

# **ANTICOMPETITIVE EFFECTS OF ANTIDUMPING POLICY IN MEXICO**

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## ABSTRACT

Protectionism or retaliation is often argued as the motivation for the increasing use of anti-dumping measures by developing countries. In this research, I address other possible motives for the relentless use of these measures, such as collusion and trade deterrence. The main hypothesis is that price distortions generated by the introduction of anti-dumping policy serve as a departure point for the achievement of the collusive agreement. I develop a theoretical model in which a duopoly compete infinitely à la Bertrand in the importing market and anti-dumping policy serves as a mean to enforce and sustain the collusive outcome. Econometric analysis is performed in order to measure the impact of anti-dumping measures in the Mexican economy. Using a rich panel data of imports I investigate the trade restriction effects of anti-dumping, i.e. trade destruction and trade diversion. Testing for trade harassment effect is also achieved. In depth analysis of the debate between competition policy and anti-dumping policy reform is developed and some recommendations on the application of the competition policy framework are pursued in order to tackle the discriminatory use of the antidumping regime. It considers, however, the need of such an instrument in an environment where production in some sectors is characterized by advantageous conditions that can harm local industries. The research contributes to the literature on antidumping from a developing country point of view and is one of the few works that look in to the effects of antidumping policy in Mexico and puts emphasis on the domestic market structure of the petitioning country.

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I dedicate this work to the memory of my grandfather.

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## INTRODUCTION

Antidumping measures are frequently offered to domestic producers as an escape valve within preferential trade agreements to protect domestic industries against unfair trade practices. Concerns about the protectionist and excessive use of these measures have increasingly made researchers focus on the alternative effects of antidumping policy. In this thesis I address some of these alternative effects, such as collusion and trade deterrence and I also explore empirically some of the consequences of antidumping policy, namely, trade destruction and trade diversion.

Building on standard results of models of firm strategy with antidumping, Chapter 1 borrows from a standard theoretical framework used in AD literature a basic model of repeated interaction between a domestic and a foreign firm that compete in prices in the importing market, with antidumping policy serving as a means to enforce and sustain tacit collusion. The main result of the chapter is that price distortions generated by the introduction of antidumping policy serve as a departure point for the achievement of the collusive outcome and antidumping becomes itself a tool of the collusive mechanism firms engage in. The introduction of antidumping alters the discount factors of future profits that sustain the collusive agreement, relative to those observed under free trade, delaying domestic firm's willingness to collude and prompting foreign firm's. Trade restrictions caused by both these price distortions and the potential collusive effects may cause negative welfare effects that are greater than those supposed to be produced by unfair trade practices from foreign competitors.

In Chapter 2, I explore for the first time for Mexico empirical evidence of the effect of antidumping action on Mexican imports and its in relationship with the market structure of the petitioning industry. Using a rich purpose-built dataset based on the 8-digit level tariff codes identified for 24 antidumping cases carried out during 1994-1998, I examine the trade patterns of the imports involved in the cases. The chapter investigates four effects of AD action previously identified in Prusa (1996): (i) duties increase the price of imports and cause a decrease in the quantity sold in the domestic market, (ii) the larger the duty, the larger the price increase and the quantity decrease, (iii) for small duties the volume of imports may not decrease and even grow, and (iv) non-investigated imports serve as a substitute for the trade restraint caused by duties and eventually offset the duty effect. Particular attention is given to the market structure of the domestic industry, which in most of the cases is characterized as highly concentrated and with investigated imports as the major competitor of the antidumping petitioners. The descriptive analysis carried out confirms the existence of the above effects. It also shows that important import deterrence motives may lie behind the claims for AD action by dominant petitioners, which should be of concern to the antidumping authority.

In Chapter 3, I estimate the effects of antidumping measures on Mexican imports investigated for the first time in Niels (2004). Using a Box-Cox Tobit random effects model that is appropriate for the purpose-built censored panel data, I confirm previous evidence of a trade destruction effect of antidumping action. In addition, evidence of a trade diversion effect not found previously is shown. However, when US cases are excluded from the estimation the trade diversion effect disappears. Evidence of some reputation effect is also found although through prices rather than values as previously. Analysis of the market structure of the domestic industry reveals that 19 out of the 24 antidumping cases investigated during the period 1994-1998 are characterized by high concentration of firms and high share of domestic production,

and that investigated imports are the major foreign competitor in the domestic market. The likely dominant position of the domestic petitioner together with the deterrence effect of AD action might result in important welfare losses for the economy that should earnestly be addressed.

To solve the problem of antidumping, countries should consider abolishing their antidumping legislation and turning to competition law for the treatment of price discrimination in the form of dumping, as it is now done within the trade association areas of The European Union, Australia and New Zealand's ANCERTA and Chile and Canada. NAFTA offers the perfect framework for the abolition of national antidumping legislations.

## CHAPTER 1

### **Alternative effects of antidumping policy: Should the Mexican authority worry?<sup>1</sup>**

#### ***1.1 Introduction***

According to the World Trade Organisation (WTO) dumping occurs when the price of an exported good is lower than the home market price of that good. In other words, exports are sold at unfair value in the importing country because their price is lower than the price consumers pay for the same good in the exporting country. Article VI of the General Agreement on Trade and Tariffs (GATT) allows country members to levy duties on dumped imports under three conditions to be satisfied altogether:

- (i) Dumping exists (dumping margin).
- (ii) The domestic industry is suffering material injury, is threatened of material injury or its establishment is materially retarded because of imports.
- (iii) There is a causal relationship between the two.

Although GATT's Antidumping Code was submitted in 1976 many country members already counted with their own national antidumping (AD) rules, and it was only after 1979 Tokyo Round Agreement that the increasing use of AD measures raised big concerns on the actual motives of their use. Amendments to the rules in the Tokyo Round agreement introduced sales below cost as a dumping practice and removed the need to proof material injury, which boosted AD actions from less than a dozen cases per year in the 1960's to about 250 cases per year in recent years (Prusa, 2001).

Study of the motives of the surge in the use of AD has been developed mainly by focusing on the AD practice of 'traditional users' such as the US and the EU, who together with Canada, Australia and New Zealand have been the major uses of AD measures. Nevertheless, developing countries such as Mexico, Brazil, Argentina, India, South Korea, among others, the 'new users', have filed since the late 1980's more AD petitions than the traditional users (see below)<sup>2</sup>.

The aim of this chapter is to show that AD policy may serve as a mean to achieve tacit collusion between the domestic and the foreign firms or industries involved in an AD petition in the importing market. The analysis focuses on the proceedings of the Mexican AD policy, which is different from other AD legislations, specifically in the US or EU, private settlements between the parties involved in the AD investigation are not allowed and price undertakings are rarely observed<sup>3</sup>. It also intends to address the topic from a developing country's point of view and to build on current debates on antidumping and its abuse<sup>4</sup>.

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<sup>1</sup> A previous version of this chapter was published as "Alternative Effects of Antidumping Policy: Should Mexican Authorities be Worried?", *economia mexicana NUEVA EPOCA*, Vol.XVI, No.1, first semester, 2005, Mexico.

<sup>2</sup> See Miranda, et al. (1998) for worldwide use of anti-dumping.

<sup>3</sup> A price undertaking is a commitment by the foreign firm to raise its export price or reduce the quantity exported. Both the private settlement and the price undertaking result in the suspension or termination of the case. Prusa (1992) first introduced the collusive consequences of withdrawn cases in the US.

<sup>4</sup> Despite the fact that new users are currently very active players in the AD field, research focusing on them is still scarce. See for instance Prusa (2001), Niels (2004), Esquivel and Solis (2002).

Within a duopoly price-competition framework, the model presented arrives at standard results that the introduction of AD policy distorts firms' pricing strategies. The consequence is a higher price level in the importing market relative to the free trade Nash-equilibrium, i.e. no AD policy. The observed price increase serves as a departing point towards the achievement of a collusive price agreement between the domestic and the foreign firm. When the benchmark game is infinitely repeated, the filing of an AD petition acts as the punishment strategy from deviation, making the collusive outcome subgame perfect. The threshold value of the discount factors<sup>5</sup> that make the collusive conditions hold are altered when AD policy is introduced, relative to those prevailing under free trade. This, results in a higher discount factor for the domestic firm to engage in the collusive agreement and smaller for the foreign firm.

Finally, this chapter also intends to contribute to the literature on AD by introducing the analysis from the perspective of a developing country. The structure of the chapter is as follows. Section 1.2 describes why it is relevant to study AD. Section 1.3 briefly reviews the general literature on AD and section 1.4 on the relationship between AD and collusion. Section 1.5 and 1.6 illustrate the current trends of AD measures worldwide and in Mexico, respectively. Section 1.7 sketches the AD proceedings under the Mexican legislation. Sections 1.8 through 1.11 develop the model. And section 1.12 concludes with some concluding comments.

## ***1.2 Relevance of the study of antidumping***

It is important to say first, that this chapter deals with the analysis of the use of AD rather than dumping mainly because price discrimination is for much considered a common practice in international trade<sup>6</sup>. Viner (1923) considered dumping or price discrimination an efficient monopoly practice accepted when consumers benefited from low prices. For instance, a monopoly will export at a low price to obtain economies of large scale or maintain full capacity without reducing its domestic price providing consumers in the importing market with a flow of cheap goods. Similarly, Brander and Krugman (1983) show how a monopoly price discriminates across markets and reciprocal dumping arise (competitors dumping to each others' domestic market). Dumping below cost has also been showed to be efficient under demand uncertainty (Davies and McGuinness, 1982; Ethier, 1982), under imperfect information of future rents (Clarida, 1993), or with incomplete and asymmetric information (Hartigan, 1994<sup>7</sup>). Nevertheless, the regard of dumping as an unfair trade practice as well as the increasing use of AD measures has made researchers focus on the causes and effects of the latter<sup>8</sup>. As said above, research bias towards traditional users does not give account of the matter in developing countries. Moreover, the debate on AD was an important component of the agenda in the last WTO conference in Doha, and in consequence incorporated as a core issue in the ministerial meeting of Cancun<sup>9</sup>.

## ***1.3 Previous work on antidumping***

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<sup>5</sup> A discount factor can be interpreted as the patience of firms to achieve long-term gains.

<sup>6</sup> See Dale (1980) for a clear appraisal of the economic foundations of dumping and antidumping.

<sup>7</sup> Cited in Niels (2004).

<sup>8</sup> See Finger, et al. (1982), Ethier and Fischer (1987), Fischer (1992), Anderson (1992) for first addressing of anti-dumping.

<sup>9</sup> However, due to the failure of the ministerial meeting in Cancun no agreement was reached with this regard. See Evenett (2003), for instance for comments on the failure of Cancun.



There is a large strand of literature concerned with the protectionist use of AD since more trade liberalisation practices have been encouraged and traditional trade barriers eliminated, AD measures being the only permitted protectionist device. Much of the analysis of the use of AD here is based on macroeconomic and political factors that induce domestic firms to claim AD action<sup>10</sup>. AD is also considered as a necessary condition for the enforcement of trade liberalisation practices and a guarantee for the domestic industry against unfair trade practices<sup>11</sup>. Similarly, another large strand of the literature has addressed the issue relying on the industrial organisation framework for the analysis. The focus is on the strategic behaviour of firms, i.e. the choice of price or quantity levels, facing AD actions where trade protection is endogenous to firms' strategic behaviour<sup>12</sup>.

Blonigen and Prusa (2003) provide an extensive description of the work carried out on the different market outcomes resulting from the introduction of AD policy. They can range from trade and investment diversion to collusion.

#### ***1.4 Antidumping and collusion***

Evidence of collusive agreements between domestic and foreign firms or among domestic firms by the means of AD action has been proved at different occasions. One case, for instance, involved a cartel of US producers of ferrosilicon who claimed AD action against five foreign competitors. With the cartel's sales restrictions accepted as proof of injury, duties were levied in 1993. The cartel then invited Brazilian producers, who started to export to the US, to form part of the agreement, but as the offer was not accepted AD action was claimed again and duties imposed. Later, the cartel was discovered and members found guilty. Similarly, in New York in 1995, a foreign firm argued that an AD action was exercised against it as a response by the domestic firm negative to accept a collusive agreement (Taylor, 2004, p. 2).

Looking at the relationship between cartels and AD within the European Community, Messerlin (1990) observes that, during 1980-1987, those cases claiming AD action in the chemical industry had a twin case in an anticartel. About 25% of the EC anticartel cases were related to products also involved in AD cases, suggesting that the imposition of duties grants a high level of protection to the industry, which is essentially needed for the generation of a more stable and strong cartel. Therefore, he suggests that AD actions should be subordinated to competition law<sup>13</sup>.

A great number of AD cases in the US are withdrawn before reaching a final decision. It is calculated that trade restrictions generated by withdrawn cases during the period 1980-1982 were at least as much as those generated by cases that ended up in an AD duty. Accordingly, withdrawn cases, which can result from a private settlement between the foreign and domestic firms or from an agreement between the foreign firm and the domestic government to restrain the quantity or increase the price of imports, may produce a collusive outcome with AD policy facilitating practice

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<sup>10</sup> See Finger et al. (1982), Yarrow (1987), Feinberg (1989), Knetter and Prusa (2000).

<sup>11</sup> See Kholer (2001) cited in Niels (2004).

<sup>12</sup> Leidy and Hoekman (1990), Fischer (1991), Anderson (1992), Prusa (1994), Kolev and Prusa (1999), Vandenbussche, Pauwels and Waverbergh (2008).

<sup>13</sup> Although the debate on the appropriate way to address the problem of AD, be it whether by AD policy itself or by competition policy, is here barely referred to in the conclusive section, the Mexican competition commission has not carried out any investigation related to cartel behaviour. Nevertheless, the conclusions to which I arrive in this chapter as well as the literature suggesting an important relationship between collusion and AD might stimulate a line of anticartel investigation on selected AD cases.

(Prusa, 1992). This is possible since a settlement reached by rival firms can benefit both and there exists an antitrust exemption that supports the achievement of a settlement and allows the petitioner to withdraw when this is reached (Prusa, 1992, p. 6)<sup>14</sup>. AD proceedings in the US provide the possibility for settlements reached either privately or under government intervention before the AD authority submits the final decision of the petition. Using a bargaining game to solve for the optimal settlement in a duopoly Bertrand-Nash framework, Prusa's model predicts that firms will always prefer a settlement to the authority's final decision. By negotiating, the foreign firm will at least avoid paying for the duty and the domestic firm will at least get the duty outcome profits. Therefore, that any settled outcome can result in collusive behaviour is evidence that firms use AD for motives different from those originally intended by the law.

Different studies followed Prusa's work in the investigation of the incentives of firms to withdraw the AD petition or wait for the authority's final decision. Bargaining power and co-ordination costs of the domestic and foreign firm affect their decision whether or not to accept the settlement. However, profits under a settlement are greater than expected profits under the imposition of duties, thus supporting the hypothesis that AD is used as a mean to achieve collusion (Zanardi, 2000). Asymmetric information is another reason why withdrawn cases are observed (Panagariya and Gupta, 1998). In their model, firms will always privately negotiate on the price under complete information, and the case is withdrawn with the likely joint profit maximisation similarly to Prusa (1992). Nevertheless, when information is asymmetric, for instance, on the possible level of the duty (i.e. one firm knows the level of the duty and the other does not), the outcome may rather result in the firms waiting for the final decision and duties paid.

Taylor (2004) contrarily, argues that settlements that induce the withdrawal of petitions have no collusive effects. Moreover, any collusive agreement triggered by the use of AD law cannot be exempt of antitrust action and the Noer-Pennington doctrine does not allow for such exemption but considers any private attempt to affect prices or quantities illegal. Empirical evidence shows that only two out of sixteen withdrawn cases during 1990-1997 show price and quantity collusive consistent movements<sup>15</sup>. Nevertheless, the author argues that these exceptional cases might owe this behaviour to factors rather different from collusion, for instance, product market share and non-subject to antidumping investigation suppliers, though this is not addressed in the chapter.

When AD policy is introduced, it can also have an important impact on the initial market structure of the industry. AD policy can be either pro-competitive or anticompetitive depending on (i) the specification of the government's welfare objective function, (ii) the cost asymmetry between domestic and foreign firms, and (iii) the degree of product differentiation between the firms (Veugelers and Vandebussche, 1999). These three key factors together determine the type of AD measure imposed by the government, the incentives of firms to collude and the resulting market structure when AD policy is introduced. Accordingly, when firms are symmetric and products homogeneous a cartel formed by domestic and foreign firms will prevail with or without AD policy and similarly, when cost asymmetries are small and the government maximises total national welfare, the existence of AD policy promotes the formation of a cartel.

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<sup>14</sup> This is the Noer-Pennington doctrine. See Taylor (2004) below.

<sup>15</sup> The products that showed price increase and quantity decrease are steel wire rod (from Belgium) and bulk ibuprofen (from India).

Finally, Staiger and Wolak (1989) show that AD policy is used as a punishment device, named the filing of an AD petition, allowing firms to co-ordinate their capacity strategies towards the monopoly outcome in a low demand environment.

So far, I have presented enough evidence that supports the hypothesis that firms use AD measures in order to pursue specific outcomes that are not solely related to the deterrence of unfair trade practices (by the imposition of duties), as aimed by AD policy. And these outcomes are achievable because the threat of the imposition of duties is credible and then, in some cases, duties need not to be imposed or even the petition reached its final decision.

### ***1.5 Worldwide antidumping trends***

National AD rules were introduced in the early 1900s by Canada, New Zealand, Australia and the United States with the aim of sheltering domestic firms from foreign rivals that could exert monopoly power after predatory pricing practices. It was only after a law submitted by the United States in 1921 and followed by many other countries when AD law considered unfair the subsidy of low-price exports by home protected foreign firms or cartels. Signature of the 1947 GATT agreement brought together all national AD rules, with big influence of the US's own AD law<sup>16</sup>. From then to the early 1970's, there were not many AD cases: the US, the EU, Australia, Canada, South Africa and New Zealand were the major users of AD measures. During this period less than 5 percent of all cases resulted in duties (Blonigen and Prusa, 2003).

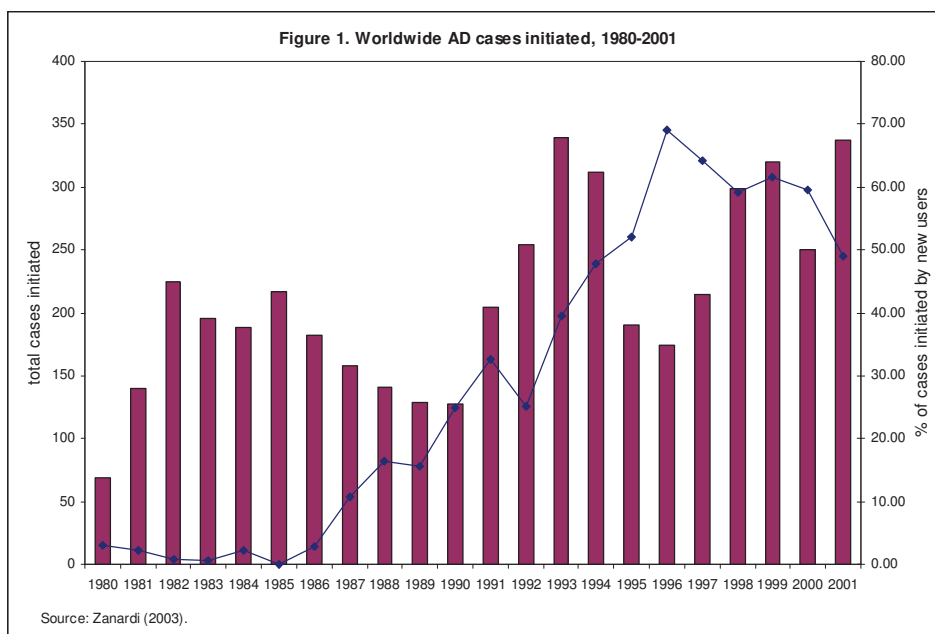
After the Tokyo Round, the use of AD changed sharply. As many as twice the cases filed during the 1970's were filed in the 1980's. From 1980 to 1985, traditional users filed more than 99 percent of all AD petitions, whereas by the mid 1990's more than half of the petitions were filed by new users (see figure 1). During the period 1987-1997, China, the US, Korea, Japan and Brazil were the most targeted countries by AD actions; and base metals, chemicals, machinery and electrical equipment and plastics the most targeted industries (see Table 1).

**Table 1. Main target countries and industries in AD investigations (1987-1997)**

Rank	Target country (% of total)	Target industry (% of total)
1	China (11.3)	Base metals (25.3)
2	United States (8.6)	Chemicals (16.8)
3	Korea (6.3)	Machinery and electrical equipment (13.5)
4	Japan (6.3)	Plastics (11.4)
5	Brazil (4.8)	Textiles (6.9)
6	Taiwan (4.6)	Pulp and paper (5.1)
7	Germany (4.2)	Glass and ceramics (3.4)
8	Thailand (2.8)	Prepared foodstuffs (2.8)
9	India (2.8)	Other manufactures (2.5)
10	United Kingdom (2.5)	Minerals (2.4)

Source: Niels (2004, table 2.2)

<sup>16</sup> See Barcelo (1991) and Horlick and Shea (1995) on the history of AD.



### 1.6 Antidumping trends in Mexico

AD rules in Mexico were adopted as the country became a member of GATT in 1986 and outlined by the Ministry of Trade and Industry (currently The Ministry of the Economy) through the Unfair Trade Practices Regulations. Currently, the International Trade Practices Unit at the Ministry of the Economy is in charge of the administration of the AD process. The legal framework is contained in the Foreign Commerce Law Regulations published in 1993<sup>17</sup>.

Mexico's AD (and CVD<sup>18</sup>) cases are registered from 1987 in the Mexican Official Journal. Nevertheless, Mexico's participation in AD activities dates from early. Prusa (1999) points out that Mexico was investigated for dumping exports before it had set up its own national rules. Many other new users were also investigated for dumping exports before having their own AD policy. This, argues the author, suggests that motives different from those to fight unfair trade practices, such as retaliation, are a driving force for the use of AD measures in developing countries.

Niels (2004) describes the evolution of AD activity in Mexico from 1987 to 2000 based on a database (SIAM) built by the Directorate General for Economic Studies of the Mexican Federal Competition Commission. During that period, a total of 172 AD cases had been investigated from which 107 (62.2%) resulted in the imposition of duties, 6 (3.5%) in undertakings, and 54 (31.4%) in a negative outcome (no duty imposition)<sup>19</sup> (see figure 2).

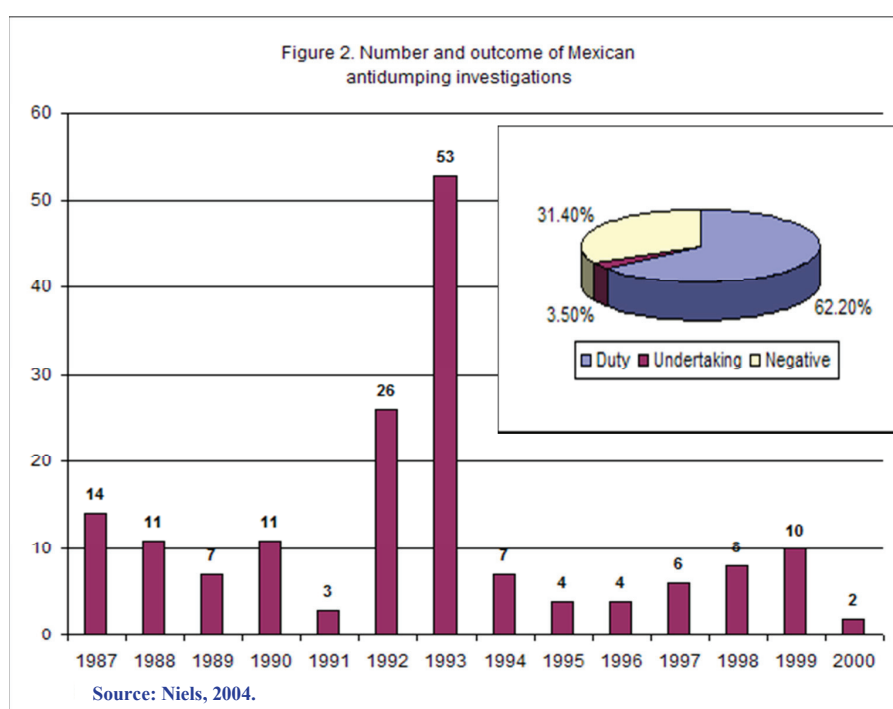
With regard to the targeted countries and industries, Table 2 shows the regions and number of investigations involved. North America is the most targeted region,

<sup>17</sup> See Malpica de la Madrid (1998) for the legal structure of the Mexican AD system.

<sup>18</sup> A CVD (Countervailing duty) is aimed to defend the domestic industry against the damage caused by subsidies given to imports at their local sources ([www.economia.gob.mx](http://www.economia.gob.mx)).

<sup>19</sup> This figure is different from the one given by the anti-dumping authority because of the specification of the data in the SIAM database, i.e. the number of investigations by product or by country.

which is not surprising as more than 70% of Mexican exports are directed to the US, however, the success rate for the region is below the total success rate, which according to Niels (2004), suggests the political influence on the use of AD, e.g. avoiding to quarrel with trade partners. East Asia, the EU and the rest of the world show a success rate above the total rate. The steel industry has filed the largest number of AD petitions (30.8% of the total), followed by the chemical industry (22.7%), textiles (9.9%), plastics (7.0%) and electrical equipment (5.2%). The methodology used to determine the fair or normal value of the subject imports was based in 47.7% of all the cases on the home price or normal value, 16.3% on the export price to a third country, 25% on the constructed value and in 15.1% of the cases the methodology was not reported<sup>20</sup>. Only in 66 cases the imposition of an *ad valorem* duty was reported and, when imposed, it was generally very high. The unweighted average duty is of 53%<sup>21</sup>.



<sup>20</sup> According to Mexican legislation prices of domestic sales in the exporting market are the first option to determine the normal value. If sales in the exporting country market are not made “in the ordinary course of trade” so that normal value cannot be calculated, two other alternatives are provided: the third country normal price which is based on a comparable price of the subject product when exported to an appropriate third country; and the constructed normal value which is based on costs of production, general administrative expenses and profits ([www.economia.gob.mx](http://www.economia.gob.mx)).

<sup>21</sup> The unweighted average of Mexico’s most favoured nation import tariff is 17% (Niels 2004, p. 135).

**Table 2. Target regions and number of Mexican antidumping investigations and success rate (1987-2000)**

Target region	Number of Investigations	Share of Investigations (%)	Success rate (%) <sup>1/</sup>
North America (US and Canada)	59	34.3	63.8
Latin America (Brazil, Venezuela, Colombia, Argentina and Chile)	30	17.4	55.2
East Asia (China, South Korea, Taiwán, Japan, Hong Kong and Malaysia)	46	26.7	74.4
EU	17	9.9	82.4
Eastern Europe and former USSR (Russia, Ukraine, Belarus, Kazakhstan, Estonia, Lithuania, Tajikistan, Uzbekistan and Bulgaria)	15	8.7	66.7
Rest of the world (Australia, India, Pakistan and South Africa)	5	2.9	80.0
Total	172	100	67.7

Note: 1/ The proportion of investigations resulting in a positive outcome, i.e. duties or undertaking.  
Source: Niels (2004).

