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The World Trade Organization and Antidumping in Developing Countries

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Abstract

Since the 1995 inception of the World Trade Organization (WTO), developing countries have become some of the most frequent users of the WTO-sanctioned antidumping trade policy instrument. This paper exploits newly available data to examine the pattern of actual industrial use of antidumping in nine of the major “new user” developing countries – Argentina, Brazil, Colombia, India, Indonesia, Mexico, Peru, Turkey and Venezuela. For these countries we are able to match data from two newly available sources: data on production in 28 different 3-digit ISIC industries from the *Trade, Production and Protection Database* to data on antidumping investigations, outcomes and imports at the 6-digit Harmonized System (HS) product level from the *Global Antidumping Database*. Our econometric analysis is to estimate a two-stage model of the industry-level decision to pursue an antidumping investigation and the national government’s decision of whether and how much antidumping import protection to provide. First, we find evidence consistent with the theory of endogenous trade policy: larger industries that face substantial import competition are more likely to pursue an antidumping investigation, and larger and more concentrated industries receive greater antidumping protection from imports. Second, we find that industries that use antidumping are more likely to face the changing economic conditions specified by the technical evidentiary criteria of the WTO Antidumping Agreement: industries that face rapidly falling import prices are more likely to pursue an investigation, and industries that are more susceptible to cyclical dumping due to greater capital investment expenditures and that face rapidly increasing competition from imports receive greater antidumping protection.

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1 Introduction

More than 40 members of the World Trade Organization (WTO) are now active users of antidumping policy, and developing countries are some of the newest and most frequent of these users. At the same time that many developing countries have started using antidumping to limit imports, many of them have also given up most other forms of flexibility in trade policy by adopting WTO disciplines and agreeing to bind their tariffs. Despite antidumping policy's escalating use by developing countries, relatively little research has examined which industries *within* developing countries are using antidumping and *how* they are using it. This paper exploits a cross-country sample of newly available, relatively disaggregated data as a first attempt to examine empirically the determinants of industrial use of antidumping in developing countries.

As with any economy, a developing country's adoption of an antidumping law has implications for the endogenous formation of its trade policy. Under the WTO Antidumping Agreement, any member that uses the policy must create an administrative procedure to investigate demands for antidumping protection. Firms in an industry that seek this form of import protection must overcome the organizational challenges of free riding in order to successfully pursue an antidumping legal proceeding. Before a government can impose a definitive antidumping import restriction, the Agreement also requires that its administrating authority solicit and collect substantial economic evidence to confirm that market conditions and behavior of foreign exporters satisfy technical, WTO-mandated legal criteria. Given the presence of an antidumping law and the economic incentives it creates, domestic industries will vary in their need and ability to obtain import protection under this policy. Nevertheless, given that antidumping has become many WTO member governments' most accessible protectionist instrument, the resulting pattern of antidumping import protection across industries may be an increasingly important indicator of these countries' overall patterns of import protection.

Which developing countries are the most frequent new users of antidumping (AD)? The columns on the right half of table 1 document the frequency of antidumping investigations and imposed measures across a number of WTO members dating from the institution's 1995 inception. While the four "historical" developed-country users of antidumping – the US, EU, Canada and Australia – have continued to be active users under the WTO, they are no longer the dominant users as they were during the prior decade (1985-1994) under the GATT regime. A sizable share of the global use of antidumping, at least as measured by the frequency of initiated cases and imposed measures, is now made up of "new user" *developing* countries such as Argentina, Brazil, Colombia, India, Indonesia, Mexico, Peru, Turkey and Venezuela, the nine developing countries forming the sample of our formal empirical investigation.¹

¹ China and South Africa are the two other developing countries that we would also characterize as frequent "new users" of antidumping during this period, but they are not part of our formal empirical investigation because of

Of the total use of antidumping during the WTO's first ten years by what are now more than 140 member countries, these nine developing countries made up 40% of all new antidumping investigations and 45% of all new antidumping measures imposed.² This is a substantial shift from the prior ten year period, when the four historical developed-country users initiated almost 75% of all antidumping investigations.

Within these nine developing countries, which *industries* chose to use antidumping to pursue protection from imports? While the steel and chemical industries have sought and received antidumping protection across virtually all of these nine countries, table 2 illustrates that most of the 28 different 3-digit ISIC industries that we analyze also pursued antidumping in at least one of these countries. Nevertheless, there is substantial variation across countries as to whether particular industries have pursued antidumping, and there is also substantial variation across countries and industries as to whether antidumping measures have been imposed as well as the coverage of imposed measures. Our empirical approach is to exploit this variation to explain industry pursuit of antidumping within developing countries. We use the criterion specified by the WTO Antidumping Agreement and the theory of endogenous trade policy to motivate our empirical framework.

Do basic features of the industry data in these developing countries suggest specific political-economic characteristics that may affect the pursuit of antidumping? The top half of table 3 motivates our formal analysis by examining summary statistics from 3-digit ISIC industries in 1994. We compare industries that pursued AD over the subsequent 1995-2003 period with those that did not. Industries that pursued antidumping in these nine countries were characterized, on average, by higher import penetration (27.9% versus 23.5%) than industries that did not use AD. The size of the industry may be expected to affect its ability to finance a costly investigation as well as its political influence over antidumping authorities; the raw data indicate that initiating industries were indeed larger than non-initiating industries when measured by the mean value of their output (\$5.10 billion versus \$1.65 billion) or by their mean share of total employment (0.3% versus 0.2%).

A second important feature of our analysis is to examine whether industries that successfully pursue antidumping protection in developing countries actually face the changing economic conditions that are legally necessary under the WTO: specifically, injury, dumping, and increased competition from

production data limitations. For similar reasons we also do not include countries such as Egypt, Malaysia and Thailand, whose use of antidumping has also been recently increasing.

² However, these countries did not all begin using antidumping in 1995. As Zanardi (2004) reports, most had implemented antidumping legislation prior to the WTO's inception: Argentina (1972), India (1985), Mexico (1986), Brazil (1987), Turkey (1989), Colombia (1990), Peru (1991), Venezuela (1992) and Indonesia (1995). While most of these countries did not begin intensive use of antidumping until after joining the WTO in 1995, there are several exceptions (Mexico in 1987, Turkey in 1990, Brazil in 1992). These countries undertook substantial trade liberalization episodes prior to joining the WTO and increased their use of antidumping shortly thereafter.

imports.³ Since formal WTO disputes have actually challenged developing country government use of antidumping only on rare occasion, there has been little oversight to determine whether even the basic evidentiary conditions of injury, imports, and dumping have been satisfied in individual cases.⁴ Our econometric analysis thus also examines whether the industry decision to pursue an antidumping investigation and to impose a trade-restricting measure are at least consistent with the changing market conditions that are legally required under the WTO Agreement.

The lower half of table 3 shows that industries that pursued AD investigations over the 1995-2003 period were, on average, more likely to face changing market conditions consistent with the WTO mandate than the industries that did not pursue antidumping.⁵ First, industries that sought antidumping protection were more likely to face cyclical dumping than non-initiating industries, as they were characterized by a higher average capital expenditure relative to value added (22.6% versus 14.2%). Furthermore, they faced prices of competing imported products that were falling more rapidly on average (-1.5% versus -1.1%) than industries that did not use AD. The industries that sought antidumping also had slower output growth on average (3.2% versus 5.6%) and slightly more rapid growth of import penetration (5.5% versus 5.2%) than industries that did not pursue antidumping investigations.

This paper provides an econometric investigation as to whether the suggestive industry statistics for developing countries presented in table 3 are economically and statistically important once we control for a number of factors affecting whether an industry pursues and is granted antidumping import

Nevertheless, our estimation focuses on the post-1995 period since this is when various rules for antidumping and enforcement became consistent across countries, as we detail below.

³ We do not suggest that the evidence legally required for imposition of new import restrictions under the WTO Antidumping Agreement is relevant from an economic welfare perspective. Indeed, most economists view antidumping as nothing more than an easy-to-access alternative to a safeguard import restriction, given that the specified evidence for dumping does not require predation or anticompetitive elements and can be consistent with other forms of non-predatory behavior (e.g., price discrimination, cyclical dumping via pricing below average cost during periods of economic downturns) legally accepted by many countries in the context of domestic firm behavior. This paper simply examines whether the industries pursuing and receiving antidumping protection face changing economic conditions consistent with the evidentiary criteria specified by the Agreement.

