta_f' X_{if} + \epsilon_{if} \Rightarrow y_{if} = 1 \text{ if } y_{if}^* \geq 0$$

The outcome equation:

$$y_{is}^* = \beta_s' X_{is} + \epsilon_{is} \Rightarrow y_{is} = 1 \text{ if } y_{is}^* \geq 0$$

(y_{is}, x_{is}) is observed only when $y_{if} = 1$

The error terms are assumed to be distributed as a bivariate normal distribution with mean zero, variance one, and correlation coefficient, ρ , i.e., $e_{is}, e_{if} \sim BVN(0, 0, 1, 1, \rho)$, for $i = 1, \dots, n$.

The log-likelihood for the bivariate model with selection is

$$\begin{aligned} \ln L = & \sum_{y_f=1, y_s=1} \ln \Phi_2[\beta_f' x_{if}, \beta_s' x_{is}, \rho] \\ & + \sum_{y_f=1, y_s=0} \ln \Phi_2[-\beta_f' x_{if}, \beta_s' x_{is}, -\rho] \\ & + \sum_{y_f=0} \ln \Phi[-\beta_f' x_{if}]. \end{aligned}$$

The first term is for industries that file and receive protection, the second is for industries that filed unsuccessful petitions, and the last term is for industries that did not file.

Table IX
Bivariate Probit with Sample Selection
The Decision to File and the Outcome of the Antidumping Petitions

Log likelihood = -762.4	Number of observations = 2663			
	Chi ² (12) = 81.74			
	Outcome of the Petitions		Decision to File	
	Coefficient	z	Coefficient	z
Concentration	0.00014	0.587	0.00026	4.936
KU times dummy for less conc	—	—	0.00837	4.936
Import-penetration ratio	0.0324	3.615	0.0057	2.932
DOC dumping margin	0.00842	2.594	—	—
Industry's dumping estimate	0.00000459	0.004	—	—
Capacity utilization	0.0106	0.778	—	—
Change in capacity utilization	—	—	-0.1586	-0.583
Employment	2.17E-07	0.006	—	—
Coverage	-0.0031	-0.089	—	—
Percentage change in demand	-1.265	-2.555	—	—
Constant	-1.058	-0.537	-2.214	-13.63
rho	-0.29517	-0.5		

Results of the Bivariate Probit

The results of the bivariate probit are presented in Table IX. The import-penetration ratio is a statistically significant factor in explaining both the decision to file and the outcome of the petitions. The level of concentration affects the decision to file, but not the outcome of the petitions. As in the simple probit, a less-concentrated industry is more likely to file as its capacity utilization increases. The percentage change in capacity utilization has the correct sign but is not statistically significant in the decision to file.

In addition to the import-penetration ratio, the probability of success of a petition is significantly affected by the dumping margin estimated by the DOC, capacity utilization, import-penetration, and the percentage change in demand. Employment has the predicted sign, but is not statistically significant.

VII. HOW THE RESULTS RELATE TO THE LITERATURE

Some results obtained in this study are consistent with the literature. The univariate and the bivariate probit estimates show that economic factors such as the import-penetration ratio and capacity utilization are significant factors in explaining the outcome of the petitions. This is similar to the findings by Finger, Hall, and Nelson (1982), Moore (1992), and Anderson (1993). Also, all the factors used in this study as proxies for political effect have the predicted signs, but were not statistically significant as in Anderson (1993).

Hansen's study showed that the main determinants of the decision to file are the percentage change in market share and the percentage change in employment. Similarly, this study shows that concentration level, capacity utilization, and import-penetration ratio are the statistically significant factors in the decision to file. Hansen's estimates of the ITC decision show that none of the economic factors is significant, whereas estimates in Table VIII show that the import-penetration ratio and the capacity utilization are significant in explaining the outcome of the petitions. This is similar to the findings by Finger, Hall, and Nelson (1982).

The outcome equation includes variables that are not included in prior studies such as the interaction term of capacity utilization and concentration ratio, the dumping estimate of the DOC, and the dumping estimate by the petitioning industry. The reason that these variables are included is to try and understand the decision to file in good times as well as in bad times as illustrated by actual data in Table I. Good times means that an industry is facing increasing demand prior to filing. The conventional wisdom is that industries seek protection when facing decreasing demand, because this implies lower sales and profits and loss of jobs.

The dumping margin estimated by the DOC is also analyzed in this study. The tobit results show that the DOC decision may not be

entirely based on comparing prices. Factors such as the import-penetration ratio and the dumping estimate provided by the petitioning industry are significant factors in the determination of the DOC dumping margins.

VIII. DISCUSSION

This article presents an empirical investigation of the decision to file, the dumping margins, and the outcomes of antidumping petitions. Estimates of the primary metal products and the stone and concrete are presented separately, as these are the two industries with the largest number of petitions in the sample.

The decision to file and the probability of success of petitions are estimated using univariate and a bivariate probit model with sample selection. The dumping margins are estimated using a tobit model. The article aims at identifying industries filing successful petitions in good times according to demand, capacity utilization, concentration, and import-penetration ratio. It also examines the relation between the dumping margin and the conditions facing the petitioning industry prior to filing, and the relation between the dumping margin and the outcomes of the petitions.

The empirical analysis indicates that the import-penetration ratio, capacity utilization, and the dumping estimates by the DOC are significant factors in explaining the outcome of the petitions. When estimating the probability of success of petitions filed by the primary metal products firms separately, the level of concentration is found to be statistically significant in explaining the probability of success of a petition. The steel industry, with the largest number of petitions in the sample, falls into the group of primary metal products. Concentration is not significant in the case of the entire sample or the stone and concrete firms. Also, the probability of success of a petition filed by the primary metal firms is higher than the average. This indicates that

petitions filed by the primary metal producers may be subject to political pressures.

The import-penetration ratio, the concentration level, and the interaction of concentration and capacity utilization are significant factors in explaining the decision to file. The analysis shows that in cases of high-capacity utilization (proxy for high demand), less concentrated industries are more likely to file, but highly concentrated industries are more likely to receive protection.

The results also show that the determination of the dumping margins is affected by the level of concentration of the petitioning industry, import-penetration, and the dumping estimates provided by the petitioning industries. This suggests that the dumping margins estimated by the DOC are not entirely based on the technical standards.

Although the variables used to assess the impact of the size of the petitioning industries (employment, concentration, and coverage) are not significant in explaining the outcome of the petitions, all have the predicted signs.

This article thus explores the decision to file an antidumping petition, and assesses how the market structure and the demand in the domestic market interact to determine when and which industries file a petition. The empirical analysis shows that the dumping margins and the final outcome of the petitions are influenced by factors other than the technical standards.

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