### ***1.7 Mexican Antidumping proceedings***

Unfair trade practices in Mexico are sanctioned under four legal instruments: the Foreign Commerce Law and its Rules, the Agreement on the Application of Article VI of GATT (1994) and the Agreement on Subsidies and Countervailing Measures. This framework “offers to the national industry a timely defence system against dumping or price discrimination practices and subsidies which ensures fair level competition conditions for the performance of the Mexican industry”<sup>22</sup>.

In order to claim an AD action, three conditions must be met:

- 1) Dumping exists (dumping margin);
- 2) The domestic industry is suffering material injury, is threatened of material injury or its establishment is materially retarded because of imports;
- 3) There is a causal relationship between the two.

According to Mexican legislation and once these conditions are met, the interested firms can file a petition if (i) they represent at least 25 per cent of the national production of the subject product, and (ii) the petition is supported by 50 per cent of the national producers. An organisation or association acting on behalf of the interested industry or firms can also file the petition. Henceforth, the terms firms and industry are indifferently used. The petition is filed within the International Trade Practices Unit (UPCI in Spanish) who is responsible of the administration of the investigation process. All the decisions or resolutions reached during the investigation are enforced by the Ministry of the Economy, the authority hereafter, and published in the Official Journal.

<sup>22</sup> [www.economia.gob.mx](http://www.economia.gob.mx). Countervailing duties (CVD) are the correspondent remedies for subsidies. However, this chapter does not consider these measures mainly because only 18 out of 234 investigations carried out by the authority refer to subsidies (UPCI, 2001). In general, AD studies do not consider CVD.



Diagram 1 shows the AD proceedings. Once the petition is filed, the authority will publish within 30 days, as an initial resolution, the acceptance of the petition and initiate the investigation. Otherwise the petition will be rejected<sup>23</sup>.

Within 130 days from the publication of the initial resolution, the authority will publish the preliminary resolution. This will announce the continuation of the investigation and the imposition of provisional duties, if it is the case, or terminate the investigation if there is not enough evidence of dumping margin, material injury or threat of material injury and a causal relationship between them<sup>24</sup>. Preliminary duties, if imposed will be collected by the Ministry of Treasure who will also accept any guarantee of payment.

At any time before the publication of the final resolution, the foreign government or exporting firms involved in unfair trade practices may, through a conciliatory audience, voluntarily and before the authority commit to increase their price or stop their exports in order to remove the dumping and injury caused. The agreement, which implies a price undertaking with the approval of the authority, will terminate or suspend the investigation and be published as a final resolution. Note that the undertaking will mimic the duty outcome as it is in the interest of the authority<sup>25</sup>. The authority can request and undertake any verification visit at the physical location of the firms or involved parties to certify any information presented during the investigation. It may also periodically review the price undertakings by petition of the interested party and continue with the investigation in case the agreement is not implemented. Once the investigation is concluded and within 260 days from the publication of the initial resolution, the authority will publish the final resolution. This will announce the definite imposition of duties, remove the provisional duties, or reject the imposition of duties.

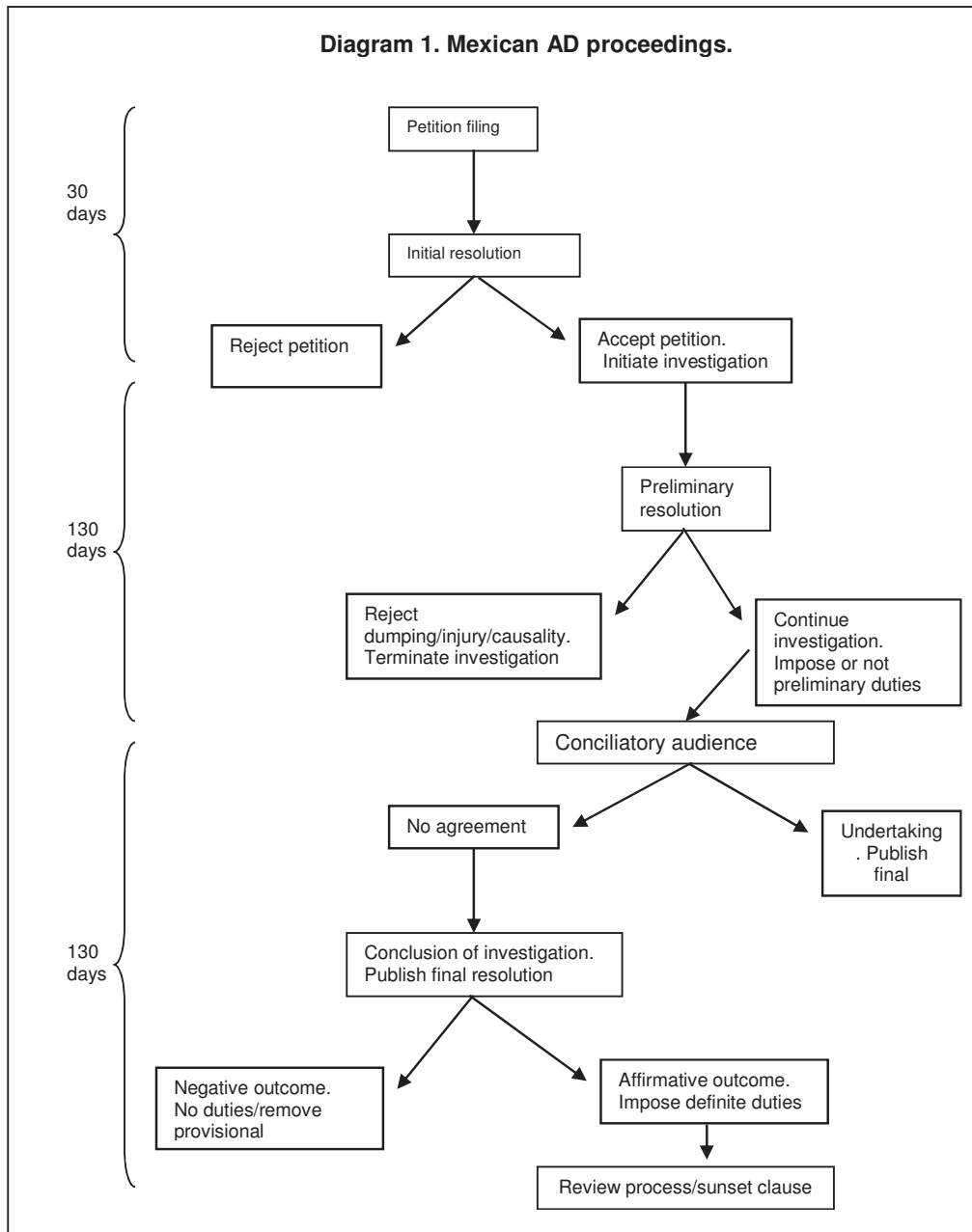
Finally, the duration of the definitive duties will be that necessary to repair the injury caused to the industry by the unfair trade practice. They can be reviewed on a yearly basis upon petition of any of the parties or by the authority itself in order to reduce, lift or confirm the duty. After 5 years of duration the duties will be removed unless there has been a petition of review. This is known as the 'sunset clause'.

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<sup>23</sup> Within 20 days from the petition filing, the authority may require the petitioner to provide additional information to support the petition filing before the initial resolution is published.

<sup>24</sup> Parties are given a 20 days period from the publication of the preliminary resolution to present any enquiry they should have.

<sup>25</sup> See Prusa (1992) for the analysis of the undertaking outcome.



### ***1.8 A basic model of collusion with antidumping***

In this section I use a synoptic version of the standard theoretical framework in the AD literature, taken from Prusa (1992), to illustrate the general result of the effect of antidumping policy when it is introduced in a Bertrand-Nash framework with two firms that compete in the national market, one of them being the importing firm. This, in order to motivate the discussion along the next chapters on the existence of anticompetitive outcomes, resulting from the imposition of AD duties to imports.



The model used, shows that, amid the price distortions caused by the introduction of antidumping in a free trade state, determined by the standard duopoly Nash-equilibrium, firms can achieve tacit collusion using antidumping as the mechanism to sustain it.

The model first sets the conditions for the one-shot static game, which represents the free trade equilibrium, this is when no antidumping legislation exists in the domestic country. This is also the benchmark case to compare with once antidumping has been introduced. Once the distortions caused by the introduction of antidumping are shown, I turn to the repeated game where the one-shot game is played infinitely and the collusive outcome achieved. The model here shown, reflects the general framework of Mexican AD policy where, as said before, neither price undertakings nor the withdrawal of the case are likely.

From the institutional proceedings of AD laid out in the previous section, general assumptions are made in the context of the theoretical framework:

It is assumed that the  $n$ -domestic firms which join to file a petition act as an industry or one firm, as it is a requirement for the initiation of the investigation to represent more than 25 percent of the national production as well as the support of at least 50 percent of national producers<sup>26</sup>. Thus, co-ordination costs are assumed to be zero so that all firms in the industry agree to file the petition. Nevertheless, these costs can be increasing in the number of firms, i.e. the greater the number of firms the more difficult to agree on something, and some firms may not join the filing group (Zanardi, 2000)<sup>27</sup>. Filing costs are assumed to be small so that petitions have already been filed. Staiger and Wolak (1994), however, point out that even though investigation effects are likely to exist<sup>28</sup>, many industries face high filing costs, e.g. hiring lawyers, doing market studies, organisation of the filing firms, etc., that limit the number of filed petitions.

The settled outcome or price undertakings frequently observed in other countries' AD investigations are rarely observed in Mexico<sup>29</sup>. This might be due to unclear undertaking rules so that petitioners do not have a good understanding of the process. The authority does not count with the resources to monitor the foreign firm's price commitment, which also makes the undertaking outcome less likely as it results an unsustainable solution for the petitioner<sup>30</sup>. Moreover, private settlements are not allowed at all in the Mexican legislation<sup>31</sup>.

Note that AD policy is an exogenous instrument to which domestic firms can resort if they want to curb dumped imports. In a Bertrand-Nash equilibrium setup where competing firms are assumed to have symmetric demand and costs functions

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<sup>26</sup> Note that, in cases where the domestic industry is highly concentrated this requirement may work as an internal condition for the sustainability of a domestic cartel. Acting individually, every firm has an incentive to join the filing group. The existence of domestic cartels is however not considered here.

<sup>27</sup> It may also be the case that the domestic firms co-ordinate to induce a positive outcome of the investigation, for instance, by reducing profits or prices to increase the likelihood of injury. This can be more difficult the greater the number of firms.

<sup>28</sup> Trade restrictions caused by the only fact that the investigation has been initiated, regardless of the final outcome.

<sup>29</sup> Although under the AD legislation the possibility of price undertakings is present, it will at least mirror the imposition of duties: "(...) exporters of the goods under unfair international trade practice can voluntarily commit before the [authority] to (...) modify their prices or cease exports. (...) if the [authority] corroborates that the commitment is unexercised, it will resume the investigation of the case and if required, re-impose the provisional duty" ([www.economia.gob.mx](http://www.economia.gob.mx)).

<sup>30</sup> These comments were taken from personal conversations with personnel from the UPCI.

<sup>31</sup> Prusa (1992), shows that the possibility of a settlement in the investigation allows firms to revise prices upwards and to get a better outcome relative to the imposition of duties.

and no uncertainty, as the one shown below, AD action should not take place and equilibrium values realised. It is only when the domestic firm decides to file an AD case, under the three conditions for dumping are complied, that AD action occurs, causing a distortion in the equilibrium values of the Bertrand-Nash setup. Therefore, the filing of an AD petition is an exogenous decision made by the domestic firm, where its lobbying powers can affect the outcome of the authorities' decision on whether or not to apply duties to imports (Finger, et. al., 1982; Grossman and Helpman, 1994). As it is argued throughout the thesis, the application of AD measures result in alternative outcomes to that of curbing dumped imports, which in turn result in a distortion of the equilibrium values of free trade and level field competition affecting consumers in the domestic market.

Now suppose there are two firms, one domestic and one foreign (\*) that compete in price in the importing or domestic market. Each firm sells a differentiated good, which is a close substitute for each other<sup>32</sup>. Firms face a linear demand for the goods produced and constant and symmetric costs per unit produced. The game played by the firms, that is choosing price strategies, is performed in one period and played only once<sup>33</sup>. The events of the game occur as follows:

- (i) Each firm maximises profits by choosing price;
- (ii) All equilibrium values are realised;
- (iii) If the petition is filed, the proceedings of the investigation as depicted in diagram 1 are followed. There is an exogenous and known probability  $\alpha$  of an affirmative final resolution with duties of  $d = P_F - P^*$  imposed to imports.  $P_F$  is the price of the good sold in the foreign firm's own market which is exported to the domestic market at price  $P^*$ ;  $P_F$  is exogenous to the game.
- (iv) With duties imposed, the foreign firm receives only  $P^*$  and  $d$  is the revenue collected by the government;
- (v) Duties are not imposed with probability  $(1-\alpha)$  and the outcome is the same as in (ii);
- (vi) Game ends.

### ***1.9 Free Trade Bertrand-Nash equilibrium***

With no AD policy in place, firms make their price decisions simultaneously and the game is played only once. This one-shot static game is the benchmark case to compare with once AD policy is introduced.

Let the respective firm's demand function be:

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<sup>32</sup> Products under AD investigation are usually classified at their 8-digit level of the 'Tarifa del Impuesto General de Importacion' which is based on the Standard Industrial Classification code (SIC). Although the disaggregation level aims to find substitutability between domestic and imported goods, they are never perfect substitutes.

<sup>33</sup> Generally, the literature on the subject specifies a two period model to introduce AD. In the first period firms choose whether to file the petition and in the second period they choose prices. Here, however, to make matters simple, it is assumed that the filing decision is already taken, as I will focus only on those cases that have been investigated.

$$q = a - p + bp^* \quad (1)$$

$$q^* = a - p^* + bp \quad (2)$$

$b$  represents a product differentiation parameter, which for greater values the goods become closer substitutes.  $p$  and  $p^*$  are the firm's price level and  $q$  and  $q^*$  the quantities produced, respectively. Each firm's profits are given by:

$$\pi(p, p^*) = (a - p + bp^*)(p - c) \quad (3)$$

$$\pi^*(p, p^*) = (a - p^* + bp)(p^* - c) \quad (4)$$

each firm maximises profits taking the other's price level as given, so that the FOC that imply each firm's best reply function are (BR):

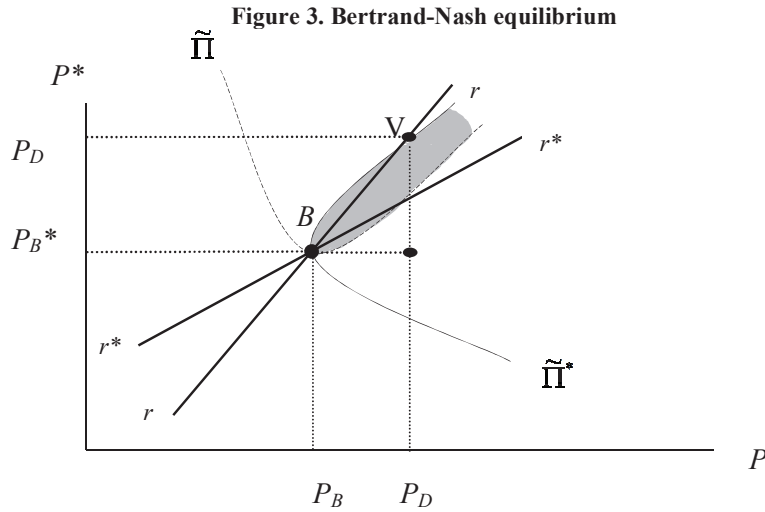
$$a - 2p + bp^* + c = 0 \quad (5)$$

$$a - 2p^* + bp + c = 0 \quad (6)$$

The Bertrand-Nash equilibrium pair of prices  $(p_B, p_B^*)$  is obtained by the solution of the system of equations formed by (5) and (6). Thus, the Bertrand-Nash equilibrium prices, quantities and profits are<sup>34</sup>:

$$p_B = p_B^* = \frac{a+c}{2-b}; \quad q_B = q_B^* = \frac{a+bc-c}{2-b}; \quad \pi_B = \pi_B^* = \left[ \frac{(a+bc-c)}{(2-b)} \right]^2.$$

Point  $B$  in figure 3 represents the equilibrium price level in the domestic market where  $r$  and  $r^*$  are the firms' respective best reply functions that attain the maximum isoprofit curve  $\tilde{\Pi}$ .



<sup>34</sup> It is assumed that the Bertrand-Nash equilibrium satisfy the sufficient conditions to be stable and unique.

### 1.10 Bertrand-Nash equilibrium with antidumping

Now, AD policy is introduced in the domestic market. Suppose that the domestic industry has chosen to file an AD petition. There is an exogenous probability  $\alpha$  of the imposition of duties to imports. The free trade Bertrand-Nash equilibrium will prevail with probability  $(1-\alpha)$ . With  $\alpha=1$ , duties are imposed on the foreign firm exports. The value of the duty is determined by the dumping margin  $d = p_F - p_B^*$ . Consequently, the foreign firm is forced to raise its price to  $P_F = p_D^* = p_B^* + d$ <sup>35</sup>. However, the firm will only collect  $p_B^*$  and  $(q_D^* \cdot d)$  will be collected by the government as the duty revenue.

Considering that the foreign firm passes on to the consumers the whole duty burden so that the market price is  $p_D^* = p_B^* + d$ , the domestic firm's new price facing its rival's price  $p_D^*$  is determined by its BR given by (5). Thus, the new equilibrium values when AD policy is introduced are<sup>36</sup>:

$$\begin{aligned} p_D &= \frac{a+c}{2-b} + \frac{bd}{2}; & q_D &= \frac{a+bc-c}{2-b} + \frac{bd}{2}; \\ p_D^* &= \frac{a+c}{2-b} + d; & q_D^* &= \frac{a+bc-c+bd-2d}{2-b} + \frac{b^2d}{2}; \\ \pi_D &= \left[ \frac{a+bc-c+bd}{2-b} - \frac{b^2d}{4-2b} \right]^2 \\ \pi_D^* &= \left[ \frac{a+bc-c+b^2d}{2-b} - \frac{b^3d}{4-2b} - d \right] \left[ \frac{a+bc-c}{2-b} + d \right] \end{aligned}$$

*Proposition 1. When with probability  $\alpha=1$  duties are imposed to foreign firm exports, profits with AD  $\pi_D$ , are greater than profits without AD (free trade),  $\pi_B$ , for the domestic firm; and profits with AD,  $\pi_D^*$ , are smaller than profits without AD (free trade),  $\pi_B^*$ , for the foreign firm.*

*Proof: To see that  $\pi_D^* < \pi_B^*$  note that demand assumptions imply that a higher price results in a reduction of the quantity sold such that  $q_D^* < q_B^*$ ; foreign firms collects only  $p_B^*$  and the government's duty revenue  $dq_D^*$  is subtracted from the firm's profit. Hence,  $\pi_D^*(p_D^*, p_D) - dq_D^* < \pi_B^*(p_D^*, p_D)$ .*

*To see that  $\pi_D > \pi_B$  it is enough to note that the domestic firm is acting under its best reply function for any price increase by the foreign firm. Hence, a higher price combination than  $(p_B^*, p_B)$  results in greater profits. Likewise,  $\pi_D > \pi_D^*$ . Q.E.D.*

<sup>35</sup> GATT/OMC rules recommend that the duty must be the necessary to remove the injury caused to the domestic industry. This implies that although prices in the domestic market are matched, the dumping margin  $p_F - p_B^*$  is not necessarily eliminated. However, this will only reduce the size of  $d$  without any change in the final outcome.

<sup>36</sup> If the foreign firm passes on to the consumer only a fraction of the duty instead of the whole amount, the price increase would be smaller. However, the final outcome remains the same.

Proposition 1 implies that the price increase of the domestic firm is smaller than the price increase of the foreign firm as only the former is acting on its best reply function. Consequently, the foreign firm sells less at a higher price. Moreover, the foreign firm never collects  $(d \cdot q_D^*)$ , the government's revenue. Therefore, AD policy makes the domestic firm better off.

Firm's expected profits before AD policy in the domestic market is applied, can be expressed by

$$E\Pi(\alpha) = \alpha\Pi_D + (1-\alpha)\Pi_B \quad (7)$$

$$E\Pi^*(\alpha) = \alpha\Pi_D^* + (1-\alpha)\Pi_B^* \quad (8)$$

*Corollary 1. The introduction of AD policy changes the expected profit of the firms. This in turn implies that for every positive value of  $\alpha$ :*

$$E\Pi_B(p_B, p_B^*) < E\Pi_D(p_D, p_D^*);$$

$$E\Pi_B^*(p_B, p_B^*) > E\Pi_D^*(p_D, p_D^*);$$

$$E\Pi_D(p_D, p_D^*) > E\Pi_D^*(p_D, p_D^*).$$

As a consequence of the price distortion that firms face with the introduction of AD policy, the filing of a petition becomes a dominant strategy for the domestic firm for every  $\alpha > 0$ . In other words, the expected profits of filing a petition are greater than the Bertrand-Nash equilibrium profits that prevail without AD policy.

Note that the size of the duty imposed depends only on the dumping strategy of the foreign firm, that is the difference between  $P_F$  and  $P_B^*$ <sup>37</sup>. The foreign firm will try to avoid the imposition of duties or at least to reduce  $d$  by setting a higher price relative to the free trade Bertrand-Nash equilibrium price  $P_B^*$ .

*Proposition 2. In order to avoid the imposition of duties, the foreign firm will set a higher price in the domestic market relative to the free trade price.*

*Proof:*  $p_F$  is exogenous with the known probability distribution function  $F(\cdot)$  on  $[p_B^*, \bar{p}^*]$ , where  $\bar{p}^*$  is the maximum level of  $p_F$ , i.e. the monopoly price. Thus, the probability of dumping by the foreign firm is given by  $\rho^d(p^*) = \int_{p^*}^{\bar{p}^*} F'(x)dx$ , where

$$\rho_1^d(\cdot) = \frac{d\rho^d(\cdot)}{dp^*} < 0. \text{ Q.E.D.}$$

Proposition 2 states that due to AD policy firms change their pricing strategy relative to their free trade price strategy. Interestingly, given the possibility of attainable higher profits, at higher prices located within the shaded area depicted in Figure 1, a new game is developed in pursuit of extraordinary profits.

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<sup>37</sup> A positive injury determination is one of the conditions for duties to be imposed, however, as the existence of a dumping margin is a necessary condition and without it no AD action would be pursued, for sake of simplicity the injury effect is not considered here. See Prusa (1994) for the modelling of the injury condition.

### 1.11 The Collusive Outcome

Let's turn back to the price distortions generated by the introduction of AD policy. As a consequence of the imposition of AD duties, consumers in the domestic market face higher prices for both the imported and the domestic good, and the domestic firm enjoys a larger market share and higher profits relative to free trade, i.e. without AD policy. The foreign firm finds itself in a worse off position.

As said above, the foreign firm in an attempt to avoid the imposition of duties will set a higher price. This price increase will be smaller the smaller the difference between  $P_F$  and  $P_B^*$ . As the best response to this price increase, domestic firm will charge a higher price too.

Suppose now that firms maximise the discounted sum of future profits. Let  $\delta$  be the discount factor and  $t$  the number of periods firms interact with each other. The value of  $\delta$  ranges between 0 and 1. The closest to 1 the more patient firms are. In other words, patient firms care about future profits. The present discounted value of per period profits is, respectively, given by:

$$\Pi = \sum_{t=1}^{\infty} \delta^{t-1} \cdot \Pi_t \quad (9)$$

$$\Pi^* = \sum_{t=1}^{\infty} \delta^{t-1} \cdot \Pi_t^* \quad (10)$$

Let  $\Pi^{BN}$  and  $\Pi^{*BN}$  be the profits in the one-shot static free trade equilibrium determined before by  $\pi_B$  and  $\pi_B^*$ , respectively. Let  $\Pi^C$  and  $\Pi^{*C}$  be the collusive profits and  $\Pi^d$  and  $\Pi^{*d}$  the profits of deviation from the collusive agreement. Firms choose the following grim trigger strategy: start by choosing the collusive price  $P^C$ , then continue to set  $P^C$  until the other firm chooses a lower price  $P^d$ . If the other firm sets  $P^d$ , then sets the free trade price level forever.

Two important conditions must prevail if this strategy is going to be subgame perfect: the first one is that interaction between the industries is foreseen to continue into the future. This is that firms see each other competing in the domestic market for an infinitely number of periods, so that they realise that co-operative gains can outweigh the short-run gains from deviating from the agreement; and the second one is that a credible punishment for any deviation from the co-operative outcome is necessary.

Before establishing the factors that make these conditions exist, it is important to note the following. It is clear now that when the free trade price level is chosen, the Bertrand-Nash equilibrium prices  $P_B$  and  $P_B^*$ , the domestic firm can file an AD petition. Thus, the domestic firm will consider any deviation by the foreign firm from the monopoly price as a dumping action. This will be the case when  $P_F$  is the monopoly price in the foreign firm's home market. If the home market structure were more competitive,  $P_F$  would be below the monopoly price and might be closer to  $P_B^*$ .  $P_F$  can also be interpreted as the foreign firm's average cost, so that AD action against sells below cost can be claimed when  $P^d \leq P_F$ .

In order for the grim trigger strategy<sup>38</sup> to be subgame perfect equilibrium, it is needed that both the co-operation strategy and the punishment strategy are Nash equilibrium.

Let's consider first the punishment strategy. Either firm's deviation from the co-operative price will make the other firm choose the free trade level price forever. It will not make sense to choose  $P^C$  anymore if the other chooses  $P_B$  (or  $P_B^*$ ) at every next period. Thus co-operation is a Nash equilibrium strategy.

Suppose now that the domestic firm sticks to the collusive price. From equation (9), its discounted profits from cooperation are:

$$\Pi^C + \delta\Pi^C + \delta^2\Pi^C + \dots = \frac{\Pi^C}{1-\delta} \quad (11)$$

If the firm deviates by undercutting its rival at price  $p^d \in [p_B, p_F]$ , it will get in the current period a greater profit  $\Pi^d$  (because of a larger market share) plus the subsequently non-cooperative profits  $\Pi^{NE}$ . Thus, deviation from the collusive agreement by the domestic firm yields a total payoff of:

$$\Pi^d + \delta\Pi^{BN} + \delta^2\Pi^{BN} + \dots = \Pi^d + \frac{\delta\Pi^{BN}}{1-\delta} \quad (12)$$

Combining (11) and (12) gives the condition that makes the coordinated outcome sustainable.

$$\frac{\Pi^C}{1-\delta} \geq \Pi^d + \frac{\delta\Pi^{BN}}{1-\delta} \quad (13)$$

Because the grim trigger strategy is symmetric, the same result is obtained for the foreign firm. However, note that, from previous sections, incentives for deviation are asymmetric when AD policy exists. Deviation by the foreign firm will trigger the filing of an AD petition. This, changes the value of the second term on the right-hand side of condition (13) (for  $\alpha=1$ ).