⁴ Even though these nine countries collectively initiated over 1000 antidumping investigations between 1995 and 2004, WTO members filed only 16 formal disputes against them over antidumping (Bown, 2006). This contrasts with the United States, which initiated only 354 antidumping investigations over this same period and yet faced over 30 formal WTO challenges relating to antidumping alone (Bown, 2005b). An alternative form of review could come under the WTO Trade Policy Review Mechanism (TPRM), where member trade policies are examined periodically. Nevertheless, developing country policies are reviewed very infrequently (the largest are reviewed only once every four years, and most others once every six years). Moreover the TPRM is not intended to examine the evidence submitted or the rulings in antidumping investigations on a case-by-case basis.

⁵ The evidence presented here and our formal econometric evidence below only compare AD-using versus non-using industries. Thus, our analysis can only examine whether the data on changing market conditions for AD-using industries are consistent with the evidentiary requirements. We do not examine whether the users of AD are industries facing changing market conditions relative to an absolute benchmark. For example, table 3 illustrates that AD-using industries on average had output that was growing more slowly than non-initiating industries. We do not

protection. Our formal econometric approach is to estimate a two-stage model: the first stage examines determinants of the industry decision to pursue antidumping import protection and the second stage examines determinants of how much antidumping protection the national government affords. We focus on the post-1995 period because this is when antidumping use across all WTO members became guided by a common set of rules for policy application and international enforcement for cases in which the policy was misapplied. While there is a substantial literature examining the political-economic determinants of antidumping in the developed economies of the US and EU, there is little empirical research examining its use in developing countries, largely because of the prior lack of suitably disaggregated data. We exploit two newly available sources of relatively disaggregated data to examine these questions on a sample of nine developing country users (see again table 1) for a cross-section of 28 3-digit ISIC industries. We match product-level data on antidumping investigations, outcomes, and imports compiled from original government publications and now made available in the *Global Antidumping Database* (Bown, 2005a) with industry-level production data from the World Bank's *Trade, Production and Protection Database* (Nicita and Olarreaga, 2006).

As a preview of our results, we present evidence from a two-stage econometric model indicating a pattern in industrial use of antidumping in developing countries once we control for the industry-specific and country-specific likelihood of pursuing an antidumping case and of a case resulting in imposition of an antidumping measure. First, we find evidence consistent with the theory of endogenous trade policy formation in the context of an antidumping law: larger industries that face substantial import competition are more likely to pursue an antidumping investigation, and larger and more concentrated industries receive greater antidumping protection from imports. Second, we find that AD-using industries do face the changing economic conditions consistent with the technical evidentiary criteria specified in the WTO Antidumping Agreement: industries that face rapidly falling import prices are more likely to pursue an investigation, and industries that are more susceptible to cyclical dumping due to greater capital investment expenditures and that face rapidly increasing competition from imports receive greater antidumping protection. These results are statistically and economically significant even when we focus on subsamples of data that exclude stereotypical AD-intensive industries such as steel and industrial chemicals.

The rest of this paper proceeds as follows. In the next section we describe the WTO Antidumping Agreement and draw on implications from the theory of endogenous trade policy to generate testable predictions regarding the characteristics of industries likely to pursue and be granted protection from imports under antidumping law. Section 3 presents the econometric model and describes the variable

examine whether the users of AD have shrinking output (i.e., output growth relative to a benchmark), which may be more conclusive evidence of injury.

construction and data used in our formal econometric analysis. Section 4 contains our estimation results, and section 5 concludes with a discussion of the broader implications of our results for the evolution of trade policy in developing countries.

2 The WTO Antidumping Agreement and the Theory of Endogenous Trade Policy

The proliferation of WTO-authorized antidumping laws and the global increase in use of this form of administered import protection has been widely recognized (Miranda, Torres and Ruiz 1998; Prusa, 2001; Zanardi, 2004). While antidumping was once a policy instrument used primarily by the US, Canada, EU and Australia, it is now used actively by over 40 WTO member countries. As table 1 indicates, some of the most frequent new users are developing countries.

To develop a theoretical motivation for our empirical analysis of the determinants of antidumping use by industries in developing countries, we proceed in two steps. In the next section we describe the WTO Antidumping Agreement, which sets out the general rules for national administration of antidumping law as well as the technical evidence necessary for a government to justify imposition of any new antidumping measure. Given the political-economic environment created by the WTO Antidumping Agreement, in section 2.2 we use the theory of endogenous trade policy to generate additional testable predictions for the econometric analysis.

2.1 The WTO's evidentiary requirements for national use of antidumping

Since the 1947 GATT, the rules of the international trading system have authorized countries to establish national antidumping statutes and to implement antidumping trade restrictions.⁶ During the Kennedy and Tokyo Rounds in the 1960s and 1970s, negotiators attempted to put more structure on the GATT antidumping rules, but countries adopted the resulting Antidumping Codes only on a plurilateral basis. The 1995 inception of the WTO and its Antidumping Agreement (WTO, 1995) provided more detailed guidance for countries to implement and administer antidumping laws. First, because the Antidumping Agreement was part of the Single Undertaking, it established a common set of basic rules that would apply to all WTO members and be subject to the enforcement provisions of the WTO Dispute Settlement Understanding (DSU).⁷ Second, relative to the GATT, the WTO Antidumping Agreement did impose

⁶ See Article VI of the 1947 GATT. National antidumping laws predate the GATT, and Article VI was largely written to accommodate these existing pieces of national legislation. Canada is credited with the first antidumping law with an implementation in 1904.

⁷ Nevertheless, Article 17.6 of the Antidumping Agreement does still imply that countries are allowed substantial discretion to implement their own version of antidumping – the WTO mainly requires that the country administer its use of antidumping in a way consistent with its own AD law.

more structure on the evidentiary requirements for a government to implement a new antidumping measure, although those requirements still allow for substantial government discretion and are at best questionable from the perspective of economic welfare.

Under the Antidumping Agreement, a national government must undertake an investigation and consider substantial economic evidence before it can impose a definitive antidumping measure that restricts imports. The investigating authority is instructed to consider a number of factors when making its decision, but most critical among them are whether two important legal criteria have been met: that a domestic industry suffers “material injury” and that this injury is the result of “dumped” imports.

The domestic industry provides evidence of dumping to the national government’s antidumping authority by showing that prices of competing products sold by foreign exporters in the domestic market were lower than the “normal value” of the product (WTO, 1995; Article 2.1). The national government authority has substantial discretion in calculating the normal value benchmark with which to compare the export price. The benchmark can be determined by any of three methods: i) the price for sales of the same good in the exporter’s home market, ii) the price for export sales of the same good in a third market, or iii) a constructed measure of the exporter’s average cost.⁸

The second major piece of evidence that must be provided to the government in a national antidumping investigation is that the petitioning domestic industry is “materially injured” by these dumped imports (WTO, 1995; Article 3). When considering evidence that the domestic industry is injured, the Antidumping Agreement suggests that national authorities can consult a number of types of industry data, including “actual and potential decline in sales, profits, output, market share, productivity, return on investments, or utilization of capacity; factors affecting domestic prices; the magnitude of the margin of dumping; actual and potential negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital or investments” (WTO, 1995; Article 3.4).⁹

⁸ There is an extensive research literature questioning these definitions from the perspective of economic welfare. If antidumping is an instrument in the arsenal of competition policy, there are many non-predatory circumstances in which a profit-maximizing foreign firm would otherwise be expected to price in violation of one of the criteria. A common example of the first is international price discrimination associated with different demand elasticities across countries. A common example of the third is pricing below average cost during short-run periods of low demand, provided the foreign firm can cover at least its variable cost. For other examples see Hoekman and Kostecki (2001, pp. 315-330). Other economic research suggests that there are various ways in which industries may be able to use antidumping within and across countries as a means of facilitating *anti*-competitive behavior such as collusion. For examples, see Prusa (1992) or Bown (2005b).

⁹ Economists also argue that these measures of “injury” alleged to be caused by unfair trade are by themselves meaningless, as they are observationally equivalent to injury caused by other sources. One example is an inefficient, import-competing industry that is contracting in the face of newfound “fair” foreign competition following an agreement to liberalize trade. Alternative explanations are that it is an industry facing changing consumer preferences for its products, negative domestic cost shocks, etc. An important limitation of the text of the Antidumping Agreement is that it does not mandate how domestic authorities are to rigorously attribute injury across multiple contributing causes. For an examination of the law and economics of this issue and the jurisprudence of antidumping disputes challenged at the WTO, see Durling (2003) and Durling and McCullough (2005).