*Proposition 3. Under the absence of AD, co-operation towards the collusive outcome can be sustained only if (expressed in terms of the domestic firm):*

$$\Pi^C(P^C, P^{*C}) \geq (1-\delta)\Pi^d(P^d, P^{*C}) + \delta\Pi^{BN}(P_B, P_B^*) \quad (14)$$

*Under AD policy, co-operation toward the collusive outcome can be sustained only if:*

$$\Pi^C(P^C, P^{*C}) \geq (1-\delta)\Pi^d(P^d, P^C) + \delta\Pi_D(BR(P_F), P_F) \quad (15)$$

$$\Pi^{*C}(P^C, P^{*C}) \geq (1-\delta)\Pi^{*d}(P^{*d}, P^C) + \delta\Pi_D^*(BR(P_F), P_F) \quad (16)$$

Proposition 3 states that any collusive agreement sustained under the existence of AD policy require the firms to make a different appraisal of future profits relative to that under free trade. This is straightforward by comparing condition (14) with (15) and

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<sup>38</sup> It is so called because any deviation from the collusive agreement will make the punishment strategy be played forever.



(16). The second term on the right-hand side of condition (15) is greater relative to the second term on the right-hand side of condition (14) when  $\alpha=1$ . This means that the possibility of greater profits for the domestic firm when duties are imposed increases its incentive to deviate; henceforth a higher value of  $\delta$  is required. On the other hand, the second term on the right-hand side of condition (16) is smaller relative to the second term on the right-hand side of both (15) and (14). This means that in order to be collusion sustainable the foreign firm requires a smaller value of  $\delta$  relative to both free trade and the domestic firm (see appendix 1 for a numerical example).

The model here presented suggests that AD policy changes firms' appraisal of future profits determined by the value of the discount factor  $\delta$ , relative to free trade. A simple numerical example of the changes in the discount factor induced by the introduction of AD policy is presented in the Annex.

### *1.12 Concluding comments*

In this chapter, I have first intended to show, through the revision of previous literature on the topic, that there are widely recognised incentives for the use of AD measures to produce outcomes that differ from the original aim of the policy, i.e. to curb unfair trade. By using a synoptic version of a standard theoretical framework in the AD literature, taken from Prusa (1992), I attempt to illustrate the standard result of the effect of antidumping policy when it is introduced in a Bertrand-Nash framework with two firms that compete in the national market, and one of them being the importing firm. This illustration serves as a motivation to bring forward, in the next chapters, the issue that there actually exist alternative effects from the use of AD policy, being these effects more costly for the society than those from unfair trade.

According to this theoretical framework, when a domestic firm and a foreign firm compete in prices in the domestic market and face the imposition of duties to imports, the domestic firm's strategic response to the price increase of the foreign firm is to set a higher price along its best reply function. The resulting Nash-Equilibrium of this one-shot static game is: higher prices in the domestic market with larger profits for the domestic firm and smaller for the foreign firm. Because the filing of a petition is a dominant strategy for the domestic firm, by increasing its price, the foreign firm will try to avoid the imposition or reduce the level of duties.

The second part of the theoretical framework presented, illustrates how the price increase induced by the introduction of AD policy aids firms to target monopoly prices in pursuit of a collusive outcome, with a grim trigger mechanism, named the filing of an AD petition, being the mechanism through which firms can achieve such an outcome.

Coming back to the opening question "Should the Mexican authority worry?", I have intended, through this chapter, to bring forward a discussion that competition authorities worldwide have generally avoided: AD policy can produce anticompetitive outcomes such as collusion, with the implied welfare losses for society. Therefore, I suggest that competition authorities in Mexico should pay attention, i.e. to worry, to a number of AD cases, as welfare losses might be larger than those supposed to be corrected by the use of AD policy. This suggestion is reinforced by the empirical evidence of Mexican AD cases in Niels (2004) and Esquivel and Solis (2002) that show that domestic industry-specific factors, such as large market power, large market share and industry concentration, are significant factors in the filing of AD petitions. Evidence of international cartels formed by firms from both developed and



developing countries has also been proved welfare costly for importing developing countries (Levenstein, et.al., 2003)<sup>39</sup>.

Empirical analysis of the effects of AD policy on Mexican imports is carried out in the following chapters.

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<sup>39</sup> A Mexican firm participated as a member of the Tampico Fiber Cartel formed also by the US and the Netherlands during January 1990-April 1995. Another Mexican firm was also a member of the Lysine Cartel investigated by the Department of Justice of the US. Although not a member of the Graphite Electrodes Cartel, a main Mexican producer was also related in the cartel's activities (Levenstein, et.al., 2003).

## **CHAPTER 2**

### ***Empirical Evidence of Mexican Antidumping Investigations.***

#### ***2.1 Introduction***

AD policy aims to curb imports traded at unfair practice, i.e. dumping. Thus, by imposing duties, the volume of imports is restrained and their price raised. However, beyond the concerns of the protectionist effect of AD policy, alternative effects have been found.

Trade restrictions can be achieved by simply filing the petition as the threat of duties does not need to have them imposed: this is the investigation effect of AD (Staiger and Wolak, 1994). Trade diversion refers to the increase of imports of the same product to that under investigation but not affected by it or the duty, because they come from a different source than the target country. This can eventually offset the trade restriction pursued by AD duties by the substitution of investigated imports for non-investigated (Prusa, 1994). Collusive effects between domestic and foreign firms arise with the withdrawal of the petition (Prusa, 1992; Zanardi, 2004) or when the threat of AD action serves as a punishment mechanism to sustain a collusive agreement (Staiger and Wolak, 1989).

Although empirical studies of AD (antidumping) have not been in short supply, the study of the effects of AD action on developing economies is still scarce. Because AD affects specific imported products, data on the line-item tariff codes is needed for an accurate analysis of the direct impact of AD measures. Access to this data is sometimes difficult, particularly in developing countries. In this chapter, I fill this gap and offer a clear account of the effect of 24 AD investigations carried out by the Mexican authority during 1994-1998. Particular focus is put on the competitive structure of the domestic industry. It is found that 19 out of 24 investigations carried out in the period of study are characterised by high levels of concentration, many of them monopolistic. Furthermore, the majority of the AD cases are filed against the major exporter, this is, the main rival of the petitioner firms in the domestic market, which participates with 70%-99% of the total imports of the respective product.

In the aggregate of national imports AD imports seem to be negligible, and consequently the effects of AD policy could be thought of as negligible to the overall economy. However, the trade restrictions and distortions to free equilibrium levels that result from the adoption of AD policy within the involved industries, if put together with the potential anticompetitive effects resulting from the petitioners dominant position in the domestic market, can lead to negative welfare effects that are greater than those supposed to be produced by unfair trade practices from foreign competitors.

The aim of this chapter is to give a close account of the effects of AD action on imports and to show evidence about the likely anticompetitive use of the policy, i.e. deterrence of import competition, if any. The effects of AD measures here investigated are based on the findings in Prusa's (1994) about the effects of AD duties in imports of the US. The chapter is divided in seven sections. The next section refers to the source and construction of the datasets used. Section 2.3 presents the general features of the 24 AD cases. In section 2.4 I refer to the competitive structure of the domestic industry. In section 2.5 the general features of the aggregated AD imports are presented. Section 2.6 describes the statistics of the imports series. And finally,

section 2.7 concludes with some comments. Graphs and tables referred to in this chapter are found in Appendix 3.

## **2.2 The Data**

During the period 1994-1998, a total of 24 AD cases were carried out by the UPCI (Unit of International Commercial Practices in Spanish), the Ministry of the Economy's division in charge of AD (antidumping) investigations. These involve a total of 72 products<sup>40</sup> imported from 11 countries within 7 manufacturing sectors<sup>41</sup>. Each investigation is carried out in three different stages for which an outcome is reported as a 'resolution' in the Official Journal (Diario Oficial). A specific dataset that picks up the main features of each case has been constructed from the respective resolutions, namely Initial Resolution, Preliminary Resolution and Final Resolution. The resolutions can be downloaded from the Ministry of the Economy's webpage <http://www.economia.gob.mx>.

The constructed dataset provides information about the relevant qualitative characteristics of each investigation such as the type of imported product, the country of origin, date and outcome of the initial, preliminary and final decisions, the reason for the petition, the calculated dumping margins and duties imposed, the structure of the domestic industry that files the petition, among others. Particular focus is attempted on the market structure of the petitioner firms. The number of firms in the industry and the number of petitioner firms and their market share (of domestic production) serve as a rough indicator of the concentration level and market share of the industry and the petitioners, respectively. The level of foreign competition is also roughly given by the share of investigated imports to total imports of the investigated product. These two elements put together offer an important insight for the relationship between AD action and the anticompetitive effect of the policy.

Another purpose-built dataset is constructed with information about the actual imports of Mexico involved in AD action. The dataset is comprised of monthly series of the value of imports, the volume of imports and the unit value of imports. Each set of series is divided into two subset series, one of investigated imports and the other one of non-investigated imports. The former refer to those imports claimed by the petitioners to be traded under unfair practices, i.e. dumping, and the latter to all other imports that compete in the domestic market. Added together they are here referred to as AD imports. Putting together the information of the two constructed datasets offers a deeper and insightful analysis of AD in Mexico. Following up on Esquivel and Solis (2002) and Niels (2004) who use industry (4-digit level) data to analyse the factors that determine the filing of AD petitions, this analysis is the only in its kind as here I use monthly product-specific data which allows one to directly pin down the effect of AD policy in import flows between Mexico and the involved exporting countries.

It is important to note here, that in the AD literature, there is a shortcoming to most of the empirical papers, which consist in the use of aggregated import data. One of the reasons for this is that classification codes usually vary from year to year, and from country to country. Despite the fact that all datasets used in the different empirical papers are purpose-built, since industry sectors that use AD action also vary from country to country or period to period of time, most of them use 4-digit Standard

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<sup>40</sup> At 8-digit aggregation level of the Standard Industrial Classification code.

<sup>41</sup> See next section.

Industrial Classification Code data, which tries to minimize the number of missing values. Import data is also generally collected on a yearly basis.

Thus, an ideal dataset will consider 8-digit level import data, the most disaggregated level, in order to reduce the number of missing data and match most closely the product-specificity between imports and domestic production potentially affected by dumped imports.

Since all imports are hypothetically suitable for AD action or the threat of AD action, the ideal dataset will consider all imports of all products coming into the domestic market. AD empirical studies, however, consider only imports of products under AD investigation.

Because AD investigations are carried out in stages, monthly data is also ideally needed, however, only a couple of papers use monthly data, thus minimising the temporary effect of AD action.

In order to look at the complete effect of AD policy, domestic production involved in AD investigations, i.e. the domestic industry that files for the AD petition should also be considered in the empirical analysis. Therefore, the ideal dataset will also have to consider the same industry classification code for all imports, domestic products and countries. This standard classification code is hardly achieved in most countries, including Mexico.

Quantitative methods used in the empirical literature typically use OLS regressions to estimate the effects of AD duties on imports. Ideally, the estimations should consider both imports and domestic production, in a sort of system of equations or equilibrium model. To my knowledge, domestic production has not been considered when empirically looking at the effects of AD action.

As mentioned before, every empirical paper in the reviewed literature has a purpose-built dataset, as it is for this thesis. Here, however, a major attempt to avoid the typical shortcomings has been made because 8-digit level, monthly import data has been collected. Nevertheless, because of the incompleteness of the AD reports, a number of missing data had resulted. The estimation method used here is also different from the typical OLS regression used generally in the literature, in an attempt to capture more efficiently the effect of AD duties on imports (see next chapter). On the other hand, domestic production data is not included in the dataset and quantitative analysis.

### ***2.3 General features of AD investigations during 1994-1998***

Table 3 (all tables in appendix 2) summarises the main features of each AD case. Column (1) refers to the destination industry of the investigated imports. Cases are grouped by the manufacturing sector to which each investigated product belongs, column (2). During the period of reference, 1994-1998, 54.1% of the cases belong to the chemical (6 cases) and the steel manufacturing sectors (7 cases); 20.8% to the food sector (5 cases); 8.3% to other manufactures (2 cases); 8.3% to plastics (2 cases) and one case to the rubber and paper sectors each. The number in parenthesis in column (1) represents the number of products involved in each investigated industry. This is, AD duties are claimed for specific products, at 8-digit level, which are sometimes imported under a more generic classification, here referred as the industry.

The US accounts for 11 of the 24 cases investigated during the indicated period and is followed by China with 3 cases. The rest of the involved countries account each for only one case. There are 3 cases that involve more than one country (prams and pushchairs, hot-rolled steel plate and cold-rolled steel sheet). As for the

products involved, the US represents almost 70% of all 72 products in the 24 cases. Most of them are imports of seamless line pipe and beef (33 out of 48 US products). Brazil follows with 5 different products in one case and China with 4 different products in three cases. The rest of cases involve one or two products in each investigation. It is important to note here that, due to the different phases carried out through the investigation process, all 72 products are considered only for matters of the Initial Resolution and refer to those imports claimed by the domestic industry of being exported at unfair practice, i.e. dumping or price discrimination.

Price discrimination is the only reason for the filing of the AD petition, column (7) and only one anti-subsidy petition was filed at the same time for imports of tinned *sliced peaches* from Greece<sup>42</sup>. This somehow, leaves aside the claim of dumped imports at sales below costs, a recurrent argument by AD advocates, at least for this period under investigation.

A Preliminary Resolution is published once the authority verifies the information provided by the petitioner or collects its own information to calculate the relevant dumping margins and the harm caused to the domestic industry. If no dumping margin or harm to the domestic industry is found, the authority terminates the investigation. For instance, only 4 out of the 23 imports of *seamless pipe line* from the US were positive in the Preliminary Resolution, thus, only this products will continue to be investigated. By initially considering all 72 products during the determined time span, this chapter intends first to give an accurate account of the proportion of imports involved in AD relative to the national level of imports, and second, to look at the variations in imports flows that face AD action before, during and after the investigation. It is also intended to pin down the already acknowledge investigation effects<sup>43</sup> (Staiger and Wolak, 1994) as well as trade diversion effects<sup>44</sup> (Prusa, 1996) of AD policy.

As the US is the major trade partner of Mexico it is not surprising that most of the cases are claimed against imports from that country. However, there's the opposite conception that renders unnecessary the existence of AD policy within trade agreements, because contrary to the aims of the agreement, it only creates barriers to trade. Aggressive low-cost exports from China might be, at first instance as well, a reason for domestic competitors' claims of AD action. In either case, when taking into account the market structure of the domestic industry and market power of the petitioners, suspicion of motives other than to curb dumping practises are not surprising.

Column (4) shows the outcome of the final decision of the investigations. A negative final decision, i.e. no duties imposed, was determined for only 3 cases: *diammonium phosphate, synthetic iron oxide and hydroxide and tinned sliced peaches*. All other cases resulted in the imposition of duties to imports<sup>45</sup>. The level of final duties and dumping margins is shown in the next two columns. Note that when more than one product is involved in one case the reported duty and dumping margin refers to a simple average of all the products involved in the investigation. Most of the figures here represent the percentage difference between the export price and the normal value of the product, but in a few cases the nominal difference is reported

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<sup>42</sup> However, only the antidumping results are considered here.

<sup>43</sup> Trade restrictions caused by the only fact that the investigation has been initiated, regardless of the final outcome.

<sup>44</sup> Import reductions caused by the imposition of duties are offset by an increase of noninvestigated imports.

<sup>45</sup> As mentioned before, withdrawal or out of court settlements are not observed in Mexico.

(*Pork and Gas lighters*) and in other cases the duty is only reported as the deviation from the reference normal value, which makes it impossible, from the information provided in the resolution, to calculate the duty (*ammonium sulphate, polystyrene crystal*). The lowest dumping margin observed is for imports of *paper bond* from US of 18.82% and a final duty of 12.76% (average of all products). The highest dumping margin observed is 2,484% with a final duty of 91.10% to imports of *sulphuric acid* from Japan. It is worthwhile to recall here, that the WTO recommends in its antidumping guidelines a ‘lesser duty rule’, which means that duties imposed need to be at the necessary level that removes the harm caused by the practice of price discrimination and not at the whole amount of the dumping margin. It can be observed that this rule was followed in only 6 of the cases (*sulphuric acid, prams and pushchairs, bond paper, steel connections, hot-rolled steel plates and cold-rolled steel sheet*).

In the rest of the cases the duty imposed corresponds to the whole amount of the dumping margin. Following the rationale of the ‘lesser rule’ and the distortions produced by the imposition of duties, the imposition of the whole amount of the duty suggests the need of a deeper look at the characteristics of the AD investigations and its outcome. The latter, should consider the market structure of the involved industries in order to avoid the use of AD as an anticompetitive practice.

#### **2.4 Domestic Petitioners. Who are the winners?**

Table 4 intends to reflect the competitive structure of the domestic industry by providing the number of competing producers or firms and the number of petitioners claiming AD action as well as their production market shares. The last column in the table intends to reflect the degree of foreign competition, if nothing else is considered. By looking at a share of investigated imports to national imports which is in most cases greater than 80%, this suggests that the investigated country or group of countries are the main source of imports of the respective product in Mexico, thus, the major foreign competitor in the domestic industry. Although the number of firms in the foreign industry is not known, it is assumed that, because duties are generally imposed to all exports of the respective product from the investigated country, all foreign firms act as a single rival to domestic producers. If one individual firm, however, proves that its export price is not below normal value it will be exempted from the duty.

The cases are marked with letters according to the market share of the petitioner firms and the share of investigated imports to total national imports. The cases marked with an A represent a highly concentrated industry and high market power, petitioners representing 100% of domestic production. Only one industry within this group does not resemble a monopoly (*steel plates in coil*). Those cases marked with a B represent also highly concentrated industries, 1 to 3 firms, and a market share of 70-99%. Industries marked with a C are those that, although a larger number of firms is observed, it is still concentrated (4-9 firms) and petitioners’ market share is still over 70%. Thus, during 1994-1998, 19 out of a total of 24 AD petitions were filed by industries with high levels of concentration and likely to have high market power. As for the other 5 cases, all but one (*sulphuric acid*) belong to the food sector. These industries, marked with a D, are characterised by a large number of firms represented by one or more associations of producers which look after the interests of its members and filed the AD petition. In few cases the petitioners represent more than 70% of the domestic production.



During the period of reference, the domestic industries that claimed AD action against price discriminated imports have high levels of concentration, as measured by the number of firms, and high levels of market power, as measured by the share in domestic production. These two factors are known facilitators of anticompetitive behaviour, such as competition deterrence and collusion. Furthermore, most of the claims for AD action are against dominant exporters (to the Mexican market) that threaten the market dominance of the domestic petitioners. Thus, in the first instance, it seems that AD claims are driven by the protectionist interests of domestic firms that see their market dominance threatened by foreign competition. However, according to the hypothesis that AD policy aids the achievement of anticompetitive outcomes, special attention must be paid when the characteristics of the industries involved in AD investigations are likely to produce anticompetitive behaviours. A closer look and an in depth analysis of the likely anticompetitive effects and trade restrictions of AD actions is pursued further in this thesis.

### ***2.5 Aggregated AD imports***

I turn now to the quantitative dataset of AD imports to put them into the general context of Mexican imports trade. The dataset is broken down into two subsets, one of investigated imports and another of non-investigated imports in which series of the value, volume and unit value of imports are analysed. The period of reference for all the series is 1992-2002, which allows a broader vision of the performance of AD imports.

Figure 4 shows the share of investigated and non-investigated imports according to its value. It can be observed that on average, during the reference period, over 60% of AD imports are investigated. This may confirm the previous observations that investigated imports are important players in the competition for the domestic market, and that other motives, different from the curbing of unfair trade practices, might be pursued by dominant petitioners.

Figure 5, which shows the monthly constant value<sup>46</sup> of investigated and non-investigated AD imports, shows the higher added value of investigated imports predominant throughout the period. Two possible factors may be the origin of the observed higher value, namely quality and price. Because the products imported are close substitutes, differences in quality cannot be too big. On the other hand, in contrast to figure 5, the gap between investigated and non-investigated imports according to volume, figure 7, is on average much narrower throughout the reference period, which suggests that differences in volume are not a decisive element of the higher value observed for investigated imports. However, it is important to note here that volume data is occasionally presented in different units according to the specific products, which make it difficult to aggregate all of them. Nevertheless, figure 6 shows that for the previous months to September 1997, when the process for the initial resolution is started, the average volume of investigated imports is much higher than the average of the subsequent months as a proportion of AD imports, yet the proportion of average value remains unchanged throughout the whole period. This leads one to suggest that, given that neither quality nor volume differences between investigated and non-investigated imports seem to cause the higher added value of investigated imports, artificial higher prices forced by the existence of AD action may

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<sup>46</sup> Adjusted to inflation of imports, which considers exchange rate fluctuations. Monthly Price Index of Imports, Banxico (<http://www.banxico.org.mx/eInfoFinanciera/FSinfoFinanciera.html>).

be the cause. Although the aim of AD policy is to raise the export price of the investigated products, which may result in the rise of its value, these distorted price adjustments together with the anticompetitive scope of the petitioner industry shown before could lead to important welfare losses.

When considered as a proportion of total national imports, the value of AD imports might seem to be negligible. Table 5 shows the share of the value of investigated imports per country per year to total national imports, this is all imports of all products made by Mexico. AD imports represent on average during the reference period 1.13% of total national imports while investigated imports represent on average 0.72%. This relative participation is stable between 1.0-1.2% for AD imports and 0.6-0.9% for investigated imports throughout the period. Particularly, from 1997, the relative participation of AD imports is more stable. This is surprising given the increasing trend of total national imports observed since January 1992, the initial month of the studied period (see figure 5). It is observed also that the monthly value of investigated imports changes more rapidly than both AD imports as a whole and non-investigated imports. And figure 6 confirms, in terms of volume, the more rapid monthly change of investigated imports relative to both AD imports and non-investigated imports.

There are a number of reasons that could explain the stable AD activity along this period. In the first instance, a limited capacity of the AD authority can be contemplated as a reason, where there is a limit to the number of cases that can be investigated. Thus, the proportion of AD imports to total national imports is similar through the time period. From the opposite side, petitioners that foresee a limited capacity of investigation by the authority refrain from filing more cases up to that expected limit. One more reason can be the stable relative participation of the US AD investigations. Tables 6 and 7 show the aggregated countries' relative participation in both AD imports and investigated imports. As the US the major participant in Mexican AD activity, the US represents over 60% of all AD imports and over 95% of investigated imports. Relative stability of these high levels of participation during the period suggest that, remaining the US as the main target for AD action by domestic producers, no increase of AD activity is observed coming from other sources of exports.

As for the rest of the countries, Greece and Taiwan and China are the second and third major participants. Respectively, their value of investigated imports represent 0.0093 and 0.0081 of total national imports value, while representing 0.81 and 0.70 percent of total AD imports, and 1.28 and 1.11 percent of investigated imports. The EU follows with 0.0046% of total national imports and 0.47% of AD imports, while representing 0.73% of investigated imports. Tables 8 and 9, show the share of the volume of investigated imports to total AD imports. Here, US participation is just over 91% of investigated imports and almost 50% of AD imports. Contrary to the above, following the US as second major participant (in volume terms) is Japan with 1.29% of AD imports and 1.98% of investigated imports. Greece, now in third place, participates with 0.92 and 1.62 percent of AD imports and investigated imports, respectively. All cases, except from US, have their positions changed in terms of participation in AD imports as compared to that of values. Investigations of imports from Taiwan and China (0.11 and 0.20 percent of AD imports and investigated imports, respectively) and from the EU (0.39 and 0.65 percent of AD imports and investigated imports, respectively) for instance, fall a number of places in the table as compared to value terms, whereas investigations from Japan moved up in the table considerably. However, as mentioned above, volume



units are sometimes different for each specific product and some cases have more than one product investigated, which make it difficult to consider all imports in a same aggregation level. Therefore, a closer analysis of individual products follows in order to get a better picture of the effects of AD policy on the variation of the volume, value and unit value of AD imports.

## ***2.6 Descriptive statistics of selected AD cases***

In this section a few number of cases are selected to look closely at the import patterns of both investigated and non-investigated products. This intends to investigate on the actual effects of AD action over the behaviour of the volume and unit values of AD imports. The focus is on the assumption made above that adjustments to AD action are caused by the price rather than the volume of imports.

Table 10 presents the descriptive statistics of AD imports. The data here is presented in three stages for both investigated and non-investigated imports series. The first stage begins with the month one year (12 months) before of the Initial Resolution and is indicated as ‘period B’; the second stage is indicated as ‘period D’ and refers to the months, usually 12, during which the investigation is carried out; and the third stage or ‘period A’ refers to the 12 months after the publication of the Final Resolution. Period B is usually the period considered by the authority to make the calculations of whether exports are sold below their normal value and can vary from four to twelve months. Period D reflects firms’ strategy change due to the observed threat of AD action and can also be determinant for the final outcome, for firms trying to avoid the imposition of duties, i.e. upward price adjustments. Staiger and Wolak’s (1994) investigation effect is also observed during this period, where trade restrictions occur without the need for the imposition of duties. Continuing on Period A, which gives a more dynamic sense to the analysis, allows one to observe the effect of the AD action<sup>47</sup>.

By comparing the mean value of imports at each period, for both investigated and non-investigated sources, the change in the pattern of imports is pinpointed once the threat of AD action is present. The expected effects of AD action on imports are (Prusa, 1996)<sup>48</sup>:

- a) Duties increase the price of imports and cause a decrease in the quantity sold in the domestic market.
- b) The larger the duty, larger the price increase and the quantity decrease.
- c) When the duty is small, the quantity of imports may not decrease and even grow<sup>49</sup>.
- d) Non-investigated imports may serve as a substitute for the trade restraint caused by duties and eventually offset the duty effect.

Although further econometric analysis will be carried out in order to obtain the parameters of these expected effects, the analysis of the descriptive statistics here presented provides important insights on the behaviour of imports. Particularly, by

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<sup>47</sup> Recall that duties can be revised every year by petition of any of the parties. Similarly, after five years the duty comes to expire, if it has not been revised; this is known as the ‘sunset clause’.

<sup>48</sup> This is one of the very few empirical papers that looks at the import restrictions of AD by using product-specific data. However, in the second part of this chapter, I will extend his analysis in terms of the bulk of data, the model specification and the estimation method (see below).

<sup>49</sup> Note that small duties may be related to the facilitation of collusive practices.

looking at the changes in mean and Stdev values of the value, volume and unit prices, a general pattern of the effect of AD policy on imports can be traced<sup>50</sup>.

Table 10 shows the mean and Stdev values for selected cases. The statistical significance of the change between the sample mean of import's value, volume and unit value was tested using a t-test. The test shows that the mean changes observed in the different periods of AD investigation are statistically significant at the 5 and 10 percent level.

According to Table 4, *Diammonium Phosphate* belongs to the group of concentrated domestic industries, where the petitioner possesses a monopolic position and faces only negligible foreign competition. According to the volume of investigated imports, *Diammonium Phosphate* has a mean of 17,258.22 units for period B with a Stdev of 18,366.59; for period D, the mean value decreases sharply to 3,069.93 with a Stdev of 3,608.08. This suggests that once the investigation is carried out and the threat of the imposition of duties is in place, foreign firm's response is to cut down on the volume of imports in order to increase the price and try to avoid a positive outcome of the investigation. This is confirmed by the increase of the mean of the unit value from 0.1151USD in period B to 0.1398USD in period D with Stdev of 0.025 and 0.036, respectively. The result of the AD action in terms of the value of imports is that the mean value decreases in period D to 415.45USD from 1,734USD in period B with respective Stdev values of 464.52 and 1,761.44. Note that although unit values are deflated using an imports deflator, all Stdev values are large. This high volatility may suggest an irrational variation of imports behaviour due to the distortions that AD introduces into the trade process. This large Stdev values are observed in all the next cases, so for the moment they are set apart.