Economists argue that the evidence required by the Agreement is not sufficient to establish whether the domestic industry does face changing economic conditions or anticompetitive practices by foreign exporters that are worrisome from the perspective of economic welfare. Nevertheless, the Antidumping Agreement specifies that the economic conditions facing a petitioning industry must satisfy at least this threshold of evidence for dumping and injury before the domestic government's antidumping authority can impose a new antidumping import restriction. Thus, as one way of assessing whether the Agreement imposes any constraints on member governments' use of antidumping, we examine whether the industries more likely to face the changing market conditions specified by the Agreement are the industries that successfully pursue import protection under the policy.

2.2 Theory of endogenous trade policy in the presence of an antidumping law

In this section we appeal to the theory of endogenous trade policy to identify characteristics of industries likely to pursue protection from imports given the incentives created by an antidumping law. Adoption of a domestic antidumping law establishes a legal process through which an industry willing to spend substantial resources may be able to obtain protection from import competition. Even an antidumping investigation in a developing country constitutes a substantial legal proceeding, which requires industries to hire lawyers and collect and distill economic evidence relating to the dumping and injury criteria.

What are the characteristics of industries most likely to find the marginal benefit from pursuing protection from imports under antidumping law greater than its marginal resource cost? The first characteristic is size – on one hand, a larger industry is more likely to pursue antidumping because it can support the litigation costs associated with the investigation process. Nevertheless, industry concentration is likely to affect its ability to overcome the free rider problem. Since all firms in the domestic industry would benefit from an antidumping trade restriction that shields them from having to compete with imports, each firm individually has little incentive to invest in the process necessary to obtain it. Furthermore, given that there is substantial discretion in the national government's administrative process for sorting through evidence provided in an antidumping investigation (e.g., which method to use to calculate dumping, which data and measures to use to assess injury), the industry's political influence with policymakers may affect the government-determined outcome in a given case and thus the industry's willingness to pursue an antidumping investigation. Political influence of the industry might be captured is through its financial size, assuming this is positively related to campaign contributions needed for re-election (e.g., Grossman and Helpman, 1994). An alternative measure of political influence might be the

number of employees in the industry, to the extent that employees have sector-specific skills and if the median voter affects trade policy decisions (e.g., Mayer, 1984).

Additional industry characteristics may play a role in the use of antidumping once we also take into consideration the use of the policy across countries. For example, industries with historical experience of having their exports targeted by foreign antidumping may be more likely to pursue the policy themselves. One explanation is familiarity – the learning experience of having defended exports in foreign antidumping investigations may affect the likelihood of pursuing antidumping as an offensive weapon at home. A second explanation is that industries targeted by foreign antidumping may be more likely to use it as a means of retaliation (tit for tat) or to discourage future foreign use of antidumping.

The research literature on US and EU trade policy has examined whether a number of differently-constructed variables capturing these elements of the political-economic process help explain the pattern of antidumping use.¹⁰ Given that both the industry-level data and data on the political process are of much higher quality for the US and EU than for the developing countries in our sample, we are not able to replicate with precision such measures in our empirical analysis. Nevertheless, we do take advantage of a reasonably disaggregated cross-country panel of industry-level data to construct measures that we use to assess whether many of the same political-economic considerations also affect the use of antidumping in developing countries. We describe this variable construction, data, and our formal econometric approach in the next section.

3 Empirical Approach and Data

What are the determinants of industry pursuit and receipt of antidumping protection in the new user developing countries? Based on data requirements and limitations discussed in more detail below, our unit of observation for the econometric analysis is a 3-digit ISIC industry in one of nine developing countries (table 2). Figure 1 illustrates how we model the formal empirical analysis.

In the first stage of the model, each 3-digit ISIC industry decides whether to pursue an antidumping investigation. In the investigation, the industry would present evidence of dumping and injury to its national authority, and it would request that its government impose a trade restriction to shield it from import competition. In the second stage, the national government considers the evidence and decides not only whether the 3-digit ISIC industry has been injured from dumped imports, but it also determines how much protection to grant the industry. We measure the government's second stage

¹⁰ A number of papers have examined different political-economic features of the government decision to grant antidumping protection. Examples for the US process include Hansen (1990) and Hansen and Prusa (1997). See Messerlin and Reed (1995) and Eymann and Schuknecht (1996) for research on the EU process, and see Francois

decision of “how much” protection to offer by defining this as the coverage ratio of total industry imports that are made up of 6-digit Harmonized System (HS) products that face definitive antidumping measures. We discuss construction of this coverage ratio variable in substantial detail below.

3.1 Econometric model

Our econometric approach uses maximum likelihood to estimate a Heckman (1979) selection model to examine determinants of a 3-digit ISIC industry’s decision to pursue an antidumping investigation and the coverage ratio of how much protection from imports under antidumping policy the domestic government provides. Our regression equation for determinants of the coverage ratio of 3-digit ISIC industry I in country C is given by

$$y_{I,C} = X_{I,C}\beta + \varepsilon_{I,C}. \quad (1)$$

However, we assume that our coverage ratio dependent variable is not observed for those industries that do not pursue an antidumping investigation. As discussed in section 2.2, industries likely to receive little protection under antidumping (i.e., a smaller share of their total industry imports covered by an antidumping measure) may be less likely to pursue an investigation in the first place due to the costs associated with the process. The assumption’s implication for our econometric approach is that the dependent variable of the antidumping coverage ratio in equation (1) is only observed for a particular industry-country pair if

$$Z_{I,C}\alpha + \varepsilon_{2I,C} > 0. \quad (2)$$

In the regression equation (1) and selection equation (2), $X_{I,C}$ and $Z_{I,C}$ are matrices of explanatory variables, α and β are vectors of parameters to be estimated, and we assume that $\varepsilon_{I,C} \sim N(0, \sigma)$, $\varepsilon_{2I,C} \sim N(0, 1)$ and $\text{corr}(\varepsilon_{I,C}, \varepsilon_{2I,C}) = \rho$. If $\rho \neq 0$, then ordinary least squares regression of (1) alone would yield biased estimates for β . The Heckman model treats (2) as the first-stage selection equation, and in our application this is the 3-digit ISIC industry’s binary decision of whether to pursue an antidumping investigation. The Heckman model addresses the concern of potential sample selection bias in the regression equation, and it also offers a parsimonious modeling approach to our two-pronged question of determinants of the industry decision to pursue antidumping and determinants of how much protection the domestic government provides.¹¹

and Niels (2004) for research on Mexico. Blonigen and Prusa (2003) and Nelson (2006) provide extensive surveys of this literature.

¹¹ This approach is closest to that used by Hansen (1990) in her two-stage nested logit examination of determinants of a US industry decision to pursue antidumping protection and determinants of the US International Trade

Due to data limitations along the time-series dimension of the *Trade, Production and Protection Database* described below, we treat the nine country sample of 28 3-digit ISIC industries as a single cross-section. We examine whether a cross-section of industry characteristics in 1994 and measures of the change in market conditions in each industry in the post-1995 period can be used to explain industry pursuit of antidumping between 1995 and 2003. We thus seek to cumulate information accurately reflecting the intensity of industry antidumping use over the 1995-2003 period without using time-series variation or other such features in the antidumping data. Thus our approach generates a number of issues concerning appropriate variable construction, which we address in the next section.

3.2 The Global Antidumping Database and construction of dependent variables

The antidumping data used in the empirical analysis is product-level information on antidumping investigations, outcomes and affected products constructed from original source national government publications and compiled in the *Global Antidumping Database* (Bown, 2005a). Our analysis focuses on the nine developing countries whose antidumping use is documented in table 1. Although the database includes information on antidumping use by some of these countries before 1995, we focus on the 1995-2003 period because the Antidumping Agreement and the rules on DSU enforcement became consistent across countries with the establishment of the WTO in 1995.¹² Over this time period we match database information on the 6-digit HS-products that are the subject of antidumping investigations and imposed measures to the product-level import data from *Comtrade*.¹³

We define the decision to pursue an antidumping investigation in the first stage of the econometric model as a ‘1’ if the industry pursued at least one investigation during 1995-2003, and zero otherwise. One legitimate question is whether we are throwing away useful information regarding variation on the intensity of industry use of antidumping for those that pursued multiple investigations during this time period. To address this potential concern we make two observations. First, our second-

Commission (ITC) injury decision. In the US, almost all investigations find evidence of dumping, so whether the domestic industry receives import protection under antidumping is determined de facto by the ITC’s injury decision. The primary difference between our econometric approaches is that Hansen’s second stage was also modeled as a binary outcome variable (the ITC’s affirmative or negative injury decision), whereas our second-stage outcome is the continuously defined coverage ratio which allows for additional variation by examining the portion of the industry’s potential imports from which the industry receives protection. Nevertheless, Hansen’s evidence that there is bias in the set of petitions received by the ITC in the US is an empirical motivation for our approach.

¹² Prior to 1995, international enforcement varied across countries under the GATT given that not all GATT Contracting Parties were signatories to the Tokyo Round’s plurilateral Antidumping Code and thus subject to its dispute settlement procedures.

¹³ We concord the 6-digit HS import data to the 3-digit ISIC level, allowing the 6-digit HS product to be allocated to only one industry.

stage antidumping investigation *outcome* measure allows this information to affect the estimation, provided that additional investigations resulted in definitive antidumping measures on *different* 6-digit HS products from those that received protection in the initial investigation. Second, when treating the estimation as a cross-section, it is not obvious that an industry with more AD cases over the 1995-2003 period has necessarily derived greater benefits from the policy than an industry that had pursued only one. For example, the “one case” industry could have benefited from imposition of a 1995 definitive measure and therefore face little competition from imports over the entire period. A different industry that pursued many cases over 1995-2003 could have faced a number of years of import competition before receiving protection as well as the cost of pursuing multiple legal proceedings.

We define our second stage antidumping *outcome* variable as a coverage ratio, i.e., the fraction of 6-digit HS product imports within a 3-digit ISIC industry’s total imports that face definitive antidumping measures.¹⁴ The construction of this variable also requires some explanation, as we construct a cross-sectional measure intended to capture the *cumulative* effects of an industry’s 1995-2003 antidumping use. First, we construct both the numerator and denominator of the coverage ratio from the *Comtrade* 6-digit HS import data. The denominator, denoting the total value of 3-digit ISIC industry imports, is the sum of the maximum value of yearly imports for each 6-digit HS product over the 1995-2003 period. The numerator of the coverage ratio is the total value of the 6-digit HS imports in the year *prior* to the initiation of the earliest AD investigation that led to a definitive AD measure affecting the product.¹⁵ More formally, let m denote the value of imports, h denote a 6-digit HS product, I be a 3-digit ISIC industry, t be the year of the initiation of an antidumping case between 1995-2003 that ultimately concludes with the imposition of a definitive measure, and A be the subset of 6-digit HS products in I that ultimately face imposition of a new antidumping measure during 1995-2003. Omitting the country subscript, the dependent variable in regression equation (1) is the coverage ratio for industry I defined as

¹⁴ Instead of a coverage ratio of affected imports, alternative approaches for the second stage would be to construct a measure of the size of the imposed final antidumping import restriction or to use a count measure of the number of measures imposed. The first alternative presents serious aggregation and averaging challenges given that most of these developing countries have not adopted the US model of implementing new antidumping measures almost exclusively in the form of an ad valorem duty. It is frequently the case for these developing countries that one subset of industry imports targeted by antidumping might be affected by an ad valorem duty, another subset might be affected by a specific duty, while a third subset might face a price undertaking. The second alternative of using a count measure also presents aggregation challenges given that many antidumping measures may be imposed on the same 6-digit HS product either across exporting countries and/or over time against the same exporter. See, for example, Staiger and Wolak (1994) for the caveats associated with constructing such measures in the case of the US.

¹⁵ There is potential mismeasurement of this variable for at least two reasons. First, we rely on the 6-digit HS data as this is the greatest level of disaggregation common across importing countries, although some countries impose antidumping measures at the 8, 10 or 12-digit level. Second, the numerator in the coverage ratio includes all 6-digit HS imports in a targeted product, and not just from those countries named in the investigation.

$$y_I \equiv \frac{\sum_{h \in A} m_{h,t-1}}{\sum_{h \in I} \max(m_{h,1995}, m_{h,1996}, \dots, m_{h,2003})}$$

3.3 The Trade, Production, and Protection Database and construction of explanatory variables

The construction of the explanatory variables needed for the econometric investigation requires disaggregated industry-level data. We obtain this data from the World Bank *Trade, Production, and Protection Database* (TPP) as described in Nicita and Olarreaga (2006). The TPP has extensive data for many production-related variables for 28 3-digit ISIC manufacturing industries across a number of countries for 1976-2004. Nevertheless, we set up our model as a cross section because the time-series dimension of the data is incomplete for the developing countries, time period, and variables required for our particular investigation.¹⁶

3.3.1 The WTO Antidumping Agreement evidentiary criteria

As we described in section 2.1, the WTO rules for antidumping require that the petitioning industry provide government policymakers with technical evidence that it has been injured by dumped imports. In this section we construct a number of variables to proxy for economic conditions that are consistent with the required evidence.

Our first variables are designed to capture the likelihood that the industry is facing dumping, or prices of competing exports that are below “normal value.” Our first measure is the industry ratio of gross fixed capital formation to value added in 1994. We expect that industries with a greater ratio of capital expenditure and thus higher fixed costs are more likely, *ceteris paribus*, to face cyclical dumping than industries with less expenditure on capital. As a second measure, we compute the average percent change in the price of competing imports in the industry over the post-1995 period.¹⁷ We expect that industries

¹⁶ We do not attempt to exploit the time-series dimension of the production data, as this would force us to lose too many observations. For Argentina and Brazil we also use 1993 data to construct the industry characteristics variables as the 1994 data is not available for these countries. Finally, the need for production data requires us to focus on manufacturing industries only; thus we lose a handful of observations relating to these countries’ use of antidumping against agricultural imports.

¹⁷ First note that for the production-level variables required from the TPP database, most of the data ends in 2000 if not a year or two earlier, which forces us to use data from 1995-2000 only to construct the changing market conditions variables. Second, with respect to the changing import price variable, we rely on the mirrored import unit values data in the TPP database to construct this measure. These are prices constructed from statistics reported by exporters rather than importers. We expect that estimated coefficients for this variable may be biased toward zero. This is because some antidumping investigations result in price undertakings, which provide an inducement for exporters to raise their prices to avoid facing duties.

facing cyclical dumping and/or rapidly declining prices for competing imports find it easier to provide evidence of dumping and are thus more likely to be successful in pursuing antidumping.

Next we create two indicators of “injury” to include in the estimation.¹⁸ The first is the average yearly growth of industry output in the post-1995 period. Industries with declining output are more likely to pursue and be granted antidumping import protection because they are better positioned to provide evidence of injury. Our second variable is defined as the average yearly change in the industry’s import penetration ratio over the period.¹⁹ Industries that face rapidly increasing import competition are more likely to be injured and to be able to blame that injury on dumped imports than industries in which import competition has not been increasing.

3.3.2 Political-economic determinants

Next consider the variables that the theory of endogenous trade policy suggests as potentially affecting the pursuit and receipt of antidumping import protection. We construct two variables designed to capture the size of the industry, which may affect both its ability to overcome the resource cost of an antidumping investigation and the political value to domestic policymakers of protecting the industry. The first is the dollar value of industry output in 1994. The second variable is the 3-digit ISIC industry’s 1994 share of the country’s total employment.²⁰ The theory suggests that larger industries are more likely to pursue antidumping and to find sympathetic policymakers willing to grant them protection from imports.

Nevertheless, large industries may have difficulty organizing politically to pursue antidumping protection if they are also diffuse. Hence, we seek a measure of the concentration of the industry to control for its ability to overcome the free rider problem and organize successfully. The TPP includes a variable indicating the number of establishments in each industry in 1994, which we use as our concentration measure.²¹ Once we control for industry size with our output and employment variables described above, we expect that industries with fewer establishments are more likely to be able to organize politically to pursue antidumping protection and to be able to coordinate a more compelling legal case to convince domestic policymakers to impose an antidumping measure, *ceteris paribus*.

¹⁸ Some antidumping authorities are also likely to use the falling import price variable as an indicator of injury, given the quotation from the Antidumping Agreement in section 2.1.

¹⁹ The import penetration ratio is constructed from the 3-digit ISIC data in the TPP. The numerator is the industry’s import value, and the denominator is output + import value – export value.

²⁰ For the denominator of this variable, we take as our total labor force measure the country’s “total economically active population” from the International Labour Organization’s (<http://laborsta.ilo.org/>) labor force surveys.