Once the investigation is concluded, period A reflects the aftermath strategy of the firm and giving to the analysis a dynamic sense which is generally not considered in other empirical studies, which end with the final outcome of the case. All the mean values of the investigated imports of *Diammonium Phosphate* show an increase relative to period D. This is not surprising as the outcome of the investigation is negative and the values would go back to the original levels before the initiation of the investigation. It is important to highlight though, that despite the aim of AD policy of raising export prices, the mean unit value in period A is above the mean unit value of period B and that the Stdev is much smaller than the one observed before the initiation of the investigation. This final result is consistent with the main hypothesis that AD action can result in the harm of the competition process as well as of consumers who end up paying higher prices, for such price increase going beyond the necessary level that corrects the harm caused to the domestic industry, i.e. lesser rule.

By turning now to the behaviour of non-investigated imports it is possible to contrast whether AD action effect is equivalent for both sources of imports or whether non-investigated imports offset its actual effect, i.e. trade diversion. Because almost all imports of *Diammonium Phosphate* come from the US, non-investigated imports are negligible and they behave exactly the opposite of investigated imports. For a decrease of the value of investigated imports in period D is followed by an increase of non-investigated imports, this being a confirmation of the presence of, although negligible, a substitution effect. Note also that mean unit prices of non-investigated imports are much higher than mean unit prices of investigated imports in period B, an element to consider as trigger of the filing of the petition. When investigated imports

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<sup>50</sup> Although the descriptive statistics have been calculated for every product, the analysis of only few selected cases is presented next.

increase volume back to near original levels in period A, non-investigated imports decrease as they are displaced by the principal source imports. The same direction is followed for the value and unit value of non-investigated imports and important to highlight is the fact that the mean unit value in period A also increases once the investigation is concluded, although contrary to investigated imports, not reaching the level of period B. Investigated mean unit values remain, nevertheless, below non-investigated levels. This suggests that investigated imports have greater efficiency levels than non-investigated, making the former major competitors of domestic production in the domestic market, thus, the target of AD action. This nevertheless, cannot be investigated given the information available.

*Furazolidone*, also a chemical, is imported from China within a domestic industry that has the same monopolistic structure as well as only one major competitor, the target country. The investigation resulted in a final positive outcome with duties of 117%. The mean value of the volume of investigated imports decreases in period D, and once the investigation is concluded and duties imposed, imports stop. A substitution effect is evidently followed by the restraint of investigated imports, observed by the increase of the mean volume of non-investigated imports in period D, which continues to increase through period A, when competition from investigated imports is eliminated. Note, however, that the mean unit values of investigated imports are greater than non-investigated unit values in period B suggesting that the trigger for the filing of the petition is other than price discrimination. Investigated unit prices decrease during period D while non-investigated increase as well as in period A. The result of AD action here is that import competition in the domestic market is dampened with the elimination of the main imports from China. Imports from other minor sources have benefited from this by increasing their volumes (substitution effect) as well as raising prices even over period B levels.

*Carbon Steel Balls* imported from Taiwan is a product within the steel sector with also a domestic industry of the characteristics of a monopoly and the target country being the major competitor. The final outcome of the investigation is positive with duties of 19.44% imposed. As expected, the mean volume of investigated imports decreases sharply from 12.43 in period B to 3.93 in period D; non-investigated imports respond similarly to the AD filing although the decrease is smaller being from 77.17 to 72.49, respectively. Mean unit values of investigated imports are much smaller than non-investigated in period B, which fairly suggests a reason for the filing of the petition; in period D, with a reduction of volume, mean unit value of investigated imports slightly increase, and contrarily to this, non-investigated unit values decrease slightly. This could be because although the threat of AD duties slows down the flow of imports, non-investigated imports are not constrained by the policy and can make up for lost volumes by lowering prices. As it is expected, once the positive outcome of the investigation is reached the mean unit value of investigated imports increase in period A. Surprisingly, an increase in volume is observed as well. This result is likely to confirm point (iii) above suggesting that small duties have the opposite effect to that intended by AD policy. Interestingly as well is the fact that the mean unit value increases beyond the initial unit value of period B. Furthermore, unit values of investigated imports remain below unit values of non-investigated imports during the three reference periods.

Also in the steel sector, imports of *Door Knobs* from China are within a domestic industry equally highly concentrated, although not monopolistic, and with a strong market power of the petitioner. Contrary to the above cases, however, here foreign competition is tougher, with the target country providing only 29% of all

imports. Nevertheless, although the target country may not be the major competitor, a duty of 236% is imposed to imports from this country. Contrary to the expected behaviour, the mean volume of investigated imports increases from 12.37 in period B to 15.20 during period D. Nonetheless, mean unit value increase as expected due to the threat of AD duties from 2.68USD to 3.42USD, respectively. The mean volume of non-investigated imports sharply increases suggesting again the existence of a substitution effect and unit values decrease in period D. In period A, due to the high level of the imposed duty, the mean volume of investigated imports sharply decrease to 5.65 but unexpectedly again, mean unit values decrease even beyond initial levels of period B. Note that also here mean unit values of investigated imports are below non-investigated mean unit values in all three periods suggesting again that motives other than targeting price discrimination may lay behind AD policy.

*High Fructose*, in the food sector, is imported from the US and the domestic industry is characterised by a large number of producers of similar characteristics. Apart from *tinned peaches* imported from Greece, the rest of the cases from the food sector, *pork*, *beef* and *apples*, have the same characteristics. However, they are different in terms of the faced foreign competition, US being the major and only competitor in the market of *high fructose (99.80% of imports)*, whereas competition levels are higher in the rest of the sectors. The behaviour of the volume of investigated imports is consistent as expected in point (i), sharply decreasing in period D from 3,049.22 to 560.86. Similarly, mean unit values increase. A substitution effect appears to be present in most of the cases, and this one is not the exception. The mean volume of non-investigated imports increase in period D to 0.163 from 0.016 from the previous period and mean unit values decrease from 3.74USD in period B to 1.96USD in period D. The duty imposed to investigated imports in this case is that of around 89.60USD over the export price rather than an add valorem percentage<sup>51</sup>. In period A, however, the mean volume of imports slightly increases driving down the unit value to 0.87USD from 1.09 of the previous period. This may as well serve as a confirmation of point (iii), a behaviour already observed above. The increase of investigated imports drives out non-investigated imports to a mean value of 0.09, nevertheless, unit values continue to fall beyond the level observed in period B. Although investigated unit values are larger than non-investigated in this period, they end up above the level of period B.

The *bond paper* domestic industry is relatively concentrated and also faces major rivalry from the target country, this being almost the only source of imports. The threat of AD duties is not enough to slow down the volume of imports during period D. Investigated imports slightly increase whereas the increase of non-investigated imports is larger. Unit values of investigated imports remain below non-investigated imports during the first two periods, nevertheless, the increase of volume result in a decrease of unit values only for non-investigated imports while investigated unit values rise as expected, adjustment of strategy to avoid the imposition of duties. Despite the low level of the duty imposed, 12.76%<sup>52</sup>, the mean volume of investigated imports decreases in period A with the expected increase of unit value. Non-investigated imports here support once more the substitution effect hypothesis with a decrease of unit value even further from initial levels. AD policy has effectively resulted again in the increase of prices and restraint of import flows.

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<sup>51</sup> The final duty is here calculated as the average of various levels of duties imposed to the different exporting firms in the investigated country.

<sup>52</sup> Final duty also an average of various levels imposed to different exporting firms.

*Bicycle tyres* imported from India resulted in a positive final outcome with a duty to imports of 116%. The domestic industry is characterised as highly concentrated with high market power of petitioner and foreign competition from target country is relative low (supplying only 27% of imports). Mean unit values of investigated imports are in all three periods below non-investigated unit values. In period D mean volume of investigated imports decrease 180.65 from 346.45 in the previous period. Consequently, mean unit values increase. The imposition of a large duty result in a drastic cut of investigated imports, the mean volume decreases to 2.91 in period A. Note however that the mean unit value notably decreases even beyond the initial level in period B. Despite the cut of non-investigated imports in period D, they increase in period A suggesting a substitution for the drastic cut of investigated imports leading to a decrease in unit values. The fact that investigated unit values remain below non-investigated as well as that restraint of trade is notably exercised in the period after the conclusion of the investigation, may clearly suggest that deterrence of imports can be an aim of AD policy even without the need of forcing export prices to raise.

The last selected product is from the plastics sector, *polystyrene crystal*. It is also characterised by a highly concentrated domestic industry and by a strong rivalry from the target country. The threat of AD action cuts down the flow of investigated imports, the mean volume drastically decrease from 445.51 in period B to 1.66 in period D; unit values, however, decrease slightly. On the other hand, the mean volume of non-investigated imports increases in period D accompanied by an important decrease of unit values. This, once again, gives account for the existence of a substitution effect. In period A, given the positive outcome of the investigation and the imposition of a duty of around 58.73%, the mean volume of investigated imports goes further down and contrarily to the expected price behaviour, unit values continue to fall. Despite the claimed substitution effect, the same behaviour is followed by non-investigated imports once the investigation is concluded and duties are levied; mean volumes go further down to 283.73 from previous 380.07 and unit values slightly decrease to 0.79USD from a previous 0.80USD. This might not seem surprising however given the negligible participation of non-investigated sources in the domestic market. Note that in this case too, unit values of investigated imports remain below non-investigated unit values and they continue to drop, surprisingly, for any drop in trade. Here again, foreign competition is deterred even when the price increase of imports is not accomplished.

Although only a small sample of cases have been analysed here, this exercise has allowed us to draw important insights of the effects of AD action on imports, which descriptively confirm the existence of the behaviour expected and a similar behaviour for the rest of the individual products can be imputed. Particularly, it is observed that the imposition of duties result effectively in what AD policy aims, which is the restraint of the volume of imports and the rise of unit values. However, it has also been observed that alternative behaviour also arises from the existence of AD action as well as the suggestion of the existence of alternative motives that lead to the filing of AD action by domestic petitioners. The deterrence of import competition even when duties are not imposed and the existence of import diversion as clear alternative effects of AD policy, and the prevailing unit values of major competitors' investigated imports below non-investigated imports as alternative motives for the use of AD policy are the results of the analysis.



## ***2.7 Concluding comments***

In this chapter I have presented one of the most extensive analyses of AD in Mexico and its effects on imports. By combining the information of two purpose-built datasets based on the official reports of the AD authority, on one hand, and on tariff-specific import data, on the other hand, important insights on the relationship between domestic market structure and AD claims have been drawn. Although AD imports may seem only a negligible part of total imports in Mexican trade, the effects of AD actions have an important impact within the domestic industry that claims the petition. By the descriptive analysis of the data here presented, I have shown that apart from the accepted conventional wisdom that AD policy distorts free trade equilibrium by artificially raising import prices and restraining their volume, alternative effects and motives for the use of the policy arise.

Particular focus is put on the competitive structure of the domestic industry. It has been showed that in 19 out of the 24 investigations carried out during 1994-1998 the respective market structure was characterised by high levels of concentration, many of them monopolistic, and with the petitioner firms' possessing important market power. Furthermore, the majority of the AD cases were filed against the major exporter, this is, the main rival of the petitioner firms in the domestic market (which participation is from 70% to 99% of the total imports of the respective product).

The descriptive results presented in this chapter are consistent with Prusa's (1996) effects of AD measures found on imports trade of the US. Volume restrictions and price increases are observed when duties are imposed. These restrictions are also larger for larger duties and contrarily, for smaller duties an increase of volume is also registered. Import diversion effects are also observed. However, this diversion effect is unlikely to offset the trade restriction objective of the policy given that in most of the cases non-investigated imports' participation in the domestic market is only marginal to import demand.

The evidence presented in this chapter is also consistent with the view of previous research, mainly theoretical however, that finds that AD policy can cause anticompetitive behaviour from the involved firms. This raises the concern on the motives for the claim of AD action, for instance, when the price increase of investigated imports after the imposition of duties goes beyond pre-filing levels or when the price of investigated imports remains below the price of non-investigated imports even when duties are imposed. Results of this chapter suggest that deterrence of imports, although an aim of AD policy, should be of greater concern in the investigations by the authority, especially when the domestic industry and petitioner firms are characterised by high concentration and large market shares of domestic production. .

Finally, further parametric research will be carried out to formally pin down the import patterns here discussed.

## CHAPTER 3

### *Antidumping Policy: Trade deterrence and trade diversion of Mexican imports*

#### *3.1 Introduction*

Although empirical studies of antidumping (AD) have not been in short supply, the study of the effects of AD action in developing economies is still scarce<sup>53</sup>. Most of the developed country-based studies of AD, however, use industry rather than product-specific data, and rather look at the motives or factors that lead to the filing of a petition and its outcome. More recently, a growing number of empirical studies have focused on the trade restrictive effects of AD measures<sup>54</sup>. This chapter belongs to this last strand of the literature and also intends to fill the gap between developed and developing country-based studies. In particular it revisits a late study on the effects of AD measures in Mexico.

Different outcomes arise from the imposition of AD duties. If a duty is levied to imports under investigation or *named imports*, its price in the importing or domestic country increases and its quantity is reduced. This effect of AD policy is known in the literature as ‘trade destruction’. Trade restrictions sought by the importing country can be achieved simply by the filing of the AD petition, for the threat of the imposition of duties is sufficient and they need not to be levied. This is known as the investigation or ‘harassment effect’ (Staiger and Wolak, 1994). AD action can also have effect on imports of the same product not subject to investigation or *non-named imports*. If the investigation increases the price and reduces the quantity of non-named imports a ‘reputation effect’ is said to occur. This is that non-named importers fearing to trigger an AD investigation will restrict their trade to the domestic market. Nevertheless, the opposite effect may also occur. If duties are imposed on named imports, non-named imports may make up for the trade restriction in the domestic market and even offset that trade restriction. This is known as the ‘trade diversion’ effect of AD policy. Collusive effects between firms may arise with the withdrawal of the petition (Prusa, 1992; Zanardi, 2004) or when the threat of AD action serves as a punishment mechanism to sustain a collusive agreement (Staiger and Wolak, 1989; Mendieta, 2005)<sup>55</sup>.

The objective of this chapter is to revisit the effects of AD duties on imports of Mexico. Niels (2004) shows that AD measures in Mexico, i.e. duties, have significant trade destruction effects on the volume and value of named imports. The author also shows that there is no evidence of a harassment effect or of a general reputation effect<sup>56</sup>. More important the author does not find evidence of a trade diversion effect of AD policy. Using a Box-Cox Tobit random effects model that is appropriate for the purpose-built censored panel data, here I confirm evidence of a trade destruction effect of antidumping action. Estimation results also show no evidence of a

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<sup>53</sup> To my knowledge, Niels (2004) is the most extensive study on AD from a developing country view.

<sup>54</sup> See section 2 below.

<sup>55</sup> Konings, *et al* (2001) provides with references on theoretical papers of the effects of AD on trade flows.

<sup>56</sup> Only some evidence of a reputation effect is observed for selected cases, i.e. developing country imports and processed food, textile and rubber imports, for all imports there is no evidence of reputation.

harassment effect and evidence of a reputation effect through prices rather than values. More importantly and in contrast with Niels (2004), results show the existence of a trade diversion effect of AD to non-named imports. This evidence is similar to previous results for the US and the EU (see below). This is important because the deterrence of import competition by the imposition of duties is dampened by the increase of imports not subject to AD investigation, which on the one hand suggests that, indirectly, the beneficiaries of AD action are other importers. On the other hand, it is interesting that when imports from the US are excluded from the estimations, the trade diversion effect disappears, suggesting that domestic petitioners do benefit from trade protection. One possible explanation to this is that the share of US imports is very high for most of the products, and given the cost and quality advantages of US-Mexico trade, imports are substituted by domestic production rather than imports from other source.

Analysis of the market structure of the petitioning industries suggests that AD action is claimed by industries that see foreign competition as a threat to their likely dominant position; however, this may be dampened by the trade diversion effect of AD. Market concentration may, however, be the cause for trade diversion to non-named imports (Konings, *et al.*, 2001).

The structure of the chapter is as follows. In the next section I summarize some of the previous results of the empirical analysis of the effects of AD measures. Section 3 describes the general features of Mexican AD investigations as reported in the official reports of the AD authority. Section 4 describes the characteristics of the market structure of the domestic AD petitioners. Section 5 presents the institutional framework on which the empirical estimation is based. In section 6 the data used is described. Section 7 presents the estimation results. And in section 8 the chapter concludes.

### ***3.2 Previous empirical studies***

Empirical research on the effects of AD policy, e.g. trade destruction, trade diversion, is increasing. Nevertheless, the majority of the studies focus on the US and the EU.

In an early paper Harrison (1991) investigates the impact of AD investigations and countervailing duties on import prices of the US during 1981-1986. Results show that for some industry sectors the effect on import prices of investigations is as great as the imposition of duties, giving evidence of both trade destruction and harassment by AD action. In what is considered the most complete study of the effects of AD, Staiger and Wolak (1994) look at both imports and domestic production in the period of 1980-1985 in the US and also give evidence of trade destruction and harassment of AD policy. The authors show that both preliminary and final findings of dumping have a significant trade destruction effect and a significant positive effect on domestic production almost of the same proportion, suggesting that domestic producers are the beneficiaries of the protection granted by the AD measures. They also show that trade destruction is achieved by only filing for an investigation, the harassment effect, where duties need not even to be imposed.

Evidence of trade diversion to non-named countries is shown in Krupp and Pollard (1996) in the US chemical industry for AD cases during 1976 to 1988. Strong destruction effects on imports of named countries are found in all US AD cases investigated during 1980-1994 (Prusa, 2002). The author also shows evidence of harassment and trade diversion to non-named countries. For 246 AD investigations between the years of 1985 and 1990 in the EU, Konings *et al* (2001) find no evidence



or only low import diversion to non-named imports compared to the US. This result is similar to Lasagni (2000) who looks at cases investigated during the period 1982-1992. Brenton (2001), on the contrary, in a sample of 98 AD cases investigated in the EU during 1989-1994 finds evidence of trade diversion to imports from non-named countries outside the EU. Some evidence of a reputation effect on non-named countries is also found on prices.

Following a rather different and innovative approach to the empirical analysis of the effects of AD measures, Bown and Crowley (2004) investigate on the effects of AD policy on exports from Japan to the US and to the EU during 1990-2001. In a first assessment they find that US AD duties on imports from Japan have a trade destruction effect, and Japanese exports to the US are reduced substantially. The authors also find a trade diversion effect, defined here as the increase of Japanese exports when AD duties are applied to a country different to Japan, e.g. the EU, Korea. The second assessment shows that when the US imposes AD duties to imports from Japan, they are “deflected” to a third country which is the EU. Similarly, when duties are imposed to a different country to Japan, such as the EU, it increases export from Japan, creating a trade depression effect on exports from the EU to the US. Two more different approaches are provided previously. Using an interventionist analysis Lloyd *et al* (1998) focus on the price undertaking effect of one particular case in the EU in the year of 1982. The authors find an increase of import prices and a fall in the imports share, namely, a trade destruction effect<sup>57</sup>.

Although focusing only on withdrawn cases in the US, Taylor (2004) looks at the effects of duties and countervailing duties on investigated imports during the period 1990-1997. The author shows that the vast majority of the cases show an increase or no change in the quantity of trade and no rise of the price, suggesting no evidence of collusion, according to the author. Although it is not made explicit by the author, results here are evidence of no harassment effect of AD investigations.

Finally, Niels (2004), provides probably with the most important analysis of the effects of AD policy in a developing country<sup>58</sup>. Looking at all AD investigations between 1992 and 1997 in Mexico, the author shows evidence of an important trade destruction effect of AD measures. He finds no trade diversion to imports of non-named countries as well as no harassment effect. Some evidence of a reputation effect is observed only for a selected sample of cases, e.g. developing country imports and processed food, textile and rubber imports; for all cases, however, there is no evidence of reputation.

Of all these studies only Konings, *et al* (2001) and Niels (2004) use disaggregate data up to 8-digit level. This is important in order to reach accurate analysis of the effects of AD action due to the specificity of the AD investigations. In this chapter I also use product-specific import data but different from any of the studies above I collect a long time series of imports<sup>59</sup>. The estimation method used here also differs from those previously used. The data is characterised by many observations taking the value of zero. This is that duties can stop the flow of imports. Since the previous studies use annual data the aggregation avoids the problem of observations with value zero. A Box-Cox transformation of the data allows for a

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<sup>57</sup> Cited in Niels (2004).

<sup>58</sup> Recall that Mexico together with Argentina, Brazil, India, South Korea, among others, are the main users of antidumping measures. In a previous paper, Esquivel and Solis (2002) investigate the motives of the filing of AD petitions in Mexico.

<sup>59</sup> Data on imports is collected monthly for the years 1992 to 2002. See section 5.

flexible approximation of the linear model to its semi-logarithmic form<sup>60</sup>. A Tobit random effects estimation is then used, which is appropriate for the structure of the data<sup>61</sup>. The monthly and long time-series structure of the database together with a more appropriate estimation method to the characteristics of the data provide with more accurate results of the effects of AD action on Mexican imports<sup>62</sup>. Different to Niels (2004) also, is that the data here picks up on the effect of both preliminary and final outcomes (similarly to Staiger and Wolak), providing a more dynamic assessment of it. Finally, following the hypothesis that AD aids for anticompetitive behaviours<sup>63</sup>, I also incorporate to the analysis of the effects of AD duties on imports the characteristics of the market structure of the domestic industry. A lagged value of the dependent variable is introduced to capture the dynamics of the antidumping process<sup>64</sup>.

Note that here the unit of research is the product-specific tariff code rather than the target country, thus, I refer to named imports rather than to named countries as it is conventional.

### **3.3 General Features of Mexican AD Investigations**

During the period of 1994-1998 a total of 24 AD cases were investigated in Mexico by the *Unidad de Practicas Comerciales Internacionales* (International Commercial Practices Unit) of the Ministry of the Economy. A total of 68 tariff-code products, identified at the 8-digit level of the *Tarifa del Impuesto General de Importacion* (General Import Tax Tariff<sup>65</sup>) are comprised in all 24 cases. It is important to note that one investigation can involve more than one product or more than one country.

The outcome of the investigation is reported at three different stages. Each stage is published as a 'resolution' in the *Diario Oficial* (Official Journal). The initial resolution publishes the decision of the authority to accept and initiate the investigation. The first results of the investigation are published in the preliminary resolution. AD measures can be applied at this stage but are not definitive and the investigation continues. Finally, a final resolution is published with the final decision on whether the preliminary outcome is made definitive or is modified, i.e. imposition of duties or not<sup>66</sup>.

As mentioned before, Table 3 describes the characteristics of the investigations, where 54.1% of the cases belong to the chemical and the steel manufacturing sectors (6 and 7 cases, respectively); 20.8% to the food sector (5 cases); 8.3% to other manufactures (2 cases); 8.3% to plastics (2 cases) and one case to the rubber and paper sectors each. Price discrimination, sales below costs and subsidies are the motives that make domestic producers claim AD protection from imports. In all 24 cases, price discrimination is the only motive of domestic petitioners to claim AD action (column 7) and only one anti-subsidy petition was filed at the same time for imports of *tinned sliced peaches* from Greece<sup>67</sup>.

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<sup>60</sup> See section 6.

<sup>61</sup> One of the practical advantages of using this estimation method is that the econometrics software STATA provides with the specific command to estimate tobit random effects models.

<sup>62</sup> A Box-Cox Tobit Random Effects model is used (section 6).

<sup>63</sup> See for instance, Prusa (1992) and Veugelers and Vandenbussche (1999).

<sup>64</sup> As considered in Brenton (2001).

<sup>65</sup> This is equivalent to the Standard Industrial Classification Code.

<sup>66</sup> The resolutions can be downloaded from the Ministry of the Economy's webpage <http://www.economia.gob.mx>.

<sup>67</sup> The anti-subsidy or countervailing investigation is not considered here.

Let's recall that if no dumping margin or harm to the domestic industry is found at the publication of the preliminary resolution, the authority terminates the investigation. All 24 investigations here were carried out until the end of the process, thus, no distinction is made between undertakings or terminated cases. Most of the cases are filed against imports from the US, which is not surprising since this country is Mexico's major trade partner. Column 4 of Table 1 refers to the decisions of the final resolution of the investigations. A negative final outcome, i.e. no duties imposed, was determined for only 4 cases: *diammonium phosphate*, *synthetic iron oxide and hydroxide*, *tinned sliced peaches* and *petrol additives*. All other cases resulted in the imposition of duties to imports<sup>68</sup>. Columns 5 and 6 show the level of final duties and dumping margins calculated in the investigation. Note that when more than one product is involved in one individual case the reported duty and dumping margin refers to the simple average of all of them<sup>69</sup>. Most of the figures here represent the percentage difference between the export price and the normal value of the product, but in a few cases the nominal difference is reported (*Pork* and *Gas lighters*) and in other cases the duty is only reported as the deviation from the reference normal value (*ammonium sulphate*, *polystyrene crystal*), making it impossible with the information available to calculate the duty. The lowest dumping margin observed is for imports of *paper bond* from the US of 18.82% and a final duty of 12.76% (average of all products). The highest dumping margin observed is 2,484% with a final duty of 91.10% to imports of *sulphuric acid* from Japan. It is worthwhile to recall here, that the WTO recommends in its antidumping guidelines a 'lesser duty rule', which means that duties imposed need to be at the necessary level that removes the harm caused by the practice of price discrimination and not at the whole amount of the dumping margin. This rule was followed in only 6 of the cases (*sulphuric acid*, *prams and pushchairs*, *bond paper*, *steel connections*, *hot-rolled steel plates* and *cold-rolled steel sheet*). In the rest of the cases the duty imposed corresponds to the whole amount of the dumping margin.

### **3.4 Market Structure Characteristics of Domestic Petitioners**

Despite the claims of price discrimination and sales below cost for the use of AD measures, there exist general suspicions of motives other than curbing unfair trade practices for the relentless use of AD action. Market structure characteristics that are known facilitators of anticompetitive behaviour, such as high concentration of firms or high market share, are considered in the analysis of the effects of AD action on imports<sup>70</sup>. Table 1.1 intends to reflect the competitive structure of the domestic industry, the last column reflecting the degree of foreign competition, if nothing else is considered<sup>71</sup>. By looking at the share of investigated or named imports to total imports of the same product, which in most cases is greater than 80%, suggests that the investigated country or group of countries are the main source of imports in Mexico, therefore, the major foreign competitor in the domestic industry. Although

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<sup>68</sup> As mentioned before, withdrawal or out of court settlements are not observed in Mexico and only one undertaking was observed during the period of reference and was not sustained by the importer.

<sup>69</sup> This is also the case for duties of different firms of one same product.

<sup>70</sup> The industrial structure of the domestic petitioning industry can be characterised given the information taken from the resolutions. Data such as product share, imports share, number of firms are used to investigate further the effects of AD measures.

<sup>71</sup> The information contained here is also taken from the resolutions.

the number of firms in the foreign industry is not known<sup>72</sup>, it is assumed that, because duties are generally imposed to all exports of the respective product from the investigated country, all foreign firms act as a single rival to domestic producers. If one individual firm, however, proves that its export price is not below normal value it will be exempted of the duty.

The cases are marked with letters according to the domestic market share (of output) of the petitioning firms and the number of firms in the industry. Cases marked with an A represent a highly concentrated industry and high market power with petitioners representing 100% of domestic production, i.e. domestic monopoly. Cases marked with a B represent also highly concentrated industries, 1 to 3 firms, and a market share of 70-99% (only one industry within this group have a market share of 100%, *steel plates in coil*). Industries marked with a C are those that, although with a larger number of firms, it is still concentrated (4-9 firms) and petitioners' market share is still over 70%. Not surprisingly, 19 out of the 24 AD cases were filed by industries with high levels of concentration and likely to have high market power. As for the rest of the cases, all but one (*sulphuric acid*) belong to the food sector. These industries, marked with a D, are characterised by a large number of firms represented by one or more associations of producers which on behalf of the producers file AD petition.

The domestic industries that claimed AD action against price discriminated imports are characterised by high levels of concentration, as given by the number of firms, and high levels of market power, as given by the share of domestic production. These two factors are known facilitators of anticompetitive behaviour, such as competition deterrence and collusion. Furthermore, most of the claims for AD action are against imports that threaten the market dominance of the domestic petitioners, as given by the share of named imports. This, at first instance, suggests that AD claims are driven by the protectionist interests of domestic firms that see their market dominance threatened by foreign competition. According to the literature that supports the hypothesis of AD policy as an aid for the achievement of an anticompetitive outcome, particular attention must be paid when the characteristics of the industries involved in AD investigations are likely to produce anticompetitive behaviours. A closer analysis of the restrictive effects of AD actions on imports is developed next.

### **3.5 The Data**

Monthly series of the value of imports and the volume of imports for the period 1992-2002 were collected for each of the 68 products (8-digit level) involved in the AD investigations<sup>73</sup>. Data is collected from the *Tarifa del Impuesto General de Importacion* (General Import Tax Tariff) of the Ministry of the Economy. By dividing the value over the volume of imports, a series of the unit value of imports was constructed. The value of imports is expressed in US dollars and is then deflated with the General Price Index of Imports in US dollars as published by *Banco de*

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<sup>72</sup> Although duties are imposed in most of the cases to individual firms, most of the time not all the exporters respond to the inquiry. Therefore, the outcome of the investigation is based only on the most available information. The highest duty is imposed to those firms which did not respond to the inquiry.

<sup>73</sup> There are only three products in the dataset that comprise more than one country and imports are added up for each product.

Mexico, the central bank<sup>74</sup>. Each series is divided into two sub-series. One is comprised by all products under investigation, named imports, and the other one by the rest of imports entering the Mexican market from sources different to those under investigation, non-named imports. These make up to a total of six series of AD imports, each in a panel data structure. The total number of products after elimination of incomplete data is 62. Therefore, each panel is comprised of 62 cross-section products and 132 time-series periods<sup>75</sup>. All series are then normalised to the year of the initiation of the duty investigation so that they are expressed as an index.

Additional information was taken from the Official Journal. Data on the outcome of the investigation at each of its different stages, i.e. initial, preliminary and final, is collected as a dummy variable, *inreso*, *po* and *fo*, respectively. Each variable takes the value of 1 for a positive determination and zero otherwise. The actual level of the duty is collected in percentage terms also for each preliminary, *pd*, and final, *fd*, stage. The real exchange rate, *rer*, is also an independent variable that controls for the macroeconomic effect. Other independent variables pick up on the market structure characteristics of the domestic industry.

The basic descriptive statistics of the variables entered in the estimations below are shown in Table 13. The characteristics of the variables and the expected relationship between dependent and independent variables are presented in the next section. From the analysis of means developed in the previous chapter, the effect of AD policy on imports of investigated and non-investigated products was shown. Volume restriction of investigated imports is observed for most of the cases in the period when the investigation is carried out (D/B). Sixteen out of twenty three cases reported in the table show a volume decrease during this period. The restraint of investigated imports is compared with the trend of non-investigated imports. Here, only ten cases show a decrease in the volume of imports (d/b). Once the final outcome of the investigation is published, more than a half of investigated cases show a decrease in imported volumes for the twelve subsequent months (A/D). As for non-investigated imports, only nine cases show a decrease in volume (a/d).

A general decrease in the value of investigated imports is also observed during the period of investigation (seventeen cases). On the other hand, only less than half of non-investigated cases show a decrease in the value of imports. Similarly, fifteen investigated cases show a decrease of the value of imports as compared with less than half of non-investigated cases showing a decrease for the twelve months after the publication of the final outcome.

The analysis of means give preliminary evidence of the trade restriction caused by the use of AD measures. General volume and value decrease as well as unit price rise of investigated imports during the months of investigation suggest that the threat of imposition of duties is sufficient to curb foreign competition by the trade protection claimed by petitioners. This preliminary result is in support of previous evidence of investigation effects (Staiger and Wolak, 1994; Prusa, 1997; Harrison, 1991). There is also preliminary evidence of the greater effect of AD action to investigated imports as compared to non-investigated in both the period of investigation and the twelve months period after the final outcome. It's worth mentioning here that although non-investigated imports are just marginal imports, with a small share in national imports (of the respective product) in many cases, the

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<sup>74</sup> *Indice General de Precios de las Importaciones en dólares*, 1980=100, in Spanish ([www.banxico.gob.mx](http://www.banxico.gob.mx)).

<sup>75</sup> The panel data used for the estimation of specifications 2 and 3 (see section 7) is comprised of 58 products due to incompleteness of data from the resolutions.



response of leading imports to AD action is much greater. This is similar to the evidence shown in Prusa (2001) where the effect of AD on investigated imports is greater than the effect on non-investigated imports.

The previous analysis suggests that AD measures in Mexico have a restrictive effect on the trade of imports reducing their volume and value and raising unit prices. This restriction can be achieved with the initiation of the investigation and the threat of imposition of duties is sufficient to restrain imports even though final duties are not imposed (e.g. *petrol additives* and *tinned sliced peaches*). Nevertheless, this analysis does not control for other factors determinant in the magnitude and direction of these effects, an econometric analysis that estimate the relationship between imports and AD policy follows.

### ***3.6 Institutional framework and empirical specification. The Box-Cox Tobit Random Effects Model***

The focus of this chapter is on the effects of AD action on the volume, the value and the price (unit value) of imports subject to an AD investigation. The estimation equation constructed to achieve this objective is a conventional specification based on Prusa (2001).

According to WTO recommendations an AD petition is filed when the export price  $P^*$  of a product is lower than the home price  $P_F$  in its own market<sup>76</sup>. The petition must also be accompanied by the proof of material injury or threat of material injury caused to the domestic industry by imports at *least than fair value* (LFV) and a causal relationship between dumping and material injury must be established in order to grant protection<sup>77</sup>. If the authority's determination of dumping is positive an *add valorem* duty equal (or less than, according to the lesser duty rule) to the dumping margin  $d = P_F - P^*$  is imposed to imports. Consequently, the foreign firm is forced to raise its price to  $P_F = P^* = P^* + d$  resulting in a reduction of the quantity imported in the domestic market.

The data used for the empirical estimation is characterised by the absence of information on the independent variable for several observations. This is, the regressand takes the value of zero. The reason is that the imposition of duties can completely stop imports for some observations or simply there are no imports observed<sup>78</sup>. The Tobit model deals with data of this characteristics, i.e. censored data (Tobin, 1958). Box and Cox (1964) introduced a power transformation that allows the estimation of general models from a linear function that specifies the appropriate functional form by the estimation of the parameter  $\lambda$ . The transformation is given by

$$y^{(\lambda)} = \begin{cases} (y^\lambda - 1) / \lambda & y \neq 0 \\ \ln y & y = 0 \end{cases}$$

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<sup>76</sup> AD duties are also claimed when sales are made below costs. This is that  $P_F$  can also be a measure of costs.

<sup>77</sup> Nevertheless, given the discretionary use of AD rules by national authorities or the indicators used to measure injury or even the political bias of their decisions, it is usually not difficult to prove injury. See Esquivel and Solis (2002) and Francois and Niels (2004) for the political motives of AD in Mexico.

<sup>78</sup> It is also the case that for few products reclassification of a tariff code makes information not available.

Note that when  $\lambda=1$ ,  $y^{(1)}$  enters the equation linearly; when  $\lambda=0$ ,  $y$  enters the equation in its logarithmic form; and when  $\lambda=-1$ ,  $y^{(-1)}$  enters the equation as the reciprocal of  $y$ . Thus, the functional form of the estimated equation is dictated by the parameter  $\lambda$ , which is itself estimated<sup>79</sup>. Thus, the combined Box-Cox Tobit Random Effects model is given by

$$Y_{it}^{(\lambda)} = \beta_1 + \beta_2 inreso_{it} + \beta_3 prel_{it} + \beta_4 final_{it} + \beta_5 rer_t + \beta_6 Y_{it-1}^{(\lambda)} + \varphi_{it} \dots \dots \dots (1)$$

where, the cross-section variation is denoted by  $i=1, \dots, 68$  (products) and the time series by  $t=1, \dots, 132$  (months). Note that all independent variables could also be transformed by estimating a value of  $\lambda$  for each one. This, however, will only complicate the estimation process<sup>80</sup>.

$Y_{it}^{(\lambda)}$  takes the form of the value, the volume and the unit value for both named and non-named imports. Therefore, six different estimations are performed. The variable *inreso* is included to control for the existence of a harassment effect<sup>81</sup>. The variables *prel* and *final* control for the effects of the preliminary decision and the final decision of the investigation, respectively. This pins down more closely the actual AD effects and provides with a better assessment of the dynamics of the process. The variable *rer* is the real exchange rate in index form and is included to control for macroeconomic factors. Equation (1) is estimated using random effects. The main intuition for using random effects is the assumption that the imports' individual characteristics –constant term- are randomly drawn from a large population, total imports of Mexico, which is subject to AD policy<sup>82</sup>. Hence,  $\varphi_{it} = \varepsilon_i + \mu_{it}$  imply that the error term of equation (1) is a combination of the individual-specific (cross-sectional) error component and the combined cross-section time series error component. The characteristics of the variables are as follows.

- Censored dependent variables

$Y_{it}^{(\lambda)}$ : is the transformed independent variable that takes the form of the value, volume and unit value of imports of either named or non-named sources. Data source is the TIGI, Ministry of the Economy. Estimation results refer to the Box-Cox transformed variables.

- Independent variables

+Outcome variables

Initial resolution: (*inreso<sub>it</sub>*) is a time dummy variable that takes the value of 1 the month of the initiation of the investigation up until the month previous to the publication of the preliminary resolution, and the value of zero otherwise. This variable controls for the existence of the ‘harassment effect’ of antidumping. Its expected sign is negative since a filing of the investigation will decrease the flow of

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<sup>79</sup> A grid-search method within the range 0-1.0 is used to estimate the value of  $\lambda$  that maximises the Log Likelihood function (see next footnote).

<sup>80</sup> Estimation of equation (1) requires the maximisation of a non-linear likelihood function. See for instance Spitzer (1982). The software used here for the estimations is STATA version 7.0.

<sup>81</sup> See next section for the description of the variables.

<sup>82</sup> This may actually be an arbitrary decision; however, it seems to suit the data. See Gujarati (2003).



imports just for the fear of the imposition of duties. Data is taken from the official AD reports published in the Official Journal.

Preliminary outcome: ( $po_{it}$ ) is a dummy variable taking the value of 1 when a preliminary affirmative outcome is published (imposition of a duty) and the value of 0 otherwise. The expected sign for the value and volume of named imports is negative due to the expected trade restriction caused by the imposition of a duty; it is positive for the unit value of imports because a duty will determine a price increase. The relationship is exactly the opposite for the non-named imports. Data is taken from the official AD reports published in the Official Journal.

Final Outcome: ( $fo_{it}$ ) is a dummy variable taking the value of 1 when a definitive affirmative outcome is published. According to the 'sunset clause' a definitive duty has duration of five years. The expected sign for the value and volume of named imports is negative due to the expected trade restriction caused by the imposition of a duty; it is positive for the unit value of imports because a duty will determine a price increase. The relationship is exactly the opposite for the non-named. Data is taken from the official AD reports published in the Official Journal.

Preliminary duty: ( $pd_{it}$ ) is the actual size of the preliminary duty levied (in percentage) when a preliminary finding of dumping is given. The expected sign for the value and volume of named imports is negative due to the expected trade restriction caused by the imposition of a duty; it is positive for the unit value of imports because a duty will determine a price increase. The relationship is exactly the opposite for the non-named imports. Data is taken from the official AD reports published in the Official Journal.

Final duty: ( $fd_{it}$ ) is the actual size of the final duty levied (in percentage) when a definitive finding of dumping is given. The expected sign for the value and volume of named imports is negative due to the expected trade restriction caused by the imposition of a duty; it is positive for the unit value of imports because a duty will determine a price increase. The relationship is exactly the opposite for the non-named imports. Data is taken from the official AD reports published in the Official Journal.

Overall duty: ( $duty^{it}$ ) is the sum of the preliminary and the final duty in percentage value and controls for the overall effect of the AD action.

+Macroeconomic factors

Real exchange rate: ( $rer80_t$ ) is taken from the reports by the Mexican Central Bank as a monthly index with 1980 as the base year. It is included to control for macroeconomic factors and its expected sign is negative. This is that an increase of the index means a depreciation of the real exchange rate, therefore making imports more expensive in domestic currency and causing a decrease of trade.

One-period lag independent variable is introduced to impose a dynamic structure of the model.

### 3.7 Estimation Results

Tables 14 to 19 present Box-Cox Tobit Random Effects estimates of equation (1). After several combinations of exogenous variables were tried to find the best fit for the reduced form of the import equation, as specified in the previous section, three different specifications resulted for each series of the dependent variable, i.e. volume, value and unit value of imports, thus having to reject a number of variables and models as it will be commented at the end of the section.

Because duties are imposed only on investigated imports, splitting the dataset in a sample of named and a sample of non-named imports controls for the heterogeneity of both samples, since the effect of the imposition of duties is expected to be different on each sample. Splitting the dataset in two samples, named and non-named imports, also takes into account the different import levels of each named and non-named series. This is important particularly for the case of Mexico, where the largest share of imports in the domestic market is held by the imports from named countries.

When AD policy is in place, imported products are suitable of AD action under the conditions laid out previously, having impact on the price and volume of substitute domestic products, non-named imports and named imports. The purpose here is to analyse empirically the behaviour, i.e. diversion or destruction effects, of import flows of products involved in antidumping investigations.

While named imports are expected to raise their price and reduce their volume, known as trade destruction, an increase of non-named imports into the domestic market may occur, known as trade diversion. If the latter effect is larger than the former, antidumping measures sought by domestic petitioners, i.e. protection may be offset.

Estimation results in Tables 14-16 refer to all 68 tariff-code products in the dataset<sup>83</sup>. Estimation results in Tables 17-19 refer to three different subsets of data that look at the effects of AD action excluding certain group of tariff-products in order to avoid possible bias due to the major participation of US imports (NO US estimation); the larger effect on developing countries (NO DEV estimation), and the large number of steel cases (NO STEEL).

The results confirm some previous findings as in Niels (2004); nevertheless, contrasting evidence shows the existence of a trade diversion effect of AD action to non-named imports. Similar results of trade diversion to non-named imports are found in Prusa (1996) for AD cases in the US and Brenton (2001) for AD cases in the EU. Interestingly, this effect disappears when imports from the US are excluded from the estimation.

The variable *inreso* throughout Tables 14 to 19, initiation of the investigation, tests for the so called harassment effect. This is, whether AD action has any effect on imports for the only fact that the AD investigation is filed and initiated (Staiger and Wolak, 1994). The coefficient of this variable in all regressions is not statistically significant, which confirms evidence in Niels (2004) of the absence of a harassment effect of AD actions on Mexican imports. This is important because, as found in Staiger and Wolak (1994), harassment may drive petitioners' motives for the filing for AD protection, however, here it suggests that the only motive of Mexican AD petitioners for filing a case is the imposition of final duties to imports, i.e. protection

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<sup>83</sup> 68 tariff-code products are estimated for specification (1) and 58 for specification (2) due to information availability.

from foreign competition. Another reason why the harassment effect is not statistically significant in Mexican AD cases is that the legislation does not allow for price settlements, as AD legislations in the US and Europe do. Because firms can achieve price undertakings in countries where AD legislation allows for them, the threat of AD is enough to make dumping importers to raise their price and avoid the imposition of final duties via price undertakings.

Table 14 shows estimation results for the value of imports. Specification (1) estimates the effect of the outcome of the investigation, variables  $po$  and  $fo$ , on named imports. Both have negative signs and are statistically significant, which confirms the existence of trade destruction in Mexican AD cases. This result is consistent with the evidence shown in Niels (2004), about the existence of a trade destruction effect of AD action on Mexican imports.

The variable  $po$  is significant only at 10% level and  $fo$  at 1%. Thus, it is at the announcement of the final decision when imports are deterred more importantly. Specification (2) controls for the real value duty as measured by its percentage value. The preliminary duty  $pd$  is negative and statistically significant at 10% and the final duty  $fd$  is statistically significant at 1% level and also exerts the strongest effect. Similarly, specification (3) controls for the overall duty effect,  $duty$ , measured by its percentage value too. It is negative and statistically significant at 1% level. Hence, Mexican AD action has an important trade destruction effect on the value of named imports.

The independent variable  $rer80$ , real exchange rate index, controls for the macroeconomic effect. It is positive and statistically significant only for specifications (2) and (3) at 5% level. Note that the expected relationship is negative, meaning a decrease of imports with a depreciation of the real exchange rate. Thus, the positive sign may be seen a result of the distortion caused by the imposition of AD measure, distortion which is not present for non-named imports (see below).

The lagged dependent variable captures the dynamic effect of the independent variables and reflects an increasing trend of the value of imports. The coefficient is positive and statistically significant at 1% in all three specifications for the named imports.

It is worth mentioning that because outcome dummy variables are not correlated between each other, since every stage and outcome of the AD investigation is independent from each other, the existence of a “dummy variable trap” is avoided<sup>84</sup>.

More importantly, and in contrast with Niels (2004), estimation results for non-named imports show evidence of a trade diversion effect of AD policy. The outcome variables of specification (1) for the non-named value of imports are positive and statistically significant at 1% and 5%, respectively. The positive sign means an increase of imports when a positive outcome is announced, i.e. imposition of duty, thus, diverting imports from non-investigated sources to the Mexican market. Similarly, specification (2) shows positive and significant coefficients for the duty value variable, with the variable  $pd$  significant at 1% level and variable  $fd$  significant at 5% level; the overall duty effect is only significant at 10% level. Hence, there is significant evidence of the existence of a trade diversion effect of AD action to non-named imports, as measured by its value. This finding for Mexican imports is

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<sup>84</sup> The problem of multicollinearity appears when all dummy variables are not independent and sum 1. This is known as the “dummy variable trap”. In order to avoid the problem, not all dummies should be included in the equation to estimate, as it is done for the different specifications in Tables 14-19. See for instance Suits (1957).

consistent with previous analysis that finds trade diversion of AD action to imports from non-named countries (Krupp and Pollard, 1996; Prusa, 1996; Brenton, 2001).

The real exchange rate variable  $rer80$  is negative and statistically significant at 1% level for the three specifications. These are the expected signs of the coefficients, which in contrast to the named imports show that in absence of AD policy influence there is no distortion. The lagged independent variable is also positive and statistically significant at 1% for all three specifications.

The marginal effect of the outcome variables can be recovered since the Box-Cox transformation approaches equation (1) to its semi-logarithmic form.

The estimated structural destruction effect of final AD action ( $fo$ ) on the value of named imports is 68.01%<sup>85</sup> (only at the final outcome of the investigation). This figure is around the magnitude of 73% estimated in Niels (2004) for Mexican AD cases. As mentioned before, this is the expected behaviour of named imports when duties are imposed.

The estimated structural trade diversion effect to non-named imports (only at the final outcome of the investigation) is 95.42%<sup>86</sup>, an increase of imports. The overall effect when the balance between named and non-named imports is calculated is a 27.41% increase of imports. This is, AD measures are offset because of trade diversion to non-named imports in the domestic market. Similarly, Prusa (1996) shows that trade diversion offsets AD measures in the US.

Estimation results for the volume of imports are shown in Table 15. The outcome variables in specification (1) are negative and statistically significant, also evidence of a destruction effect on the volume of named imports. The main trade restriction is observed at the time of the announcement of the final outcome  $fo$ , significant at 1% level. The duty level effect in specification (2) is also negative and statistically significant for both  $pd$  and  $fd$  at 1%, and a larger effect is observed at the imposition of the final duty too. The overall duty effect on the volume on named imports picked up in specification (3) is also negative and statistically significant at 1% level. All three different specifications show clear evidence of trade destruction. Hence, the estimated structural destruction effect on the volume of named imports is 72.19%. This figure is also around 81% estimated in Niels (2004).

The real exchange variable  $rer80$  is also positive and significant only in specifications (2) and (3) at a level of 10% and 5% respectively. The lagged independent variable is also positive and statistically significant at 1% level in all three specifications of the volume of named imports.

Evidence of a trade diversion effect is also present on the volume of non-named imports. Specification (1) shows positive and statistically significant coefficients for both  $po$  and  $pd$ , at 5% and 1% level respectively. This is, when the final outcome of the AD investigation is positive, an increase of the volume of imports from non-investigated sources is observed. The estimated duty effect shown in specification (2) is positive and significant at 5% for both duty coefficients. The overall duty effect captured in specification (3) also proves the existence of trade diversion with a positive and statistically significant coefficient at 5% level. Hence, trade diversion in the volume of imports is also evident.

Similarly to the value of non-named imports, the real exchange rate coefficient has the expected sign. It is negative and statistically significant at 1% level. The lagged independent variable is positive and statistically significant at 1% too. The

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<sup>85</sup> Calculated as  $e^{-1.14}-1=-68.01$ .

<sup>86</sup> This is significant at 5%, though.

estimated structural trade diversion effect to non-named imports is large enough to offset the trade destruction on the volume of named-imports.

The expected beneficiaries of AD action are the domestic producers who file a petition against competing imports. Nevertheless, the distinct behaviour between named and non-named imports observed here, shows that the trade diversion effect is larger than the trade destruction effect, thus, the beneficiaries of AD policy are rather the import sources that are not investigated. This result suggests that the amount of trade diversion can be considered as an indicator of the ineffectiveness of AD action, and should be taken into account by petitioners before incurring in the costs involved in filing a petition.

Table 16 shows estimation results for the price of imports. The expected signs for the outcome and duty variables of named imports are positive. This is because an imposition of a duty will raise the price, making imports more expensive and thus deterring its trade. A negative sign for non-investigated imports will result in trade diversion, since prices are to decrease in order to increase their volume in the domestic market. Nevertheless, the estimation results for prices must be interpreted with caution and bearing in mind that these are rather unit values calculated from the value and volume series. Furthermore, the magnitude and direction of relationship will depend on whether a value effect or a volume effect dominates.

The final outcome and final duty variables  $fo$  and  $fd$  as well as the overall duty variable  $duty$  are statistically significant at 1% level for named-imports. Note that the relationship is negative. This means that with an affirmative decision, the price of the named imports will decrease. Prusa (1994) shows that a small duty will produce a price decrease given that the benefit of selling more is greater than the cost of paying for the duty<sup>87</sup>.

Contrarily, the price of non-named imports increases with a positive decision at the stage of the preliminary outcome of the investigation. Note that this reputation effect can work as a threat of AD action on non-named imports, however, it is not enough to offset the trade diversion effect. The preliminary outcome and preliminary duty are statistically significant at 1%. The overall duty is also positive and statistically significant at 1% level. This is, AD action affects the price of non-named imports by raising it, thus resulting in a reputation effect, i.e. price is raised in fear of a filing of an investigation. Hence, Mexican AD policy has a reputation effect on the price of non-named imports. This result is also found in Brenton (2001) and in Niels (2004).

The real exchange rate control variable in all three specifications is negative and statistically significant at 1% level. The lagged independent variable is also statistically significant at 1% level and with positive sign.

Tables 17 to 19 show estimation results of specification 1 (outcome variables) for three different subsamples of the imports dataset. In all three subsample estimation results, the variable *inreso*, which controls for the harassment effect of AD action, is not statistically significant. This is further evidence of the absence of any harassment effect of AD policy in Mexico.

The NO US regressions exclude from the estimation all imports coming from the US. This is to control for possible country bias since the US is Mexico's major trade partner and almost 70% of all imports in the dataset come from this country. Another reason to consider a subsample without the import data from the US is that,

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<sup>87</sup> This avenue is related to the hypothesis of collusion through AD, which is not developed empirically here.



according to some emerging literature, the use of AD measures is influenced by the reduction of tariffs resulting from free trade agreements, and Mexico and the US are part of one of the largest free trade agreements, namely NAFTA<sup>88</sup>.

Results in Table 17 for the value of named imports, show that the estimated outcome coefficients  $po$  and  $fo$  are negative and larger than the estimated outcome coefficients with all imports included; the preliminary outcome is not statistically significant though. This suggests that the trade destruction effect of final AD action ( $fo$  coefficient) on the value of named imports for non-US cases is greater than that for all imports; the estimated structural effect is of 83.79% (as compared to 68.01%) and statistically significant at 1%. This result confirms previous evidence in Mexican AD cases of a greater destruction effect on non-US cases, which is of about similar magnitude<sup>89</sup> (Niels, 2004). Large trade shares and the degree of trade specialisation (intra-industry and intra-firm trade) between both countries may explain why trade destruction is larger for imports coming from other countries than the US.

Surprisingly, the estimation of the value of non-named imports shows that when imports from the US are not included, the trade diversion effect disappears<sup>90</sup>. AD action result in an effective instrument to protect domestic producers from imports coming from countries other than the US. This can also be explained due to the degree of trade specialisation between Mexico and the US: with similar products traded between Mexico and the US, domestic production can substitute deterred imports from the US, whereas imports of goods coming from countries other than the US are substituted by non-investigated imports rather than by the domestic production<sup>91</sup>.

Similarly to the NO US regressions, the NO DEV regressions exclude from the estimation all imports coming from developed countries. This subsample is also intended to control for possible bias caused by the share of imports coming from developed countries. Although the largest share of imports comes from the US, as mentioned above, the number of developing countries involved in antidumping cases is larger than the number of developed countries, including the USA. Therefore, the control sample NO DEV. This is also in line with Prusa (1992) and Konings, *et al.* (2001) where the number of developing countries involved in antidumping investigations is greater than the number of developed countries both in the USA and the EU, respectively.

The results in Table 17 show that only the final outcome is statistically significant at 1% level and the coefficient is greater than when all imports included. This suggests a greater structural destruction effect on the value of imports from developing countries, equivalent to 78.56%<sup>92</sup>, than that for all imports. This value is similar to the value estimated in Niels (2004) of 76.5%. The NO DEV estimation for non-named imports also shows that the trade diversion effect is exclusive of US imports, since both outcome coefficients are not statistically significant.