²¹ The measure typically used in studies involving the US would be the four-firm concentration ratio or a Herfindahl index. Such measures are not systematically available for industries in the developing countries in our sample.

Our last political-economic variable captures the level of import competition facing the industry, measured by the industry's 1994 import penetration ratio. The theory predicts that, *ceteris paribus*, an industry that faces little competition from imports is unlikely to spend resources to pursue antidumping to shield it from future import competition. A lower value for the import penetration ratio may capture two distinct global competitiveness scenarios facing the industry, but both have the same implication for its future pursuit of antidumping: the industry may already be shielded from imports because of higher tariff or non-tariff barriers; alternatively, the industry could be one in which the country has a global comparative advantage.

3.3.3 Other country and industry control variables

We also want to consider specifications that control for additional concerns. One such factor, as discussed in section 2.2, is that certain industries may be more likely than others to pursue antidumping, perhaps because of learning across countries or because of retaliation/enforcement concerns.²² Thus, in some specifications we include 3-digit ISIC industry-specific fixed effects to control for unobservable industry characteristics that affect use of the antidumping process across countries.

A cross-country estimation exercise may also control for country-specific differences, such as government preferences, the quality of national institutions, and macroeconomic shocks. Countries may differ in access to antidumping policy due to specifics of national law, the efficiency of the administering bureaucracy, etc.²³ The countries in our sample also differed in their exposure to exchange rate fluctuations (e.g., Asian Crisis, currency devaluations in Argentina and Brazil) and other macroeconomic shocks during the 1995-2003 period in ways that may have affected their industries' demand for antidumping import protection.²⁴ Thus, in many specifications we include country-specific fixed effects to control for unobservable country characteristics that may uniformly affect the probability of antidumping use by all industries within the country.

Table 4 presents summary statistics for the data and constructed variables used in the formal econometric analysis that we present in the next section.

²² See, for example, Blonigen and Bown (2003), Prusa and Skeath (2004), and Feinberg and Reynolds (2006).

²³ Because our empirical exercise includes only countries that have established and actively used antidumping, this is less of a concern than if our sample of countries included non-users.

²⁴ For a set of four developed countries, Knetter and Prusa (2003) report evidence that changes in real GDP and real exchange rates affect the country's overall number of antidumping investigation filings on a year-to-year basis.

4 Empirical Results

For ease of exposition, we present our estimates from the two-stage Heckman model by splitting them into two tables. Table 5a reports the marginal effects estimates from five different specifications of the selection equation – the impact of political-economic and evidentiary variables on the industry decision to pursue antidumping. The dependent variable is the binary choice of each 3-digit ISIC industry in each of the sample’s nine developing countries to pursue at least one antidumping investigation during 1995-2003. Table 5b presents estimates from the same five specifications of the full model of the impact of these variables on the *second*-stage antidumping investigation outcome, which we define as the coverage ratio of 6-digit HS products within a 3-digit ISIC industry imports that faced a newly imposed final antidumping measure during the 1995-2003 period.

Our preferred specification of the model presented in tables 5a and 5b is (3), in which we control for unobserved country and industry-specific effects.²⁵ Nevertheless, we begin our presentation of the empirical results with specification (1), which is an estimate of the Heckman model without these fixed effects, and we interpret our results and their sensitivity to different specifications in detail in the next two sections. We turn to a discussion of the *economic* significance of the results in section 4.3.

4.1 First-stage decision: what determines industry pursuit of antidumping protection?

Consider table 5a beginning with specification (1), which reports estimates from the sample of data *without* controls for industry and country-specific effects. While this is not our preferred specification due to the lack of control for these unobservables, it is noteworthy that the coefficient signs for almost all of the explanatory variables in the selection equation are consistent with both the predictions of the theory of endogenous trade policy and the evidentiary requirements specified in the WTO Antidumping Agreement. In accordance with the theory, industries are more likely to pursue an antidumping investigation if they face more competition from imports and are more politically valuable as measured by their size (value of output and industry share of total employment). With respect to the WTO’s evidentiary criteria, industries are more likely to pursue antidumping investigations if they have greater capital expenditure and are thus more likely to face cyclical dumping, and for the post-1995 period, if they face greater reductions in the price of competing imports, greater reductions in industry output, and more rapid increases in import penetration. Nevertheless, although each of these variables in specification (1) has a coefficient estimate with the predicted sign, the only variables whose impact is statistically

²⁵ Interestingly, while specifications (1) and (2) estimate the correlation of the error terms across the selection and regression equations (i.e., ρ) as being statistically different from zero, this result disappears once we introduce industry-specific effects in specification (3).

different from zero in this specification are the size of the industry (as measured by value of output) and the industry's capital expenditure.

The one variable from specification (1) that is *inconsistent* with the basic political-economic theory is our industry concentration measure, defined as the number of establishments. We expect the number of establishments to be negatively related to an industry's ability to organize, overcome the free rider problem, and successfully pursue antidumping protection from its domestic government. While there is no evidence of this phenomenon in the first specification (the estimate is positive, though not statistically significant), once we add country-specific fixed effects in the selection and regression equations in specification (2), the marginal effect estimate is negative and statistically significant. While this negative estimate for its impact on the first-stage decision is not robust to the further addition of industry-specific fixed effects in specification (3), the evidence provided in table 5b below confirms that once we control for unobservable country-level variation through fixed effects, the concentration measure is negative and statistically significant in *either* its impact on the first stage antidumping pursuit decision *or* the second stage antidumping protection outcome. Thus, we conclude that industry concentration does affect the process, as industries with fewer establishments receive more protection via antidumping than less concentrated industries, *ceteris paribus*.

Once we add the country-specific fixed effects to the estimation, the estimated signs of the other determinants in the selection equation in specification (2) of table 5a do not change. However, adding the country-level effects does improve upon the estimation results as the marginal effect for the variable capturing the impact of the post-1995 period average percent change in import prices is now also statistically significant. Once again, adding country-specific effects in the first and second stages controls for possible differences across the nine developing countries in their probabilities of using antidumping due to differences in national institutions, government preferences, or macroeconomic shocks they faced during the period.

In specifications (3) and (4) we add industry-specific effects – first, only in the regression equation, and then in both the selection and regression equations. We proceed sequentially because the introduction of industry-specific effects in the first-stage selection equation with a binary dependent variable causes us to lose a substantial number of observations for which there is no variation within a given industry across countries as to whether it seeks antidumping protection (see again table 2). When we add industry-specific effects in the second stage only in specification (3), there are three qualitative changes to the estimates in the selection equation in table 5a (comparing specifications 2 and 3). The first has been noted above – the estimate for our industry-concentration proxy (number of establishments) is no longer negative in the industry antidumping pursuit decision, though it turns out to have a negative and significant impact in the second stage antidumping outcome decision. The second change is similar, as the

inclusion of industry-specific effects in specification (3) indicates that the capital-expenditure proxy for cyclical dumping is no longer statistically significant in the first-stage antidumping pursuit decision. Nevertheless, as we confirm in our discussion of the second-stage outcome estimates presented in table 5b below, the capital-expenditure measure has a positive estimate and is statistically significant in *either* its impact on the first-stage antidumping pursuit decision *or* the second-stage antidumping protection outcome, if not both. Thus, we also conclude that the likelihood that an industry faces cyclical dumping does affect the process, as industries with a greater capital expenditure more successfully pursue antidumping import protection than other industries. The final qualitative change for specification (3) is that the measure of the industry's 1994 import penetration ratio is positive and statistically significant once we control for industry-specific unobservables.

Specification (4) adds industry-specific effects in the first-stage selection equation as well as to the second stage. The qualitative pattern of the results is almost identical to those of specification (3); the primary quantitative difference is the size of some of the reported marginal effects. To get a sense for which of these changes are due to the difference in underlying samples of data (i.e., the inclusion of industry-specific effects loses 50 observations when compared to the baseline sample) versus the change in specification, consider also column (5), which reports the same specification as (3) but on the same sample of data found in (4).²⁶ For the estimates that are statistically significant, most of the difference in the size of the coefficient estimates can be attributed to controlling for industry-specific effects as opposed to focusing on a subsample of data.

Finally, it is worthwhile to highlight that once we include industry-specific effects in the first stage in specification (4), there is still robust evidence that political-economic determinants and the WTO's evidentiary criteria affect the decision of an industry to pursue an antidumping investigation. This is noteworthy because the results are robust *even though* adding industry-specific effects forces the estimation to drop all observations of some of the major industrial users of antidumping, particularly steel and industrial chemicals. Thus, it is important to note that our results are *not* driven by the steel and chemical industries alone.