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<sup>88</sup> A dummy variable indicating whether a free trade agreement has been signed or not between Mexico and the imports source country was considered, however it was not significant. Thus, there is no evidence here that NAFTA could have influence on the application of AD measures, an avenue of research worth trying to investigate, however.

<sup>89</sup> The estimated coefficient is -1.77 (83%).

<sup>90</sup> Although statistically not significant, the negative sign rather implies a reputation effect of AD action (as suggested in Niels).

<sup>91</sup> The implication of this result can be related to the literature on commercial policy where trade is diverted from low cost to high cost imports. See for instance Bhagwati *et al* (1998).

<sup>92</sup> Still around the 83% estimated in Niels.

In the same way, the NO STEEL regressions exclude all imports of steel from the estimation in order to check for a bias in the results given the number of steel products. Similarly, only the final outcome variable is negative and statistically significant at 1% level for the value of imports. The estimated structural destruction effect is similar to the one estimated for all imports. This suggests that there is no particular influence by the steel cases when all products are considered in the estimation results. The latter is reflected in the estimation for non-named imports, which shows a statistically significant trade diversion effect of the preliminary outcome, albeit at 10% level. Note that although steel imports do not have important influence in the overall results, the estimated coefficient ( $po$ ) is smaller than the coefficient when all imports are included. This is because all steel imports come from the US, therefore, only the remaining US steel imports are responsible for the trade diversion to non-named imports.

Estimation results for the volume of imports in Table 18 are similar. The destruction effect of final AD action ( $fo$ ) on non-US imports is statistically significant at 1% and equivalent to 82.96%<sup>93</sup>. NO DEV and NO STEEL estimations for named imports also show negative and statistically significant final outcome coefficients at 1% level. The estimated structural trade destruction effect for imports from developing countries is 79.40%. This estimation is similar to the 83.1% estimated in Niels (2004). On the other hand, none of the outcome variables for NO US and NO DEV estimation of non-named imports are statistically significant. This follows up the above evidence of the absence of a trade diversion effect when no US/developed country cases are considered.

The NO STEEL estimation, as seen above, shows that when some imports from the US are included the trade diversion effect appears again. The coefficient is positive although only statistically significant at 10% level.

Table 19 shows unit value estimates. A price reduction in all three specifications is statistically significant for the preliminary outcome variable. This price reduction is larger than that for all imports, however, as mentioned earlier, caution should be taken in the interpretation of this result. Finally, the reputation effect appears again when some imports from US are considered in the NO STEEL estimation:  $po$  is positive and statistically significant at 5%.

As mentioned at the beginning of this section, some exogenous variables were rejected in order to obtain, after several combinations of variables, the best fit for the import equation which estimation results are presented in Tables 14-19. One of these variables is the one that captures the market structure that identifies each industry in the antidumping cases here presented. Such market structure variable is represented as the market share of the AD petitioner (the domestic producer that files for AD action against imports of the same product), to national production of the product under investigation, as shown in column 4 of Table 4. The variable is collected as a percentage value and therefore introduced in the estimations as a continue variable. This is because it could be that during the period that AD measures are active (one year for the investigation and five years of duties on imports), the reduction or termination of the flow of foreign imports into the domestic market may cause a change in the market structure of the industry involved in the AD case, either increasing or reducing its share in the domestic markets<sup>94</sup>.

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<sup>93</sup> The coefficient is similar to the estimated in Niels, -2.24 (89%).

<sup>94</sup> Yearly market share information was not available however.



It has been mentioned that market concentration and dominant industries may resort to AD action in pursuit of anticompetitive outcomes, namely collusion<sup>95</sup>. The theoretical literature has been revised in chapter one and empirical work that has introduced the variable of market structure is only incipient.

The general hypothesis when market structure is considered as an influential variable in antidumping investigations is that large firms or dominant firms can generally influence AD authorities towards the imposition of protection, i.e. duties to imports, through lobbying or political clout (Finger, *et. al.*, 1982; Grossman and Helpman, 1994), or use AD action as a mechanism to pursue a collusive arrangement (Staiger and Wolak 1992). Veugelers and Vandebussche (1996) study the effect of antidumping policy on European cartels and show that antidumping legislation can both have a pro-competitive or an anti-competitive effect on the market structure of the industries involved in antidumping depending upon three main factors: the welfare objective function used by the European government, the cost asymmetry between foreign and domestic firms and the heterogeneity between the domestic and imported product. Konings and Vandebussche (2003) find that when duties are imposed and import diversion occurs in European antidumping cases, the market power of domestic firms is not affected, thus, AD action does not influence market structure when trade diversion occurs. Konings, *et. al.*, (2001) show that trade diversion from named to non-named countries in European antidumping cases is high for highly concentrated industries.

As it can be observed, the relationship between AD policy and market structure is ambiguous. Here, for the Mexican antidumping cases considered during the period of study, the market structure variable was not statistically significant in any of the specifications estimated in Tables 14-19. One reason for this may be that market structure is only influential on the outcome of the antidumping investigation, that is, whether protection is granted or not by the authority. Thus, the variable has no effect here since all cases considered are already determined positive and the outcome is not evaluated. Niels (2004) finds ambiguous significance of the market structure variable for different outcome specifications in Mexican AD cases.

One other reason why market structure is not significant in the estimation results presented before may be the existence of trade diversion. Trade diversion from named to no-named imports undermines the protection that domestic industries pursue with the imposition of AD measures to foreign imports, causing no change in the market structure of the domestic industry. This result is in line with Konings and Vandebussche (2003) for European AD cases, where market power is not affected by AD action.

In order to check for industry bias, estimations were performed excluding all steel AD cases, since steel products are the largest number in the dataset. As shown in Tables 17-19 results general results with all cases hold. It has been mentioned before that the market structure variable was not significant. Panel data analysis is the obvious and commonly used approach to the empirical analysis of import responses to AD action, since this is the way to gauge the expected effects, particularly those of trade deterrence and trade diversion. Nevertheless, additional estimations splitting the dataset in a subsample for each industry of named and non-named imports were performed here in order to check if this could improve the statistical significance of the market structure variable<sup>96</sup>. Results show for most of the regressions statistical

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<sup>95</sup> This avenue is not explored in the thesis, however.

<sup>96</sup> The number of industries involved in AD cases in Mexico during the period of study was eight: steel, chemical, other manufactures, plastics, rubber, food and paper.

significance on the final outcome dummy variables *fo* and *fd*, and the duty continuous variable *duty*, for the three different specifications. This is what expected and confirms the results obtained in Tables 14-16 as for the variables related to the outcome of the investigation and their effect on the flow of imports.

Contrarily, the market structure variable resulted not statistically significant in any of the regressions<sup>97</sup>. To explain this we resort to the two reasons given above as for why market structure is not significant in tables 14-19. One is that import data refers to AD cases, this is, that the outcome of the investigation is already known and positive, therefore, the influence of the market structure, if any, has already been realised. The other one is the existence of trade diversion.

### **3.8 Concluding comments**

Empirical evidence of the effects of AD measures on developing countries is scarce and they are important since developing countries are now among the major players of AD activity. It is also important to assess the effects of AD policy given the amply documented concerns on its deliberate use to pursue outcomes different to those purely related to unfair trade practices. Niels (2004) provides probably the most complete study of the effects of AD measures on imports from a developing country perspective, namely Mexico. Here I revisit these results. Using a larger dataset in the time-series and a Box-Cox Tobit Random Effects model, a more sophisticated estimation method, I can confirm some of the previous results and also find some new contrasting evidence.

Niels (2004) finds evidence of significant trade destruction effects of AD measures on the value and the volume of named countries. I confirm this evidence, which is similar in magnitude, of about 68% and 72%, respectively, and similar to other findings for the US and the EU. With monthly data used to pin down the effect of AD investigations at its different stages, it is also shown that the main trade destruction effect occurs with the final outcome, which sustains the argument that Mexican domestic petitioners file to obtain final protection from import competition. Interestingly, the preliminary outcome does not have any significant effect on the price of named imports and when the final outcome is published prices show a negative relationship. This is that prices decrease with a positive final determination as noted by Prusa (1994). Nevertheless, since prices are given by the unit value of imports this result should be interpreted with caution. No evidence of a harassment effect of AD measures is found, which is consistent with Niels (2004). Although trade diversion to non-named imports is shown, there is some evidence of a reputation effect in prices, however, this is not enough to offset the trade diversion effect.

When imports from the US are excluded from the estimations, results show that the trade destruction effect on named imports is larger. The magnitude of the effect on the value of named imports is about 83%, same as estimated in Niels (2004); it is also about 83% for the volume of named imports, similar to Niels' estimation of 89%. Estimation of the value and volume of named imports from developing countries also confirms evidence from Niels (2004) of a greater destruction effect than for all imports. The estimated magnitude is about 79% for both value and volume and similar to Niels (2004) of 76% and 83%, respectively.

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<sup>97</sup> Since the aim of the exercise was to test for the significance of the market structure variable and it resulted not statistically significant, results are not reported.

Interestingly, and contrary to Niels (2004), is the significant evidence of a trade diversion effect of AD action to non-named imports. A positive final outcome of the investigation produces a structural increase on the value and volume of non-named imports large enough to offset the structural trade destruction caused by AD action. This implies that the beneficiaries of AD policy are other foreign competitors rather than domestic producers as in Staiger and Wolak (1994). Surprisingly, this trade diversion effect disappears when imports from the US and the rest of developed countries are excluded from the estimations and the effect is even larger for the estimation of US imports only.

When the market structure of the domestic industry is analysed, it is observed that 19 out of the 24 antidumping cases investigated during the period 1994-1998 are characterized by high concentration of firms and high share of domestic production, and that investigated imports are the major foreign competitor in the domestic market. The market structure variable is however not statistically significant in any of the regressions performed. The reason for this may be the existence of trade diversion, which offsets the effect of trade protection causing no change in the market structure of the domestic industry or that the import data collected has already absorbed the market structure effect in a way that, ex post to the outcome of the investigation, market structure is not influential.

Empirical studies on the relationship between AD policy and market structure are incipient and results are ambiguous, thus deserving further investigation. Nevertheless, both theoretical and empirical evidence on the effects of AD policy on trade suggests that AD action is claimed by industries that see foreign competition as a threat to their likely dominant position.

The likely dominant position of the domestic petitioner together with the deterrence effect of AD action might result in important welfare losses for the economy that should earnestly be addressed by both competition and antidumping authorities.

## **CHAPTER 4**

### ***Summary and Conclusions***

Antidumping measures are frequently offered to domestic producers as an escape valve within preferential trade agreements to protect domestic industries against unfair trade practices caused by dumping of imports. Concerns about the protectionist and excessive use of these measures in the last years, particularly by developing countries, have increasingly motivated research on the alternative effects of antidumping policy and its effect on imports. As it was discussed in Chapter 1, both theoretical and empirical literature give account of anticompetitive outcomes from the use of AD measures against imports in the market where AD action is filed. The literature revised in the chapter has mainly focused on the collusive outcomes resulting from the implementation of AD policy, and in the trade restrictions caused to imports. The vast majority of the literature has also focused mainly on AD cases in the US and EU. This however, has motivated more and more studies of the alternative effects of AD in other countries. In this thesis I intend to contribute to the literature on the effects of AD policy, from a developing country point of view, and it is important to mention that Mexico is now one of the major users of AD measures as it is one of the most active countries in the discussions about the problems of AD policy in the World Trade Organisation. As member of the “friends of antidumping” group of countries, Mexico has pushed for the clarification and improvement of AD rules in order to prevent abusive and excessive use of AD measures, to avoid excessive burden on investigation respondents, and to enhance the transparency, the predictability and fairness of the system. Nevertheless, since the collapse of trade negotiations within WTO after the ministerial conference in Cancun, the problem with antidumping still prevails.

By using a synoptic version of a standard theoretical framework in the AD literature, taken from Prusa (1992), I attempt to illustrate the standard result of the effect of antidumping policy when it is introduced in a Bertrand-Nash framework with two firms that compete in the national market and imports into the market from a foreign firm are alleged to be dumped. The theoretical framework borrowed from Prusa (1992) illustrates how once AD policy enters the free trade Bertrand-Nash equilibrium setup, the equilibrium strategies of firms are distorted with price increases that aids firms to target monopoly prices in pursuit of a collusive outcome. The grim trigger mechanism through which firms can achieve such an outcome is the filing of an AD petition. The model presented in this chapter is used as a motivation for the next chapters, particularly, to bring forward a discussion that must pass from scholars to policy makers, since evidence is enough of anticompetitive effects of AD policy.

The main conclusion in this chapter is that, when competing firms have symmetric cost functions and there is no uncertainty, Bertrand-Nash equilibrium values should prevail, however, AD policy acts as an exogenous aid for firms to take strategic advantage of the price distortions to achieve collusion. Thus, I suggest that competition authorities in Mexico should pay attention, i.e. to worry, to a number of AD cases, as welfare losses might be larger than those supposed to be corrected by the use of AD policy.

In the following chapters, empirical analysis of the effects of AD policy on Mexican imports is carried out. The aim in Chapters 2 and 3 is to answer the question of whether AD action results in the trade restriction of alleged dumped imports into

the Mexican market and if there is a relationship between the market structure of the domestic petitioning industry and the trade restriction of imports.

In Chapter 2, I develop a descriptive analysis of monthly import data of all AD cases filed in Mexico during the period of 1994-1998. A total of 24 cases were filed, which involved a total of 72 products at 8-digit level disaggregation of the SIC code, imported from 11 different countries. Time-series of imports of investigated and non-investigated products are collected for the period 1992-2002. Industry characteristics of the domestic petitioners were also collected in order to attempt to relate the market structure characteristics to the effects of AD measures on imports.

It is important to mention that all AD empirical studies in the literature use purpose-built datasets of imports, since periods of study, countries and products vary between studies. Nevertheless, there is a degree of similarity between countries in terms of the type of industries and products occurring in AD cases. One of the important features of this thesis is the richness of the dataset used. Empirical studies commonly use yearly data for the study of AD effects on imports. Product-specific monthly import data collected here allows one to directly pin down the effect of AD policy in Mexican imports and reach more consistent results.

By comparing the mean values of the import data for named and non-named imports between the different stages of the AD investigation, the expected effects on import flows caused by the imposition of duties were shown. The results observed are in line with empirical evidence shown for the US (Prusa, 1996) and serve as a departing point for the econometric analysis of next chapter. The found effects are: (i) price of named imports, as measured by unit values, increases and volume decreases, (ii) with larger duties, the price increase and volume decrease is larger, (iii) trade of non-investigated imports increases.

Additionally, from the industry characteristics of the domestic petitioners, it is found that in 19 out of the 24 AD cases filed during the period of study, the market structure, as measured as the share of petitioners production to national production, is highly concentrated, many of them monopolistic, that is, only one domestic producer was reported to occur in the investigation reports. Another market characteristic found is that the majority of AD cases were filed against the major exporter into the Mexican market of the respective product, that is, investigated imports share to total imports share goes from 70% to 99%.

The findings of this chapter are a clear evidence of the deterring effect of AD policy on imports. Despite the fact that import protection is the goal of the imposition of duties in essence, the harm to consumers from observed price increases, together with the highly concentrated filing industries aim to deter foreign competition, is an outcome of AD policy that deserves more attention as to whether welfare losses produced by AD policy are larger than those occurring from alleged dumped imports.

Econometric analysis is performed in Chapter 3 in order to test for the statistical significance and magnitude of the general results observed in the previous chapter. The analysis also addresses the question of whether the relationship between market structure and import deterrence is statistically significant for Mexican AD cases observed during the period of study.

Regressions for named and non-named imports were performed in three different specifications as the result for the best fit for the combination of variables. The econometric method used here differs largely from the OLS estimations performed previously for Mexican AD cases (Niels, 2004), and allows for the characteristic of the large panel data used here. The findings confirm previous results



found in Niels (2004) and also shed light of the existence of other outcomes not observed there.

When AD policy is in place, imported products are suitable of AD action filed by domestic producers under the conditions laid out in Chapter 1, having effect on the price and quantity of named and non-named imports. The purpose of the econometric analysis is to identify import patterns: trade destruction, trade diversion, harassment and reputation effects of AD measures.

While named imports are expected to raise their price and reduce their volume, known as trade destruction, an increase of non-named imports into the domestic market may occur, known as trade diversion. If the latter effect is larger than the former, antidumping measures sought by domestic petitioners, i.e. protection may be offset. Thus, AD action would rather benefit non-named imports than domestic petitioners. The main results follow.

The harassment effect is found to be not statistically significant in any of the estimations. The absence of this effect is also found for Mexican AD cases in Niels (2004). The main reason for this may be that AD legislation in Mexico does not allow for price settlements, as AD legislations in the US and Europe does. Because firms can achieve price undertakings in countries where AD legislation allow for them, the threat of AD is enough to make dumping importers to raise their price and avoid the imposition of final duties via price undertakings.

Results show that there is an estimated structural trade destruction effect of the final outcome of the AD investigation on the value of named imports of about 68%. This figure is in line with previous findings for Mexico. A destruction effect is also found for the volume of imports, a reduction of about 72% after a positive final outcome of the investigation.

An interesting finding, is that trade diversion is found to be positive and statistically significant for the value of non-named imports. This result is not found in Niels (2004) previously for Mexican AD cases, and it is because a better estimation methods is used here as well as a richer dataset. The trade diversion effect of the final outcome of the investigation on non-named imports is of the magnitude of 95%. The overall effect of AD policy is an increase in the value of imports of 27%, thus, AD measures are offset because of the existence of a trade diversion effect to non-named imports. The same result holds for the volume of imports. These findings are in line with the results observed for AD cases in the US, where trade diversion is large enough to offset AD measures (Prusa, 1996).

Estimations for the unit value of non-named imports show a slightly significant reputation effect on non-investigated imports of the preliminary outcome. Note that this reputation effect can work as a threat of AD action on non-named imports, nevertheless, it is not enough to offset the trade diversion effect. Estimation results for unit value series, however, must be interpreted with caution, bearing in mind that these are unit values calculated from the value and volume series.

Three different subsets for named and non-named imports were estimated splitting the dataset to check for any bias of the results given the share of imports from the US, imports from developed countries and imports of steel products.

Interestingly, the trade destruction effect of the final outcome of the AD investigation on named imports is larger than when all imports are included. Large trade shares and the degree of trade specialisation (intra-industry and intra-firm trade) between Mexico and the US may explain why trade destruction is larger for imports coming from other countries than the US. Interestingly too, is that the trade diversion effect disappears when US imports are excluded from the dataset. This

means that AD measures are only effective for imports coming from countries other than the US. This result is confirmed when imports from developed countries are excluded from the estimation. It is also confirmed that there is no sector bias in the estimations.

It has been shown from the literature review that the relationship between AD policy and market structure is ambiguous. Here, for the Mexican antidumping cases considered during the period of study, the market structure variable was not statistically significant in any of the specifications estimated in Tables 14-19. One reason for this may be that market structure is only influential on the outcome of the antidumping investigation, that is, whether protection is granted or not by the authority. Thus, the variable has no effect here since all cases considered are already determined positive and the outcome is not evaluated. Niels (2004), nevertheless, finds ambiguous significance of the market structure variable for different outcome specifications in Mexican AD cases. One other reason why market structure is not significant in the estimation results presented before may be the existence of trade diversion. Trade diversion from named to non-named imports undermines the protection that domestic industries pursue with the imposition of AD measures to foreign imports, causing no change in the market structure of the domestic industry.

Since empirical studies that introduce the market structure of filing industries into the effects of AD measures on imports is still incipient and reviewed results ambiguous, one obvious extension of this research would be to try different proxy variables and estimation methods to further investigate on the relationship between market structure and the effect of AD policy on Mexican AD cases.

Another obvious extension of the thesis would be the incorporation of welfare analysis into the results here obtained, since one limitation has been that welfare losses from the application of AD duties and the resulting anticompetitive outcome are only assumed to exist.

Lastly, the theoretical model of collusion would be enriched if cost asymmetry, uncertainty and endogenisation of  $P_F$  were introduced into the framework. Another limitation here is that the collusive outcome is treated only theoretically, and empirical analysis has not been performed to test for the existence of a collusive outcome in Mexican AD cases. The extension of the dataset to include all national imports, not only those related to AD cases, would be considered in future research to extend the empirical analysis and investigate whether AD policy has a threat effect on trade.

Finally, a note on the implications of having different legislative frameworks in Mexico to treat competition and dumping issues follows. This, as an attempt to raise awareness among competition and antidumping authorities on the need to tackle the problem of antidumping policy and its anticompetitive outcome.

Economic competition law and foreign trade have a common feature named dumping, price discrimination and price predation. In these three firm strategies, there exists a different price for one same product. Nevertheless, the legal analysis, objectives and consequences of each one are distinct. Some economic background is drawn, following a comparison between the legal elements of each concept and the relationship between them and the problems that arise due to their conceptual differences.

Determining the price of a product is not an easy task for a trade person and one which has to be undertaken. There might be different scenarios that the trade person would take into account when setting the price for her product. At one extreme is the monopolist at the other perfect competition. There can be found a diversity of



scenarios in between both extremes that allow prices to reach the gain aimed by strategic pricing. Such practice of strategic pricing has not to be a practice to condemn since a firm cannot be expected to maximise its gains without taking into account its rivals' strategies, thus being a legitimate maximization objective. Nevertheless, not all strategic prices are legitimate, thus, the real task is to identify the kinds of strategic prices that have to be sanctioned without dissuading economic agents of setting such prices that allow competitive economic practice to develop.

Mexican legislation, commercial-law based, gives answer to this problem by defining three illegal practices that, according to the evidence provided, is worth of sanctioning:

a) Price discrimination – A firm that participates in a market of perfect competition, has no other choice than setting a competitive price. This is that the demand curve is horizontal and the firm becomes a price taker with the only option to sell at the market price. However, the majority of the markets do not behave in such a manner and the firm can set its price in a strategic way. They can set different prices for the same product sold in different markets or for different quantities sold of the same product (non-linear pricing) with the objective of increasing their gains.

In economic terms, price discrimination occurs when one seller obtains different return rates for selling the same product to different consumers or markets. In other words, a seller can price discriminate setting prices at different distances from her cost curve. Price discrimination can be an interesting practice. It finds its *raison d'être* in the residual differences of value among individuals. At the same time, it is justified by the differences among markets. One more reason for price discrimination to be an interesting practice is that it can be considered both pro-competitive and anti-competitive in the law. It is pro-competitive when it diminishes cartel practices but it is anti-competitive if there is market power, when it produces market inefficiencies if it is not perfect or when it makes price predation more likely.

When firms attend to different or multiple markets, they seek to maximise gains in every market. Thus, prices are different for different markets, different demand or revenue curves. It is economically accepted then, that if firms have different levels of market power in different markets, they set different prices for each market. Even more, price discrimination can produce social welfare in the sense that it provides goods to levels where perfect competition could not be brought.

Since price discrimination can be, depending on the factors considered, either pro-competitive or anti-competitive, the policy goal is to establish the differences between both. Nevertheless, price discrimination has always been targeted under commercial law.

b) Dumping – The legal framework of dumping under Mexican legislation has already been sketched. Accordingly, dumping occurs when the price of an imported product is considered under 'normal value' in the country of origin, thus causing or threatening to cause harm to the importing country and there is a causal relationship between this and the import price to at least 25% of the domestic industry.

c) Price predation – Refers to a firm setting a strategic price such that it is low enough to eliminate market rivals. Once displacement is achieved, the predating firm will set monopoly prices in the market. This is sanctioned by the commercial law in Mexico under three elements: i) prices below variable average cost for occasional sales and total average cost for recurrent sales; ii) market power of the firm; and iii) the purpose of the price is to displace rivals from the market.

Despite the similarity between price discrimination, dumping and price predation, each one has different objectives and economic grounds. The same is for

the legislation in which they are ascribed. Competition advocates are not the same than antidumping policy advocates. The former are concerned with welfare losses caused by market power while the latter are concerned with the protection of declining or monopolistic industries.

Economic grounds are different to each legislation. Antidumping legislation relies on arguments such as justice or loyalty in its aim of seeking popular consensus on the contingent practices that it advocates and has little to do against monopolies or to promote level playing ground. Contrarily, competition law goals are market efficiency, social welfare, market competition, prevention of excessive market power. Even though antidumping legislation lacks of a solid, convincing, theoretical framework, contrary to that of competition law, countries are increasingly adopting antidumping legislation and antidumping measures are increasingly being used.

It is true that the debate of anticompetitive effects of AD policy is avoided by both competition authorities and AD policy promoters despite the growing research that shows evidence on the anticompetitive outcomes when AD policy is activated.

The solution to the problem of antidumping seems to be clear: countries should consider abolishing their antidumping legislation and turning to competition law for the treatment of price discrimination in the form of dumping, as it is now done within the trade association areas of The European Union, Australia and New Zealand's ANCERTA and Chile and Canada. Nafta seems to be the perfect framework where national antidumping legislations could be abolished.

## APPENDICES

### Appendix I

*A Numerical example of a discount factor in AD policy:*

Table 1A. Strategies and Payoffs

	Co-operation	Deviation	BN Equilibrium
Free trade	5	6	3
AD Domestic firm	5	6	4
AD Foreign firm	5	6	1

The first row of the table shows the free trade expected payoffs each firm obtains at the respective strategy they choose in the repeated game. Remember that the grim trigger strategy they engage in to achieve collusion is symmetric, so the payoffs structure is the same for the two firms. Column three shows the Bertrand-Nash equilibrium payoff from the one-shot static game, which in the collusive mechanism is the punishment strategy. Similarly, the last two rows show the domestic and foreign firm's payoffs under AD policy, respectively. Here, expected payoffs of the punishment strategy are altered because of the possibility of the imposition of duties to imports. This is reflected in the second term on the right-hand side of conditions (15) and (16).

Now, by substituting the payoffs of Table 1A into conditions (14), (15) and (16) for every value of  $\delta$  throughout its range, Table 2A shows the threshold value of  $\delta$  that makes collusion sustainable according to the grim trigger mechanism. It can be observed that under free trade, condition (14) holds for a  $\delta$  value of 0.4. Once AD policy is introduced, the value of  $\delta$  required to sustain the collusive outcome given by (15) increases to 0.5. Contrarily, a smaller value of  $\delta$  is required for the foreign firm to satisfy condition (16), bringing it down to 0.2 in this numerical example.

Table 2A. Collusive mechanism. Profits and value of  $\delta$ .

$\delta$	Free trade		AD policy			
	(14)		Domestic firm's profits (15)		Foreign firm's profits (16)	
0	5.00	6.00	5.00	6.00	5.00	6.00
0.1	5.56	6.33	5.56	6.44	5.56	6.11
0.2	6.25	6.75	6.25	7.00	<b>6.25</b>	<b>6.25</b>
0.3	7.14	7.29	7.14	7.71	<b>7.14</b>	<b>6.43</b>
0.4	<b>8.33</b>	<b>8.00</b>	8.33	8.67	<b>8.33</b>	<b>6.67</b>
0.5	<b>10.00</b>	<b>9.00</b>	<b>10.00</b>	<b>10.00</b>	<b>10.00</b>	<b>7.00</b>
0.6	<b>12.50</b>	<b>10.50</b>	<b>12.50</b>	<b>12.00</b>	<b>12.50</b>	<b>7.50</b>
0.7	<b>16.67</b>	<b>13.00</b>	<b>16.67</b>	<b>15.33</b>	<b>16.67</b>	<b>8.33</b>
0.8	<b>25.00</b>	<b>18.00</b>	<b>25.00</b>	<b>22.00</b>	<b>25.00</b>	<b>10.00</b>
0.9	<b>50.00</b>	<b>33.00</b>	<b>50.00</b>	<b>42.00</b>	<b>50.00</b>	<b>15.00</b>
1	0.00	6.00	0.00	6.00	0.00	6.00

## Appendix 2.

### Mexican antidumping cases.

Table 3. Main features of AD cases, 1994-1998.							
no. case	Type of industry (no. of 8-digit level products involved) (1)	Manufacturing sector (2)	Country of origin (3)	Final outcome (4)	Final duty (%) (5)	Final dumping margin (%) (6)	Reason for investigation (7)
1	steel connections (1)	steel	Brazil	positive	99.1% (average)	176.00%	price discrimination
2	Cold-rolled steel sheet (2)	steel	Bulgaria, Kazakhstan, Russia	positive	54.78% (average)	139% (average)	price discrimination
3	Furazolidone (1)	chemical	China	positive	117.00%	117.00%	price discrimination
4	Gas lighters (1)	other manufactures	China	positive	0.1232US\$ per unit	0.1232US\$ per unit	price discrimination
5	door knobs (2)	steel	China	positive	236%	236.00%	price discrimination
6	prams and pushchairs (3)	other manufactures	China, Taiwan	positive	53.03% (average)	64.22% (average)	price discrimination
7	polystyrene crystal (2)	plastics	EU	positive	difference between NV (US\$0.927) and X price	58.73%	price discrimination
8	tinned sliced peaches (1)	food	Greece	negative	0.00%	0.00%	price discrimination and anti-subsidies
9	Bicycle tyres (1)	rubber	India	positive	116.00%	116.00%	price discrimination
10	sulphuric acid (1)	chemical	Japan	positive	91.10%	2484%	price discrimination
11	Steel plates in coil (2)	steel	Russia	positive	29.30%	29.30%	price discrimination

Table 3. Main features of AD cases, 1994-1998.							
no. case	Type of industry (no. of 8-digit level products involved) (1)	Manufacturing sector (2)	Country of origin (3)	Final outcome (4)	Final duty (%) (5)	Final dumping margin (%) (6)	Reason for investigation (7)
12	hot rolled steel plate (2)	steel	Russia, Ukraine	positive	55.69% (average)	58.69% (average)	price discrimination
13	Carbon steel balls (1)	steel	Taiwan	positive	19.44%	19.44%	price discrimination
14	diammonium phosphate (1)	chemical	US	negative	0%	0%	price discrimination
15	Ammonium sulphate (1)	chemical	US	positive	dif between NV (97.18USD) and X price	57.91%	price discrimination
16	petrol additives (3)	chemical	US	positive	81.00%	81.00%	price discrimination
17	synthetic iron oxide and hydroxide (2)	chemical	US	negative	0.00%	0.00%	price discrimination
18	High fructose [corn syrup] (4)	food	US	positive	n.a	n.a	price discrimination
19	apples (1)	food	US	positive	46.58%	46.58%	price discrimination
20	beef (10)	food	US	positive	28.93%	28.93%	price discrimination
21	Pork (1)	food	US	positive	0.351USD	48.13%	price discrimination
22	Bond paper (1)	paper	US	positive	12.76% (average)	18.82% (average)	price discrimination
23	regenerated celluloid film (1)	plastics	US	positive	30.60%	30.60%	price discrimination
24	seamless line pipe (23)	steel	US	positive	82.41%	82.41%	price discrimination

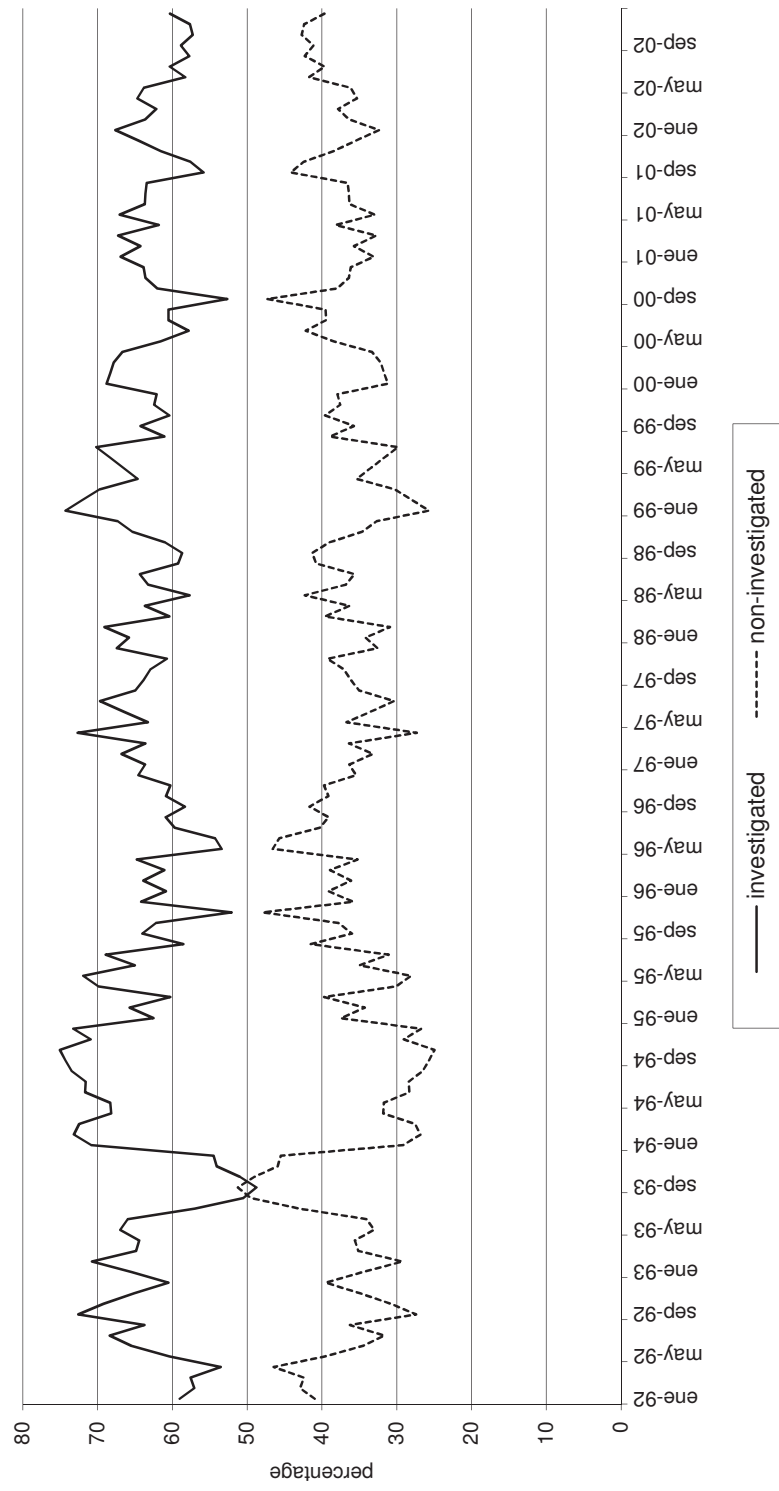




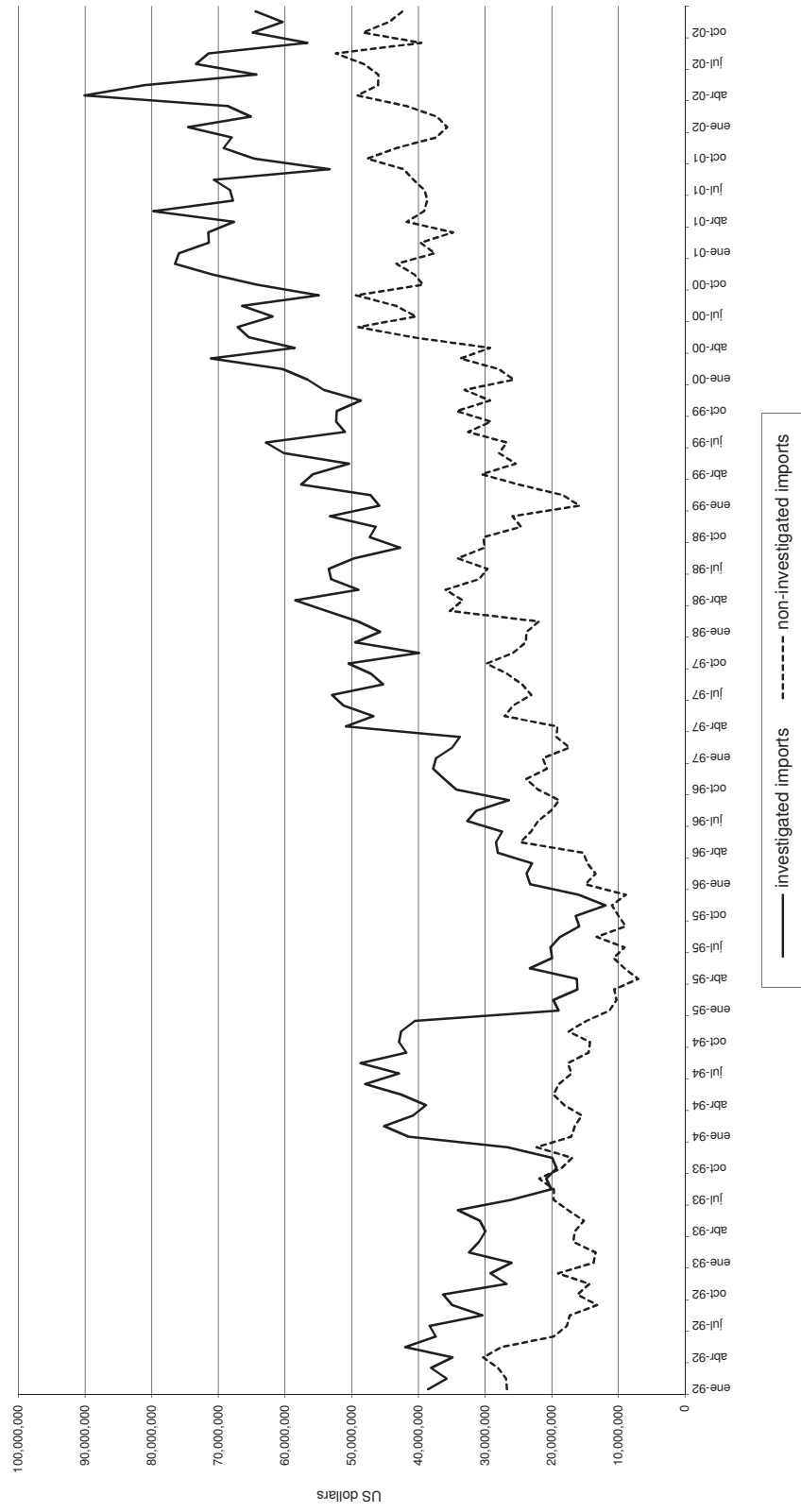
**Table 4. Competitive structure of AD cases.**

(sector)Industry	No. of firms in the domestic industry (i.e. industry concentration)	No. of petitioners	share of petitioner to national production (%) (i.e. market share)	share of named imports to national imports (%) (i.e. foreign competition)
			<b>&gt;70</b>	<b>&gt;60</b>
(chemical)Diammonium phosphate	1 <b>A</b>	1	100	99.70
(steel)Carbon steel balls	1 <b>A</b>	1	100	98.30
(chemical)Furazolidone	1 <b>A</b>	1	100	97
(paper)Bond paper	9 <b>C</b>	8	100	97
(plastics)Celluloid film	1 <b>A</b>	1	100	99
(food)High fructose	61 <b>D</b>	59	98	99.80
(chemical)Iron oxide/hydroxide	2 <b>B</b>	1	95	82
(plastics)Polystyrene crystal	3 <b>B</b>	2	90	96
(food)Tinned peaches	6 <b>C</b>	1	90	65
(chemical)Ammonium sulphate	5 <b>C</b>	3	71	89
(steel)Steel connections	1 <b>A</b>	1	100	86
(chemical)Petrol additives	6 <b>C</b>	1	80	n.a.
(other manuf.)Gas lighters	1 <b>A</b>	1	100	n.a.
			<b>&lt;70</b>	<b>&gt;60</b>
(food)Pork	n.a. <b>D</b>	1 (association of producers)	68	100
(food)Apples	n.a. <b>D</b>		60	83
(chemical)Sulphuric acid	13 <b>D</b>	2	45	71
<b>Rest</b>			<b>&gt;70</b>	<b>&lt;70</b>
(steel)Seamless line pipe	1 <b>A</b>	1	100	58
(steel)Plates in coil	3 <b>B</b>	3	100	41
(steel)Hot-rolled plate	1 <b>A</b>	1	100	49
(rubber)Bicycle tyres	3 <b>B</b>	1	92	27
(other manuf.) Prams&pushchairs	n.a. <b>B</b>	1	90	11.30-36
(steel)Door knobs	3 <b>B</b>	1	80	29
(steel)Cold-rolled sheet	3 <b>B</b>	2	71	31
(food)Beef	n.a. <b>D</b>	1 (association of producers)	90-100	67-100
<p>Note: Different values are calculated for the <i>Beef</i> case, where 6 out of 10 products have a domestic share of 90-100% and imports' share is over 67.2 for all its products.</p> <p>A: domestic market share of 100; 1 firm            B: domestic market share of 70-99; 1-3 firms            C: domestic market share &gt; 70; 3-9 firms            D: domestic market share &lt; 70; 9+ firms</p>				

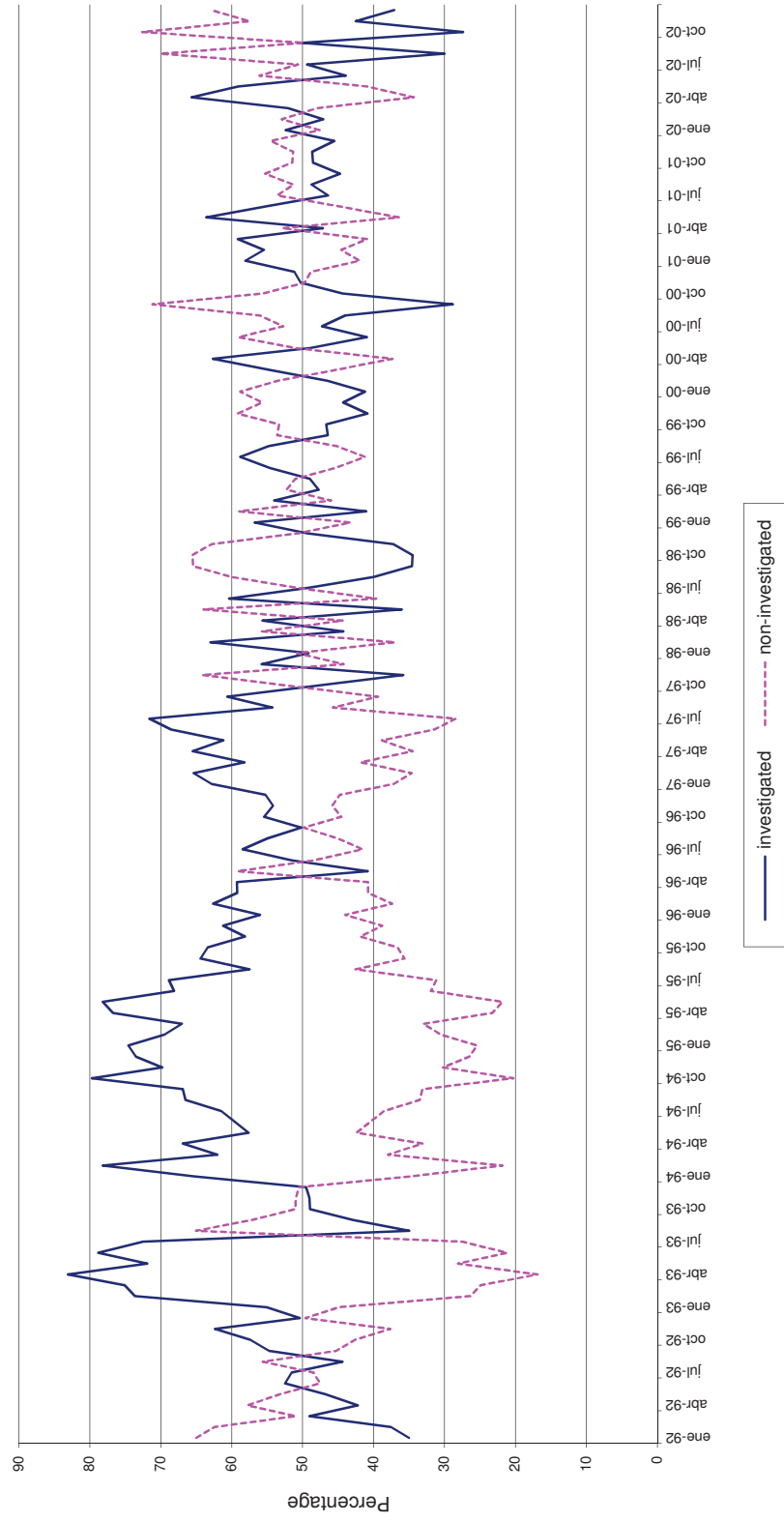
Figure 4.  
Share of investigated and non-investigated imports (value).  
AD imports, 1992-2002



**Figure 5.**  
**Monthly value of investigated and non-investigated imports.**  
**AD imports 1992-2002, 1980=100**



**Figure 6.**  
**Share of investigated and non-investigated imports (volume)**  
**AD imports, 1992-2002**



**Figure 7.**  
**Monthly volume of investigated and non-investigated imports.**  
**AD imports, 1992-2002.**

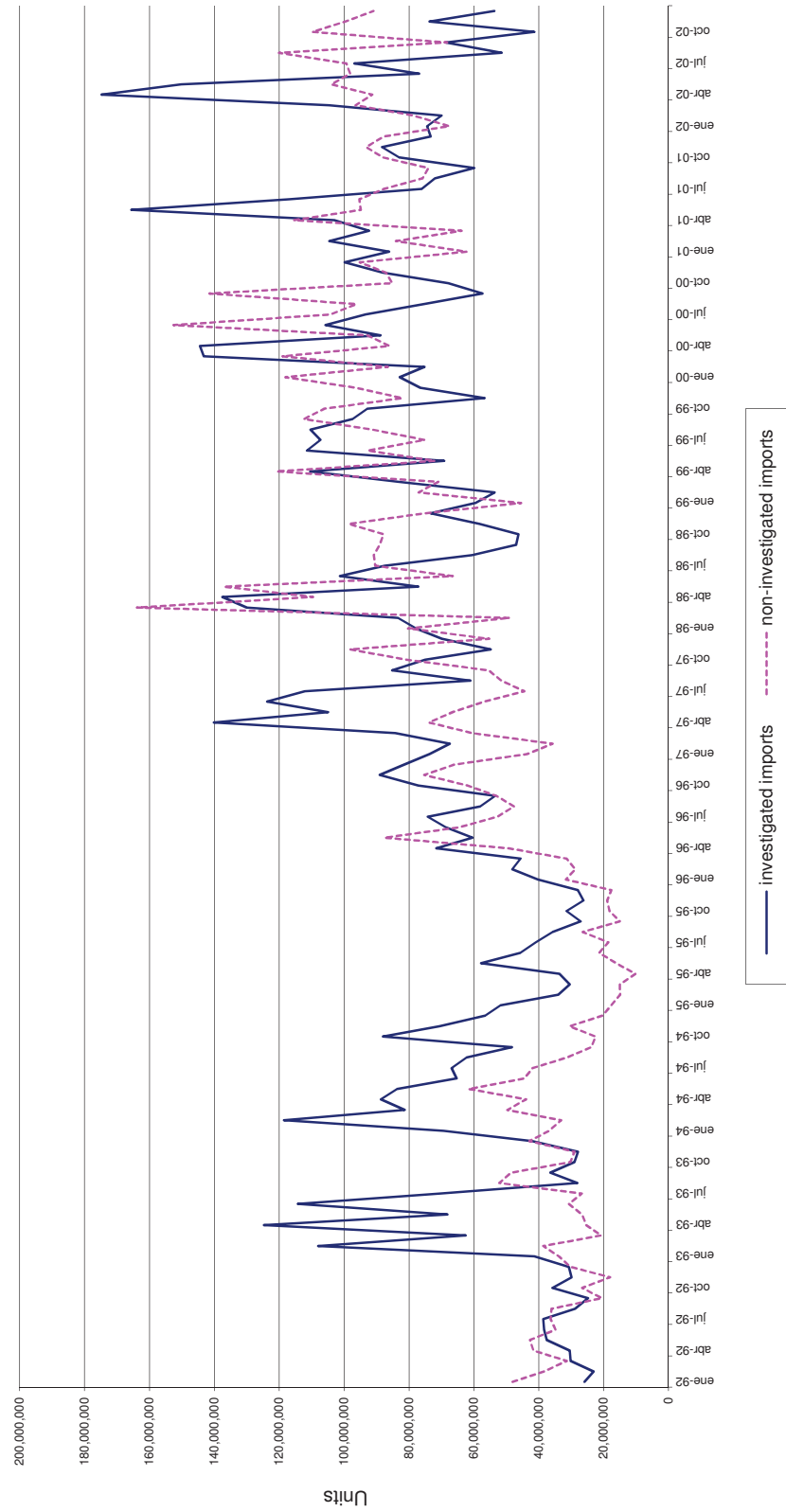
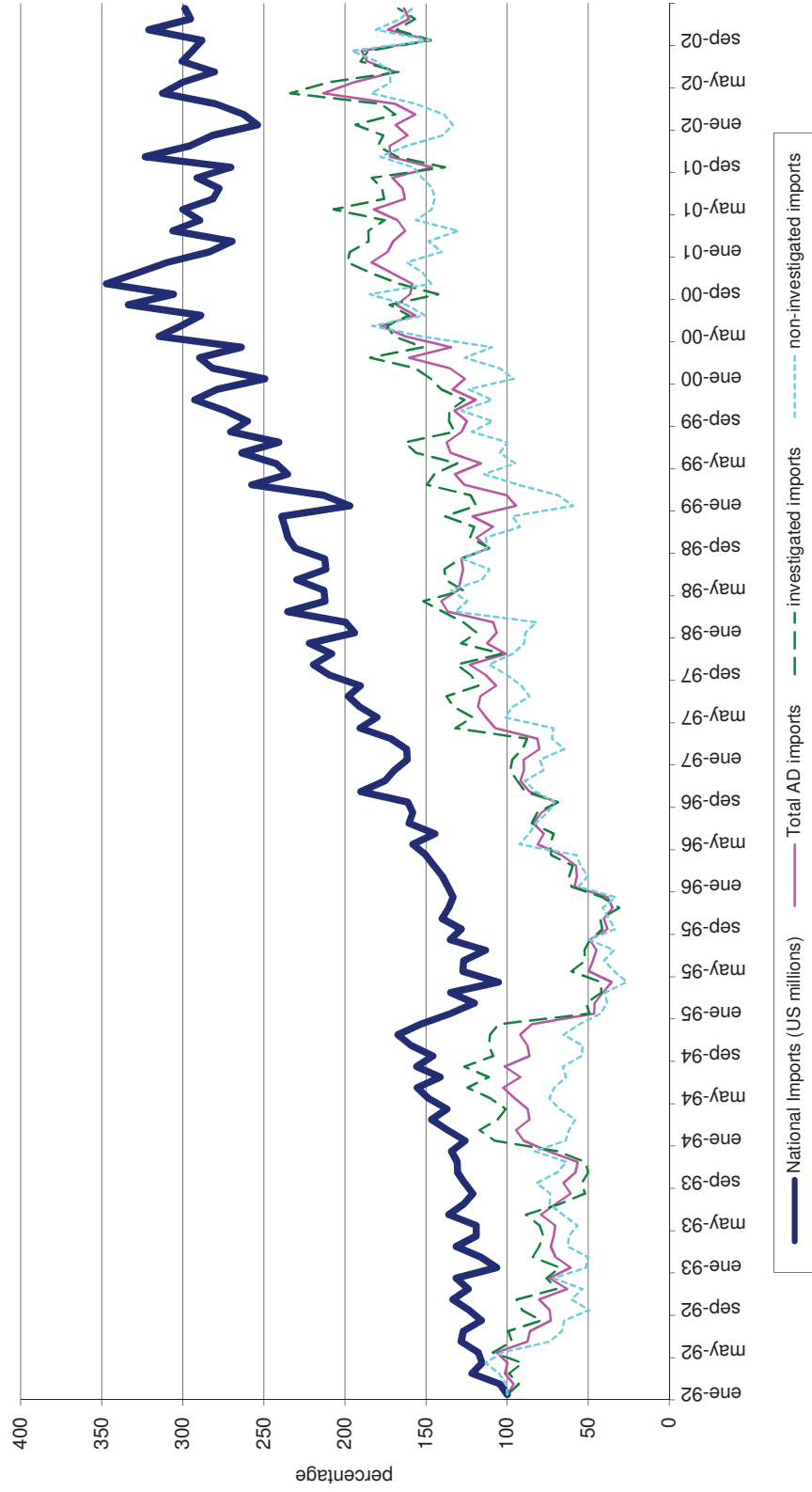


Table 5.  
Investigated imports per country per year. % of total national imports, 1992-2002 (value).