²⁶ ISIC categories 351 (industrial chemicals) and 371 (iron and steel) have antidumping investigations across all countries in the sample, while ISIC categories 314 (tobacco), 323 (leather products), 332 (furniture) and 342 (printing and publishing) did not see antidumping investigations in any of the countries. Since the industry-specific effect alone perfectly predicts the first-stage binary decision for these industries, they are dropped from specifications (4) and (5).

4.2 Second-stage outcome: what determines how much antidumping protection an industry receives?

Next consider table 5b, which presents our second-stage estimates of the Heckman model. These estimates examine the impact of the same explanatory variables on the antidumping investigation's outcome, defined as the coverage ratio of 6-digit HS imports within a 3-digit ISIC industry that face definitive antidumping measures imposed over the 1995-2003 period. Once again, while our preferred specification is (3) because it includes country and industry-specific fixed effects, we begin our discussion of an estimation of the model without these controls.

Similar to the selection-equation results in specification (1), in the regression equation, almost every explanatory variable has an estimated impact on the antidumping investigation outcome that is consistent with the theory.²⁷ Nevertheless, similar to the selection equation, without the country- and industry-specific controls, the only variables that matter statistically are the size of the industry (as measured by the value of its output) and the capital expenditure. Specification (2) of table 5b adds country-specific fixed effects to both stages of the model, and specifications (3) and (4) present the second stage model estimates in which industry-specific fixed effects are added first to the regression equation only (specification 3) and then to both the regression and selection equations (specification 4). Specification (5) is a final robustness check, presenting the same model specification of column (3) on the subsample of data estimated in column (4).

Our remaining discussion focuses on the second-stage estimation results that are robust across specifications (3) through (5) once we control for unobservable country-specific and industry-specific effects. The estimates indicate four variables that are statistically significant and with the theoretically predicted sign. Between 1995 and 2003, governments in these developing countries imposed antidumping protection over a greater share of industry-level imports: i) the larger is the industry, as measured by the value of its 1994 output; ii) the more concentrated is the industry, as measured by the fewer the number of establishments in 1994; iii) the more likely is the industry to face cyclical dumping, as measured by its 1994 ratio of capital expenditure to value added; and iv) the more rapid the increase in import competition the industry faced, as measured by the average yearly percent change in its import penetration ratio over the post-1995 period.

²⁷ The exceptions in specification (1) are the concentration measure (number of establishments) and the employment share variable.

Once again, it is important to point out that these results continue to hold even in specifications (4) and (5) and are thus robust to estimation on a subsample of data that *drops* industries that are stereotypical antidumping users, specifically steel and industrial chemicals.²⁸

Finally, as a robustness check, we have also estimated specifications of the Heckman model in which the selection and regression equations each have distinct explanatory variables. This is meant to address the concern that there may need to be some determinants that affect the industry decision to pursue an antidumping investigation (the selection equation) but not the coverage ratio of the amount of protection granted (the regression equation). While we do not report them here to conserve space, the estimated results from those specifications are qualitatively consistent with those presented in tables 5a and 5b and are available from the author on request.

4.3 Summarizing and interpreting the economic significance of the estimates

In this section we summarize our results and provide a discussion of their economic significance. Consider the implications of specification (3) and the estimates presented in tables 5a and 5b. After we control for the industry-specific and country-specific likelihood of both pursuing and imposing antidumping measures, we find evidence consistent with the theory of endogenous trade policy formation in the context of an antidumping law: larger industries that face substantial import competition are more likely to pursue an antidumping investigation, and larger and more concentrated industries receive more comprehensive antidumping protection from imports. Furthermore, we also find that, relative to non-using industries, AD-using industries are more likely to face changing economic conditions consistent with the technical evidentiary criteria mandated by the WTO Antidumping Agreement: industries that face rapidly falling import prices are more likely to pursue an investigation, and industries more likely to face cyclical dumping because of higher capital expenditure and which face more rapid increases in competition from imports receive more comprehensive antidumping protection. Our results for determinants of the successful industrial use of antidumping in developing countries are similar to the political-economic determinants of its use in the US and EU, where it has been studied extensively and surveyed in Blonigen and Prusa (2003) and Nelson (2006).

Are the specification (3) estimates economically important? Consider first the selection equation estimates of determinants of the industry decision to pursue an antidumping investigation presented in table 5a. First note the predicted probability of pursuing an antidumping investigation is equal to 0.425

²⁸ As we explained in section 4.1, the inclusion of industry-specific effects (specification 4) in the selection equation forces the estimation to drop industries with no variation across countries as to whether they pursue antidumping investigations in the first stage. Examples of such industries in our sample of data include steel and industrial chemicals, which pursued antidumping investigations in all nine countries.

when the coefficient estimates are evaluated at the mean value of each explanatory variable.²⁹ With respect to the statistically robust estimates in table 5a, the economic impact of the results of specification (3) are: i) a 1 percentage point increase in the import penetration ratio would increase the probability of an investigation by 0.006; ii) each \$1 billion increase in the value of an industry's output increases the probability of an investigation by 0.07, and iii) for each additional 1 percentage point drop in the average yearly percent change in import prices over the post-1995 period, there is a 0.008 increase in the probability of an antidumping investigation. These estimates are economically significant. *Ceteris paribus*, a one standard deviation change in each variable in the direction indicated above implies a predicted increase in the probability of an investigation by 0.154 (import penetration), 0.360 (value of output) and 0.074 (average percent change in import prices), when compared to the predicted probability of an investigation when evaluated at the means of the data of 0.425.

Consider next the regression equation estimates in table 5b regarding determinants of the coverage ratio of 6-digit HS imported products within a 3-digit ISIC industry receiving antidumping import protection. First note the predicted coverage ratio is equal to 0.075 (i.e., 7.5% of industry imports are in 6-digit HS products that have obtained protection through definitive antidumping measures applied between 1995-2003) when the coefficient estimates are evaluated at the mean value of each explanatory variable, and recall that means and standard deviations of the underlying data are reported in the lower half of table 4. With respect to the statistically robust estimates in table 5b, the economic impact of the results of specification (3) are: i) each \$1 billion increase in the value of an industry's output increases the coverage ratio by 0.433 percentage points; ii) a 1000 firm reduction in the number of establishments in the industry increases the coverage ratio by 0.70 percentage points; iii) a 1 percentage point increase in the ratio of capital expenditure to value added increases the coverage ratio by 0.071 percentage points; and iv) each 1 percentage point increase in the average annual percent change in import penetration over the post-1995 period increases the coverage ratio by 0.281 percentage points. These effects are also economically significant. *Ceteris paribus*, a change of one standard deviation in each variable in the direction indicated above increases the ratio of industry imports covered by an antidumping measure by 2.9 percentage points (value of output), 2.6 percentage points (number of establishments), 2.3 percentage points (ratio of capital expenditure to value added) and 2.1 percentage points (average percent change in import penetration), when compared to the predicted coverage ratio of 7.5% when evaluated at the means of the data.

²⁹ The actual share of the 228 industry observations in the sample that pursued an antidumping investigation was 0.412 (i.e., 94 industries). Also recall that the statistics reported in the table have already been converted to the

5 Conclusion

The increase in antidumping use by developing countries raises the concern that much of the trade liberalization commitments they undertook as part of the Uruguay Round negotiations may be offset *de facto* by new protection. This paper investigates industry pursuit of antidumping across nine major developing countries in the 1995-2003 period and provides evidence that this use is consistent with industry characteristics predicted by the WTO's evidentiary requirements and the theory of endogenous trade policy. After controlling for country and industry-specific effects, we find that the industries that successfully pursue new protection from imports by using antidumping have the following characteristics: they are larger, more concentrated, have greater capital expenditure, and they face substantial (and increasing) import competition and more rapidly declining prices of competing imports. Our results are statistically and economically significant, and they are robust to subsamples of data that exclude stereotypical AD-intensive industries such as steel and industrial chemicals.

Understanding the causes of developing country use of antidumping is important for a number of reasons. First, many of these countries are increasingly taking on WTO commitments that restrict their ability to use other trade-restricting policies. The resulting pattern of antidumping import protection may thus be an increasingly important indicator of these countries' overall pattern of industrial import protection. However, some analysts have suggested a potentially important function of the antidumping undertaken by these developing countries. Finger and Nogués (2005), for example, contains a set of case studies for many of the Latin American countries in our data sample.³⁰ Each case study examines the details of a particular country's adoption of antidumping (and other trade remedy) law, provides a discussion of how the law has been used, and in some cases, how it has even been reformed during this time period. A common theme from many of the country-level case studies is that antidumping helped provide an escape valve that domestic policymakers used to manage an overall program of trade liberalization during this time period. The theory is that antidumping may positively affect the sustainability of a country's overall liberalization commitment and/or increase a country's ex ante willingness to take on more extensive liberalization commitments than it would take on without such an option.³¹

marginal effects estimates, and the means and standard deviations of the underlying data are reported in the upper half of table 4.

³⁰ See specifically the Finger and Nogués (2005) chapters by Nogués and Baracat (Argentina); Kume and Piani (Brazil); Reina and Zuluaga (Colombia); Reyes de la Torre and González (Mexico); and Webb, Camminati, and Thorne (Peru).

³¹ Our evidence from table 5b is broadly consistent with this theory. If trade liberalization leads to additional import competition, our results are that industries with a more rapid increase in its average yearly percent change in import penetration receive more protection from imports via antidumping over the 1995-2003 period. For a broader discussion of the theory behind this issue, see Hoekman and Kostecki (2001, chapter 9).

But even if antidumping contributes to a country's process of trade liberalization, it is equally important to identify the potential long-term economic costs of this contribution.³² As a caveat, we conclude by pointing to some of the costs experienced by the historical users of antidumping where the policy has a longer track record. First, it is perhaps not surprising to learn that it is difficult for governments to remove an antidumping measure once it has been imposed and an industry is benefiting from the protection it provides. While Article 11 of the WTO Antidumping Agreement introduced a mandatory 5-year "sunset review" investigative procedure for each imposed measure, evidence for the US suggests that this requirement has little impact on the removal of already imposed measures (Moore, 2006; Liebman, 2004). Furthermore, among WTO members, there is no historical precedent for a country that has been an intensive user of antidumping suddenly to curtail that use (Zanardi 2004; table 2). When combined, these findings suggest that over time, the *cumulative* impact of antidumping measures in place in an economy may be substantial even though each distinct antidumping investigation may cover only a few products and may thus seem to pose little overall economic threat. Indeed, in a study of the cumulative effects of the US use of antidumping law, Gallaway, Blonigen and Flynn (1999) conclude that US-imposed import protection under antidumping made it the second most costly trade policy program in terms of lost US economic welfare in 1993, trailing only the Multi-Fibre Arrangement.

³² There is also the concern that many antidumping laws are designed so as not to give legal standing during the investigative process to the domestic industries or consumers that would be adversely affected by import restrictions (Finger, 2002). Thus even the short-run economic costs of imposed measures may be nontransparent, which makes the reporting requirements mandated by the WTO and data generation efforts on the use of antidumping such as those collected in Bown (2005a) an important step in improving transparency.

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Figure 1. Two Stage Model Forming the Basis for Estimation

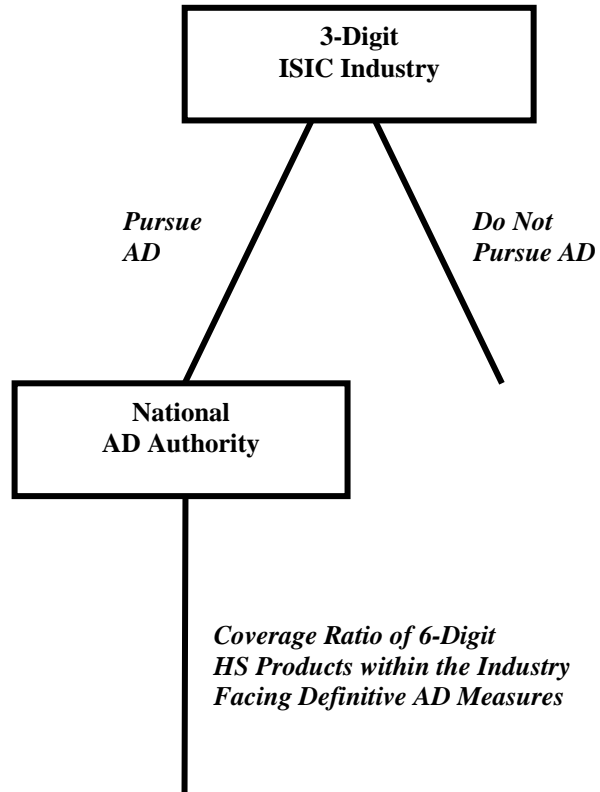


Table 1. Use of Antidumping by Countries under Recent GATT and WTO Periods

Country	GATT Period, 1985-1994	WTO Period, 1995-2004	
	Number of Antidumping Investigations	Number of Antidumping Investigations	Number of Antidumping Measures Imposed
“New User” Developing Countries in the Empirical Analysis			
Argentina	44	192	139
Brazil	58	116	62
Colombia	11	23	11
India	9	400	302
Indonesia	0	60	23
Mexico	123	79	69
Peru	11	55	34
Turkey	74	89	77
Venezuela	6	31	25
...Subtotal (share of total)	336 (16.2%)	1045 (39.5%)	742 (44.8%)
“Historical” Users of Antidumping			
Australia	447	172	54
Canada	223	133	80
European Union	364	303	193
United States	475	354	219
...Subtotal (share of total)	1509 (73.1%)	962 (36.4%)	546 (33.0%)
Other WTO Members (share of total)	220 (10.7%)	639 (24.1%)	368 (22.2%)
Total	2065	2646	1656

Source: Data for the 1985-1994 use of antidumping is taken from Zanardi (2004, table 2). Data for the 1995-2004 initiations and measures used in this table is taken from WTO (2005a,b).

Table 2. Industry Use of Antidumping Across Nine Developing Countries, 1995-2003

3-digit ISIC Industry	ARG	BRA	COL	IND	IDN	MEX	PER	TUR	VEN
311 Food products	I A	I A		I	I	I A	I A		
313 Beverages									I
314 Tobacco									
321 Textiles	I A	I A	I	I A		I A	I A	I A	
322 Wearing apparel except footwear							I		
323 Leather products									
324 Footwear except rubber or plastic							I A		I A
331 Wood products except furniture	I A								
332 Furniture except metal									
341 Paper and products	I A	I A		I A	I	I A			I
342 Printing and publishing									
351 Industrial chemicals	I A	I A	I A	I A	I A	I A	I A	I A	I A
352 Other chemicals	I A	I A		I A	I A	I A			
353 Petroleum refineries				I A					
354 Misc. petroleum and coal products				I A					
355 Rubber products	I A	I A	I	I A			I A	I A	
356 Plastic products	I A	I A					I A		I A
361 Pottery china earthenware				I A		I			
362 Glass and products	I A	I A		I A				I A	
369 Other non-metallic mineral products	I A	I A		I A		I			
371 Iron and steel	I A	I A	I A	I A	I A	I A	I A	I A	I A
372 Non-ferrous metals		I		I A	I A		I A		
381 Fabricated metal products	I A	I A		I A		I A	I A	I A	I A
382 Machinery except electrical	I A	I A		I A		I A		I	
383 Machinery electric	I A	I A		I A		I			
384 Transport equipment	I A	I				I A		I A	
385 Professional and scientific equipment	I A	I		I A			I A	I A	I A
390 Other manufactured products	I A	I A				I A	I A	I A	

Note: Data constructed by the author from Bown (2005a). Countries are Argentina (ARG), Brazil (BRA), Colombia (COL), India (IND), Indonesia (IDN), Mexico (MEX), Peru (PER), Turkey (TUR) and Venezuela (VEN). "I" indicates industry had at least one antidumping investigation initiated during the period. "A" indicates industry received at least one affirmative decision and final antidumping measure imposed during the period.

**Table 3. Comparison of Industry Characteristics
for AD Using vs. Non-using Industries in Nine Developing Countries**

	Mean value for industries pursuing AD investigations, 1995-2003 (N=94)	Mean value for industries not pursuing AD investigations, 1995-2003 (N=134)
<u>Political-economic determinants</u>		
Import penetration ratio in 1994	27.9%	23.5%
Value of output in 1994	\$5.10 billion	\$1.65 billion
Employment share of total employment in 1994	0.3%	0.2%
<u>Antidumping Agreement's evidentiary determinants</u>		
Ratio of gross fixed capital formation to value added in 1994	22.6%	14.2%
Average yearly percent change in import prices, post-1995	-1.5%	-1.1%
Average yearly percent change in import penetration, post-1995	5.5%	5.2%
Average yearly percent change in output, post-1995	3.2%	5.6%

Note: Author's calculations based on an unbalanced sample of 28 3-digit ISIC industries across the nine developing countries listed in table 2.

Table 4. Summary Statistics for Variables Used in the Econometric Investigation

Variables	Predicted Sign	Mean	Standard Deviation	Minimum	Maximum
<u>Selection Equation</u>					
<u>Dependent Variable</u>					
Binary variable = 1 if industry pursued an AD investigation, 1995-2003		0.412	0.493	0	1
<u>Explanatory Variables</u>					
Import penetration ratio in 1994	[+]	0.253	0.258	0	1
Value of output in 1994 †	[+]	0.031	0.049	0.000	0.403
Number of establishments in 1994‡	[-]	0.125	0.268	0.000	2.113
Employment share of total employment in 1994*	[+]	0.021	0.026	0.000	0.199
Ratio of gross fixed capital formation to value added in 1994	[+]	0.177	0.256	-0.066	2.703
Average yearly percent change in import prices, post 1995	[-]	-0.013	0.089	-0.213	0.478
Average yearly percent change in import penetration, post 1995	[+]	0.053	0.130	-0.642	0.512
Average yearly percent change in output, post-1995	[-]	0.046	0.112	-0.436	0.581
<u>Regression Equation</u>					
<u>Dependent Variable</u>					
Coverage ratio of industry imports facing a definitive AD measure initially imposed during 1995-2003		0.069	0.120	0	0.727
<u>Explanatory Variables</u>					
Import penetration ratio in 1994	[+]	0.279	0.242	0.014	1
Value of output in 1994 †	[+]	0.051	0.068	0.001	0.403
Number of establishments in 1994‡	[-]	0.205	0.377	0.001	2.113
Employment share of total employment in 1994*	[+]	0.025	0.028	0.001	0.163
Ratio of gross fixed capital formation to value added in 1994	[+]	0.226	0.329	-0.037	2.703
Average yearly percent change in import prices, post 1995	[-]	-0.015	0.077	-0.161	0.476
Average yearly percent change in import penetration, post 1995	[+]	0.055	0.075	-0.236	0.303
Average yearly percent change in output, post-1995	[-]	0.032	0.094	-0.436	0.269

Notes: † (‡) indicates underlying variable scaled by 100,000,000,000 (10,000). * indicates underlying variable scaled by 0.1.

**Table 5a. Marginal Effects Estimates of the Industry-Level AD Investigation Decision
(First Stage Selection Equation)**

Industry-level explanatory variables	Selection Equation: Binary dependent variable = 1 if industry pursued an AD investigation, 1995-2003				
	(1)	(2)	(3)	(4)	(5)
<u>Political-economic determinants</u>					
Import penetration ratio in 1994	0.075 (0.097)	0.172 (0.113)	0.596 ^a (0.170)	1.005 ^a (0.382)	0.475 ^b (0.190)
Value of output in 1994 †	1.623 ^a (0.375)	2.832 ^a (0.572)	7.347 ^a (2.020)	9.375 ^a (3.403)	4.382 ^b (1.787)
Number of establishments in 1994‡	0.052 (0.066)	-0.202 ^b (0.097)	0.095 (0.242)	0.605 (0.563)	0.379 (0.305)
Employment share of total employment in 1994	0.014 (0.923)	1.492 (1.359)	1.244 (2.022)	7.085 ^b (3.608)	2.609 (2.149)
<u>Antidumping Agreement's evidentiary determinants</u>					
Ratio of gross fixed capital formation to value added in 1994	0.313 ^a (0.106)	0.180 ^c (0.103)	0.291 (0.204)	-0.238 (0.180)	0.047 (0.153)
Average yearly percent change in import prices, post-1995	-0.354 (0.315)	-0.609 ^c (0.323)	-0.830 ^a (0.454)	-2.390 ^b (0.963)	-1.277 ^b (0.645)
Average yearly percent change in import penetration, post-1995	0.270 (0.399)	0.163 (0.432)	0.238 (0.318)	0.504 (0.687)	0.664 (0.579)
Average yearly percent change in output, post-1995	-0.250 (0.275)	-0.372 (0.313)	-0.576 (0.377)	-0.357 (0.622)	-0.591 (0.502)
Country fixed effect in selection equation	No	Yes	Yes	Yes	Yes
Industry fixed effect in selection equation	No	No	No	Yes	No
Country fixed effect in regression equation	No	Yes	Yes	Yes	Yes
Industry fixed effect in regression equation	No	No	Yes	Yes	Yes
Estimate for ρ	1.000 (0.000)	1.000 (0.000)	-0.136 (0.140)	-0.185 (0.299)	-0.135 (0.111)
Log pseudo-likelihood	-18.53	-7.09	18.34	47.70	30.32
Selection equation observations	228	228	228	178	178
Regression equation observations	94	94	94	78	78

Notes: Observations are an unbalanced cross-section of 28 3-digit ISIC industries across nine AD-imposing countries. In parentheses are White's heteroskedasticity-consistent standard errors, with a, b, c denoting variables statistically different from zero at the 1, 5 and 10 percent levels, respectively. Each stage also estimated with a constant term whose estimates are suppressed. † (‡) indicates underlying variable scaled by 100,000,000,000 (10,000). * indicates underlying variable scaled by 0.1.

**Table 5b. Marginal Effects Estimates of the Industry-Level AD Coverage Ratio Outcome
(Second Stage of Regression Equation with Selection)**

Industry-level explanatory variables	Regression Equation:				
	Dependent variable = coverage ratio of industry imports facing final AD measure, 1995-2003				
	(1)	(2)	(3)	(4)	(5)
<u>Political-economic determinants</u>					
Import penetration ratio in 1994	0.030 (0.039)	0.061 (0.042)	0.075 (0.052)	0.102 ^c (0.058)	0.106 ^c (0.060)
Value of output in 1994 †	0.647 ^a (0.184)	0.748 ^a (0.234)	0.433 ^b (0.212)	0.391 ^c (0.204)	0.416 ^b (0.203)
Number of establishments in 1994‡	0.021 (0.028)	-0.058 (0.038)	-0.070 ^a (0.023)	-0.060 ^b (0.025)	-0.061 ^b (0.024)
Employment share of total employment in 1994	-0.024 (0.369)	0.092 (0.501)	-0.031 (0.453)	-0.208 (0.611)	-0.159 (0.547)
<u>Antidumping Agreement's evidentiary determinants</u>					
Ratio of gross fixed capital formation to value added in 1994	0.123 ^a (0.032)	0.083 ^b (0.034)	0.071 ^a (0.016)	0.064 ^a (0.016)	0.061 ^a (0.015)
Average yearly percent change in import prices, post-1995	-0.137 (0.131)	-0.148 (0.135)	0.045 (0.092)	0.039 (0.092)	0.031 (0.083)
Average yearly percent change in import penetration, post-1995	0.117 (0.167)	0.089 (0.167)	0.281 ^b (0.135)	0.413 ^b (0.150)	0.413 ^a (0.147)
Average yearly percent change in output, post-1995	-0.094 (0.102)	-0.058 (0.109)	0.006 (0.075)	0.033 (0.084)	0.033 (0.083)
Country fixed effect in selection equation	No	Yes	Yes	Yes	Yes
Industry fixed effect in selection equation	No	No	No	Yes	No
Country fixed effect in regression equation	No	Yes	Yes	Yes	Yes
Industry fixed effect in regression equation	No	No	Yes	Yes	Yes
Estimate for ρ	1.000 (0.000)	1.000 (0.000)	-0.136 (0.140)	-0.185 (0.299)	-0.135 (0.111)
Log pseudo-likelihood	-18.55	-7.09	18.34	47.70	30.32
Selection equation observations	228	228	228	178	178
Regression equation observations	94	94	94	78	78

Notes: Observations are an unbalanced cross-section of 28 3-digit ISIC industries across nine AD-imposing countries. In parentheses are White's heteroskedasticity-consistent standard errors, with a, b, c denoting variables statistically different from zero at the 1, 5 and 10 percent levels, respectively. Each stage also estimated with a constant term whose estimates are suppressed. † (‡) indicates underlying variable scaled by 100,000,000,000 (10,000). * indicates underlying variable scaled by 0.1.