Country (products)	VAL92	VAL93	VAL94	VAL95	VAL96	VAL97	VAL98	VAL99	VAL00	VAL01	VAL02	period average
USA (48)	0.8932	0.6347	0.8570	0.4100	0.5500	0.7024	0.6931	0.6585	0.6598	0.7381	0.7335	0.6846
Greece (1)	0.0220	0.0175	0.0170	0.0092	0.0072	0.0029	0.0010	0.0038	0.0075	0.0061	0.0079	0.0093
Taiwan,China (3)	0.0085	0.0066	0.0092	0.0038	0.0045	0.0042	0.0050	0.0051	0.0126	0.0138	0.0154	0.0081
EU (2)	0.0030	0.0061	0.0047	0.0114	0.0082	0.0157	0.0008	0.0006	0.0002	0.0003	0.0001	0.0046
Russia,Ukraine (2)	0.0000	0.0000	0.0000	0.0000	0.0114	0.0147	0.0051	0.0030	0.0016	0.0015	0.0042	0.0038
Bulgaria,Kazakhstan, Russia (2)	0.0000	0.0000	0.0000	0.0000	0.0124	0.0062	0.0179	0.0002	0.0000	0.0001	0.0000	0.0034
Russia (2)	0.0000	0.0005	0.0269	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0028
China (4)	0.0021	0.0034	0.0022	0.0018	0.0007	0.0006	0.0003	0.0004	0.0006	0.0006	0.0009	0.0012
India (1)	0.0016	0.0032	0.0051	0.0021	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0011
Brazil (5)	0.0009	0.0011	0.0038	0.0014	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0007
Taiwan (1)	0.0006	0.0006	0.0005	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002
Japan (1)	0.0007	0.0006	0.0010	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000	0.0002
AD imports (72)	1.4993	1.1255	1.2891	0.6925	0.9889	1.1391	1.1516	1.0174	1.0909	1.2034	1.2476	1.1314
investigated	0.9326	0.6741	0.9273	0.4429	0.5945	0.7468	0.7238	0.6719	0.6827	0.7608	0.7623	0.7200
Non-investigated	0.5667	0.4514	0.3618	0.2496	0.3944	0.3922	0.4278	0.3455	0.4082	0.4426	0.4853	0.4114
<b>Total National Imports</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>



Figure 8.  
Monthly change of national imports and AD imports, 1992-2002



**Figure 9.**  
**Monthly change of AD imports, 1992-2002 (volume)**

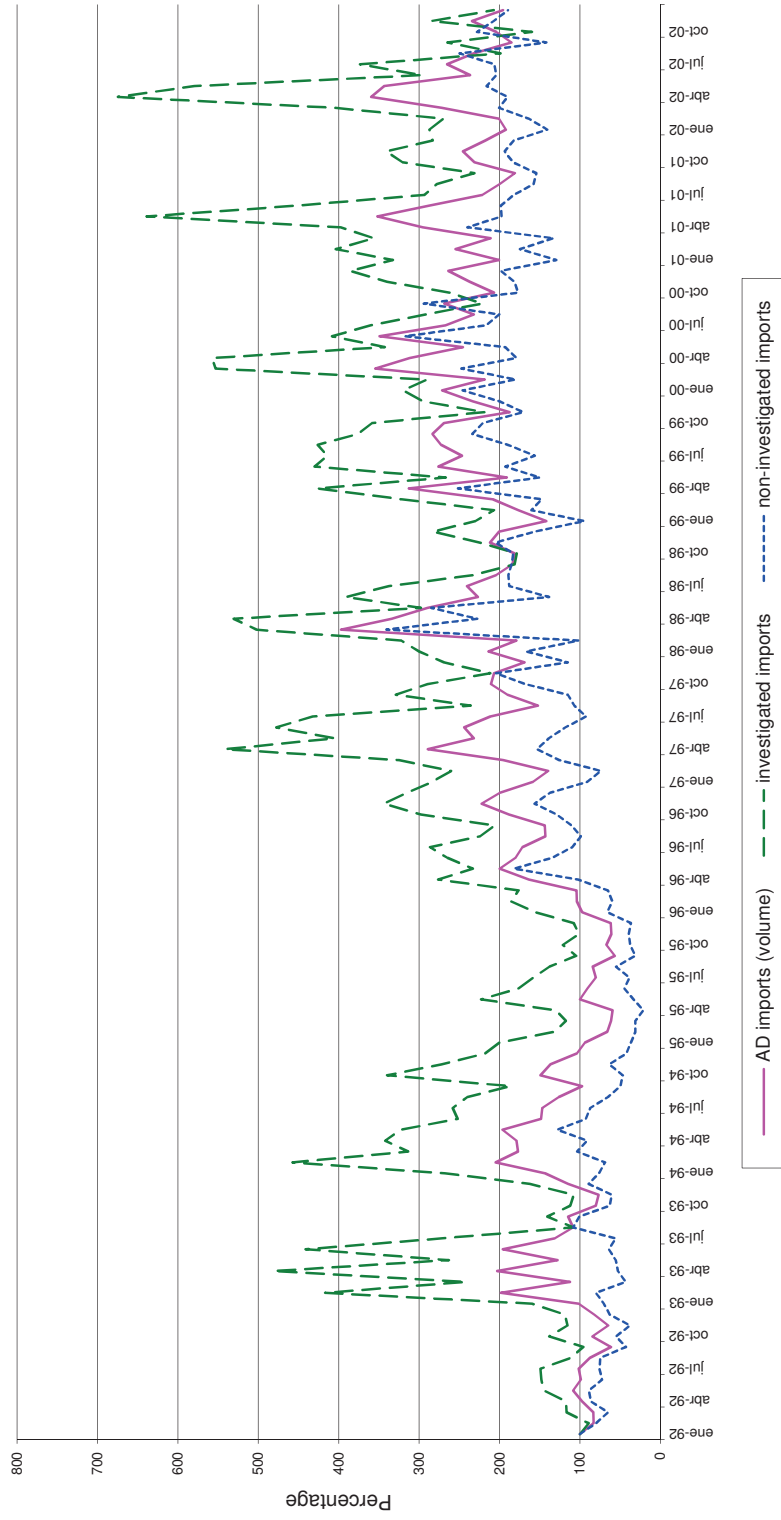


Table 6.  
Investigated imports per country per year. % of AD imports, 1992-2002 (value).

Country (products)	VAL92	VAL93	VAL94	VAL95	VAL96	VAL97	VAL98	VAL99	VAL00	VAL01	VAL02	period average
USA (48)	59.57	56.39	66.48	59.20	55.62	61.67	60.18	64.72	60.48	61.33	58.79	60.40
Greece (1)	1.47	1.55	1.32	1.32	0.73	0.25	0.09	0.38	0.69	0.51	0.63	0.81
Taiwan,China (3)	0.57	0.59	0.71	0.55	0.46	0.37	0.44	0.51	1.16	1.15	1.23	0.70
EU (2)	0.20	0.54	0.37	1.64	0.83	1.37	0.07	0.06	0.02	0.03	0.01	0.47
Russia,Ukraine (2)	0.00	0.00	0.00	0.00	1.15	1.29	0.44	0.30	0.15	0.13	0.33	0.35
Bulgaria,Kazakhstan,	0.00	0.00	0.00	0.00	1.26	0.54	1.56	0.02	0.00	0.01	0.00	0.31
Russia (2)	0.00	0.04	2.09	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23
Russia (2)	0.14	0.31	0.17	0.26	0.07	0.05	0.03	0.04	0.06	0.05	0.08	0.11
China (4)	0.10	0.28	0.39	0.31	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.10
India (1)	0.06	0.10	0.29	0.20	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.06
Brazil (5)	0.04	0.05	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Taiwan (1)	0.05	0.05	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02
Japan (1)	0.05	0.05	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02
<b>total AD imports (72)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 7.  
Investigated imports per country per year. % of investigated imports, 1992-2002 (value).

Country (products)	VAL92	VAL93	VAL94	VAL95	VAL96	VAL97	VAL98	VAL99	VAL00	VAL01	VAL02	period average
USA (48)	95.78	94.15	92.42	92.57	92.51	94.06	95.76	98.01	96.65	97.01	96.22	95.01
Greece (1)	2.36	2.59	1.83	2.07	1.21	0.38	0.14	0.57	1.10	0.81	1.04	1.28
Taiwan,China (3)	0.92	0.98	0.99	0.86	0.76	0.56	0.70	0.76	1.85	1.81	2.02	1.11
EU (2)	0.32	0.91	0.51	2.57	1.38	2.10	0.11	0.09	0.03	0.04	0.01	0.73
Russia,Ukraine (2)	0.00	0.00	0.00	0.00	1.92	1.97	0.70	0.45	0.24	0.20	0.55	0.55
Bulgaria,Kazakhstan,												
Russia (2)	0.00	0.00	0.00	0.00	2.09	0.82	2.48	0.03	0.00	0.02	0.00	0.49
Russia (2)	0.00	0.07	2.90	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
China (4)	0.22	0.51	0.24	0.41	0.11	0.08	0.04	0.05	0.09	0.08	0.12	0.18
India (1)	0.17	0.47	0.55	0.48	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Brazil (5)	0.10	0.16	0.41	0.31	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.10
Taiwan (1)	0.07	0.08	0.06	0.04	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.03
Japan (1)	0.07	0.09	0.10	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.03
<b>Investigated imports (72)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 8.  
Investigated imports per country per year. % of AD imports, 1992-2002 (volume).

Country (products)	VOL92	VOL93	VOL94	VOL95	VOL96	VOL97	VOL98	VOL99	VOL00	VOL01	VOL02	period average
<b>USA (48)</b>	45.40	54.45	52.13	61.91	47.58	53.51	42.16	48.51	45.35	50.43	45.38	49.71
Japan (1)	0.00	7.75	5.92	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	1.29
Greece (1)	0.89	1.81	1.59	1.40	0.68	0.26	0.07	0.32	1.01	0.99	1.05	0.92
Russia, Ukraine (2)	0.00	0.00	0.00	0.00	1.82	2.39	0.63	0.59	0.44	0.31	1.31	0.68
Russia (2)	0.00	0.10	5.52	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Bulgaria, Kazakhstan,												
Russia (2)	0.00	0.00	0.00	0.00	2.04	0.95	2.73	0.03	0.00	0.03	0.00	0.53
China (4)	0.38	0.12	0.98	1.88	1.36	0.62	0.09	0.05	0.02	0.02	0.02	0.50
EU (2)	0.27	0.40	0.29	1.15	0.63	1.46	0.03	0.03	0.02	0.02	0.01	0.39
Taiwan (1)	0.84	0.02	0.05	0.02	0.00	0.00	0.00	0.00	0.01	0.38	0.01	0.12
Taiwan, China (3)	0.06	0.06	0.09	0.23	0.05	0.07	0.07	0.11	0.12	0.12	0.19	0.11
India (1)	0.11	0.21	0.34	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
Brazil (5)	0.08	0.04	0.24	0.14	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.05
<b>total AD imports (72)</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Table 9.  
Investigated imports per country per year. % of investigated imports, 1992-2002 (volume).

Country (products)	VOL92	VOL93	VOL94	VOL95	VOL96	VOL97	VOL98	VOL99	VOL00	VOL01	VOL02	period average
USA (48)	94.49	83.78	77.63	91.28	87.85	90.26	91.12	97.65	96.45	96.43	94.60	91.05
Japan (1)	0.01	11.92	8.82	0.00	0.00	0.00	1.07	0.00	0.00	0.00	0.00	1.98
Greece (1)	1.86	2.78	2.36	2.06	1.25	0.44	0.14	0.64	2.16	1.89	2.19	1.62
Russia, Ukraine (2)	0.00	0.00	0.00	0.00	3.37	4.03	1.37	1.18	0.94	0.60	2.73	1.29
Bulgaria, Kazakhstan,												
Russia (2)	0.00	0.00	0.00	0.00	3.77	1.61	5.90	0.06	0.01	0.06	0.00	1.04
Russia (2)	0.00	0.15	8.22	1.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
China (4)	0.80	0.19	1.46	2.77	2.50	1.04	0.20	0.09	0.05	0.04	0.05	0.84
EU (2)	0.56	0.61	0.43	1.70	1.16	2.46	0.06	0.06	0.03	0.04	0.01	0.65
Taiwan (1)	1.76	0.03	0.07	0.02	0.01	0.00	0.01	0.01	0.01	0.72	0.03	0.24
Taiwan, China (3)	0.13	0.09	0.14	0.35	0.09	0.11	0.15	0.23	0.25	0.23	0.40	0.20
India (1)	0.23	0.33	0.51	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Brazil (5)	0.17	0.06	0.35	0.21	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.08
investigated imports	100	100	100	100	100	100	100	100	100	100	100	100



**Table 10. Mean values. AD investigations. Volume of imports.**

Product	Sector	Investigated				non-investigated			
		B	D mean	A	D/B %change	b	d mean	a	d/b %change
Diammonium phosphate	chemical	17,258.22	3,069.93	11,249.76	-82.21	266.45	0.54	0.29	90.38
Furazolidone	chemical	2.11	0.59	0.00	-71.86	-100.00	3.01	1.39	115.94
Iron oxide/hydroxide (19)	chemical	238.12	378.97	504.30	59.15	33.07	45.65	14.81	208.14
Ammonium sulphate	chemical	1,609.63	257.26	192.56	-84.02	-25.15	15,032.49	3.76	399,505.39
Petrol additives (25)	chemical	15.24	8.83	5.04	-42.09	-42.87	0.40	0.16	151.97
Sulphuric acid	chemical	7,443.05	2,108.62	0.07	-71.67	-100.00	18,110.63	5,213.48	247.38
High fructose (14)	food	3,049.23	560.87	580.33	-81.61	3.47	0.09	0.16	1,823.53
Tinned peaches	food	835.85	248.10	502.19	-70.32	102.42	2,283.77	1,227.10	86.11
Apples	food	7,835.30	10,018.40	10,750.05	27.86	7.30	3,648.46	2,411.58	51.29
Pork	food	9.95	24.02	3.95	141.50	-83.53	0.36	0.01	2,357.85
Gas lighters	other manuf.	966.31	55.02	67.41	-94.31	22.50	2,804.26	2,981.86	60.43
Prams&pushchairs (69)	other manuf.	93.93	28.80	31.15	-69.34	8.15	8.83	11.71	-61.66
Bond paper	paper	2,401.01	2,404.26	1,618.66	0.14	-32.68	1,251.81	302.86	311.91
Polyethylene crystal (27)	plastics	445.52	1.67	1.46	-99.63	-12.42	283.73	380.07	21.92
Celluloid film	plastics	101.76	68.71	76.71	-32.48	11.64	11.62	8.01	-51.63
Bicycle tyres	rubber	346.46	180.66	2.91	-47.86	-98.39	343.88	314.13	-46.01
Carbon steel balls	steel	12.44	3.93	5.79	-68.38	47.28	89.92	72.50	-6.06
Door knobs (66)	steel	12.38	15.21	5.65	22.87	-62.83	78.60	113.12	121.82
Seamless lime pipe (44)	steel	34.35	46.61	53.00	35.71	13.71	68.10	102.52	-38.55
Steel Connections (64)	steel	7.73	1.58	0.00	-79.60	-99.94	133.63	157.31	7.21
Plates in Coil (36)	steel	4,068.92	780.52	0.00	-80.82	-100.00	0.00	1,138.08	-87.24
Hot-rolled plate (37)	steel	2,603.19	2,526.38	1,045.73	-2.95	-58.61	9,270.33	17,476.10	72.28
Cold-rolled sheet (39)	steel	844.58	1,416.62	4.64	67.73	-99.67	7,647.02	6,459.57	7.96
<b>Sample mean</b>		<b>2,184.14</b>	<b>1,052.42</b>	<b>1,160.93</b>	<b>51.82**</b>	<b>10.31**</b>	<b>1,669.16</b>	<b>1,669.16</b>	<b>7.40*</b>

\* difference in sample means is significant at 5% level.

\*\*difference in sample means is significant at 10% level.

**NOTE:** The t- test of difference in means is applied to the difference between sample mean values.

**Table 11. Mean values. AD investigations. Value of imports.**

Product	Sector	Investigated				non-investigated			
		B	D	A	A/D	b	d	a	d/b
		mean	mean	Mean	%change	mean	mean	mean	%change
Diammonium phosphate	chemical	1,734.27	415.45	1,682.33	-76.04	304.94	0.00	111.45	-99.99
Furazolidone	chemical	11.73	3.32	0.00	-71.67	-100.00	3.49	8.11	132.41
Iron oxide/hydroxide (19)	chemical	153.16	166.16	173.34	8.49	4.32	30.79	24.69	53.25
Ammonium sulphate	chemical	78.51	22.72	19.85	-71.07	-12.64	2.69	1.14	622.91
Petrol additives (25)	chemical	28.66	16.17	7.10	-43.59	-56.07	0.39	0.52	0.75
Sulphuric acid	chemical	28.63	16.43	0.37	-42.60	-97.74	228.77	265.16	413.20
High fructose (14)	food	446.25	93.32	85.50	-79.09	-8.38	0.15	0.32	0.15
Tinned peaches	food	369.11	120.33	274.30	-67.40	127.96	316.71	741.44	1,313.56
Apples	food	2,600.31	5,071.57	6,126.19	95.04	20.79	28.61	1,028.05	1,571.22
Pork	food	392.41	1,044.89	223.73	166.27	-78.59	0.00	0.59	19.03
Gas lighters	other manuf.	15.04	0.53	4.47	-96.46	739.72	288.44	352.22	308.29
Prams&pushchairs (69)	other manuf.	105.70	144.20	178.01	36.43	23.45	103.25	94.28	92.70
Bond paper	paper	1,555.23	1,709.50	1,309.67	9.92	-23.39	96.09	282.33	751.01
Polyethylene crystal (27)	plastics	191.17	1.85	0.96	-99.03	-48.42	375.09	305.30	220.67
Celluloid film	plastics	269.20	152.53	146.68	-43.34	-3.84	39.87	21.33	28.43
Bicycle tyres	rubber	210.18	117.77	3.13	-43.96	-97.34	725.51	367.19	366.06
Carbon steel balls	steel	15.32	3.60	8.06	-76.53	123.95	614.96	517.91	468.65
Door knobs (66)	steel	34.78	33.82	3.58	-2.78	-89.40	427.87	846.74	600.09
Seamless line pipe (44)	steel	62.76	54.97	84.81	-12.41	54.29	182.76	103.18	87.34
Steel Connections (64)	steel	8.63	2.05	0.01	-76.18	-99.70	102.59	97.06	140.05
Plates in Coil (36)	steel	831.87	161.43	0.00	-80.59	-100.00	2,155.84	311.53	0.00
Hot-rolled plate (37)	steel	670.02	666.66	257.44	-0.50	-61.38	3,676.91	5,385.83	2,723.38
Cold-rolled sheet (39)	steel	222.80	365.26	1.22	63.94	-99.67	2,017.99	2,315.47	2,551.27
<b>Sample mean</b>		<b>436.34</b>	<b>451.50</b>	<b>460.47</b>	<b>3.48*</b>	<b>1.99**</b>	<b>496.82</b>	<b>569.02</b>	<b>536.75</b>

\* difference in sample means is significant at 5% level.

\*\*difference in sample means is significant at 10% level.

**NOTE:** The t- test of difference in means is applied to the difference between sample mean values.

**Table 12. Mean values. AD investigations. Unit Value of imports.**

Product	Sector	Investigated				non-investigated						
		B		A		b		a		d/b	a/d	
		mean	D	mean	A	mean	d	mean	a			
Diammonium phosphate	chemical	0.12	0.14	0.16	21.48	12.49	3.34	1.20	2.15	-64.18	80.01	
Furazolidone	chemical	2.64	1.71	0.00	-35.31	-100.00	1.39	2.25	4.33	61.10	93.02	
Iron oxide/hydroxide (19)	chemical	0.65	0.45	0.34	-30.21	-24.16	2.59	2.58	1.56	-0.21	-39.35	
Ammonium sulphate	chemical	0.09	4.58	0.10	5,023.64	-97.82	1.27	1.63	2.30	27.84	41.64	
Petrol additives (25)	chemical	1.90	2.11	1.72	11.00	-18.38	5.45	3.18	2.37	-41.57	-25.52	
Sulphuric acid	chemical	2.60	3.02	2.84	15.88	-5.96	0.06	0.09	0.04	38.92	-55.24	
High fructose (14)	food	0.18	1.10	0.87	512.89	-20.34	3.74	1.96	0.45	-47.63	-76.88	
Tinned peaches	food	0.45	0.26	0.55	-42.62	115.34	0.61	0.61	0.56	-0.66	-8.58	
Apples	food	0.34	0.49	0.58	42.64	18.61	0.20	0.37	0.45	85.83	20.06	
Pork	food	44.18	45.80	27.54	3.67	-39.87	0.00	3.14	25.59	-	714.61	
Gas lighters	other manuf.	0.14	0.11	0.15	-17.10	29.08	0.18	0.12	0.11	-35.96	-6.79	
Prams&pushchairs (69)	other manuf.	3.13	5.82	7.04	86.32	20.89	6.41	11.07	11.24	72.64	1.58	
Bond paper	paper	0.65	0.74	0.86	13.35	15.81	1.36	1.19	0.61	-13.11	-48.18	
Polyethylene crystal (27)	plastics	0.27	0.25	0.05	-6.44	-78.34	1.07	0.80	0.80	-24.90	-0.44	
Celluloid film	plastics	2.63	2.24	1.97	-14.74	-12.37	4.08	2.28	5.74	-44.02	151.12	
Bicycle tyres	rubber	0.62	0.69	0.43	12.98	-38.01	1.28	1.18	1.10	-8.16	-7.16	
Carbon steel balls	steel	1.08	1.36	1.52	25.44	12.23	8.03	7.76	5.47	-3.33	-29.58	
Door knobs (66)	steel	2.69	3.42	0.58	27.27	-83.09	8.13	7.62	7.90	-6.30	3.67	
Seamless line pipe (44)	steel	1.99	1.39	1.75	-30.14	25.91	1.24	1.52	1.57	22.24	3.24	
Steel Connections (64)	steel	1.12	1.15	0.52	2.81	-54.95	0.78	0.66	1.26	-14.38	89.96	
Plates in Coil (36)	steel	0.17	0.15	0.00	-16.65	-100.00	0.24	0.23	0.00	-7.04	-100.00	
Hot-rolled plate (37)	steel	0.26	0.30	0.24	14.77	-19.52	0.38	0.32	0.31	-15.67	-4.58	
Cold-rolled sheet (39)	steel	0.24	0.21	0.04	-12.33	-79.87	0.34	0.37	0.34	9.44	-7.91	
<b>Sample mean</b>		<b>2.96</b>	<b>3.37</b>	<b>2.17</b>	<b>13.74**</b>	<b>-35.66*</b>	<b>2.27</b>	<b>2.27</b>	<b>3.32</b>	<b>-0.13*</b>	<b>46.30**</b>	

\* difference in sample means is significant at 5% level.

\*\*difference in sample means is significant at 10% level.

**NOTE:** The t- test of difference in means is applied to the difference between sample mean values.

### Appendix 3.

Trade deterrence and trade diversion in Mexican imports.

<b>Table 13. Descriptive statistics of estimation variables.</b>					
<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
value investigated <sup>1/</sup>	8184	315.387	1281.677	0	44219.63
value non-investigated <sup>1/</sup>	8184	1417.24	9233.334	0	378596.4
volume investigated <sup>2/</sup>	8184	1243.652	17073.13	0	1293150
volume non-investigated <sup>2/</sup>	8184	24831.39	405069.5	0	1.59e+07
unit value non-investigated <sup>1/</sup>	8184	189.5715	1917.075	0	134145.1
unit value investigated <sup>1/</sup>	8184	1058.709	13041.49	0	888326.6
preliminary outcome ( <i>po</i> )	8184	.0391007	.1938464	0	1
final outcome ( <i>fo</i> )	8184	.2028348	.4021351	0	1
preliminary duty in % ( <i>pd</i> )	8184	2.995753	18.37189	0	236
final duty in % ( <i>fd</i> )	8184	13.70011	34.2602	0	236
total duty in % ( <i>duty=pd+fd</i> )	8184	16.69586	37.80467	0	236
real exchange rate ( <i>rer80</i> ) <sup>3/</sup>	8184	111.0607	22.72378	75.67453	187.7788

Note: Box-Cox parameter  $\lambda$  for model transformation ranges within 0.12 and 0.15. 1/Index. Box-Cox transformed variable. 2/Index. Box-Cox transformed variable. 3/In index form, 1980=100. An increase of the index means a depreciation of the exchange rate.

**Table 14. Box-Cox Tobit Random Effects estimates for the value of imports.**

Dependent variable1/:	Named imports			Non-named imports		
	(1)	(2)	(3)	(1)	(2)	(3)
<i>value of imports</i>						
inreso	0.01233 (0.2039)	0.1966 (0.2100)	0.1911 (0.2104)	0.4586 (0.3099)	0.3231 (0.3020)	0.2507 (0.3035)
po	-0.5363* (0.2682)			1.5301*** (0.3927)		
fo	-1.1449*** (0.1484)			0.6746*** (0.2184)		
pd		-0.0071* (0.0031)			0.0182*** (0.0040)	
fd		-0.0144*** (0.0022)			0.0074** (0.0023)	
duty			-0.0122*** (0.0016)			0.0046* (0.0020)
rer80	0.0027 (0.0022)	0.0056** (0.0023)	0.0061** (0.0023)	-0.0248*** (0.0034)	-0.0281*** (0.0033)	-0.0268*** (0.0033)
imports (-1)	0.6577*** (0.0114)	0.6589*** (0.0119)	0.6674*** (0.0118)	0.6132*** (0.0129)	0.6000*** (0.0132)	0.6165*** (0.0132)
constant	1.3943*** (0.2771)	0.3415*** (0.2924)	0.7468*** (0.2779)	1.2996*** (0.4281)	3.6378*** (0.4309)	3.6853*** (0.3974)
sigma_u	2.6171*** (0.0938)	2.3098*** (0.0994)	2.6101*** (0.0904)	3.6865*** (0.1498)	3.4770*** (0.01926)	5.3434*** (0.2165)
sigma_e	4.3202*** (0.3931)	4.3513*** (0.0411)	4.3629*** (0.0412)	6.4155*** (0.6189)	6.1244*** (0.0603)	6.1534*** (0.0607)
estimated $\lambda$	0.15	0.14	0.14	0.13	0.13	0.13
cross-section observations						
panel observations	62	58	58	62	58	58
Log likelihood	8122	7598	7598	8098	7574	7574
Prob>chi2	-20141.55	-18762.284	-18758.983	-21317.4	-19993.647	-19988.74
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1/Box-Cox transformed variable.

Standard errors in parenthesis; \*\*\*denotes significance at 1% level, \*\*significance at 5% level and \*significance at 10% level.

**Table 15. Box-Cox Tobit Random Effects estimates for the volume of imports.**

Dependent variable1/: <i>volume of imports</i>	Named imports			Non-named imports		
	(1)	(2)	(3)	(1)	(2)	(3)
inreso	0.0398 (0.2002)	0.2186 (0.2077)	0.2527 (0.2074)	0.5452 (0.3416)	0.3415 (0.3253)	0.3005 (0.3248)
po	-0.5011* (0.2572)			1.3549** (0.4411)		
fo	-1.2854*** (0.1444)			0.8065*** (0.2498)		
pd		-0.0093*** (0.0029)			0.0141** (0.0044)	
fd		-0.0167*** (0.0016)			0.0085** (0.0028)	
duty			-0.0131*** (0.0016)			0.0084** (0.0027)
rer80	0.0018 (0.0022)	0.0052* (0.0022)	0.0056** (0.0022)	-0.0257*** (0.0038)	-0.0292*** (0.0036)	-0.0298*** (0.0035)
imports (-1)	0.6676*** (0.0111)	0.6861*** (0.0113)	0.6770*** (0.0115)	0.6450*** (0.0133)	0.6085*** (0.0137)	0.6009*** (0.0133)
constant	0.9883*** (0.2743)	1.6383*** (0.2857)	0.3996*** (0.2745)	3.1198*** (0.4786)	3.6747*** (0.4504)	2.5313*** (0.4754)
sigma_u	2.3228*** (0.0781)	2.7886*** (0.0985)	2.3166*** (0.0822)	4.0551*** (0.2310)	4.1415*** (0.2642)	3.646*** (0.1472)
sigma_e	4.1814*** (0.0382)	4.2397*** (0.0403)	4.2307*** (0.0402)	7.0484*** (0.0686)	6.5868*** (0.0653)	6.5762*** (0.0648)
estimated $\lambda$	0.14	0.13	0.14	0.11	0.11	0.12
cross-section observations	62	58	58	62	58	58
panel observations	8122	7598	7598	8098	7574	7574
Log likelihood	-20751.03	-19418.16	-19393.127	-21741.9	-20349.107	-20333.446
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1/Box-Cox transformed variable.

Standard errors in parenthesis; \*\*\*denotes significance at 1% level, \*\*significance at 5% level and \*significance at 10% level.



**Table 16. Box-Cox Tobit Random Effects estimates for the unit value of imports**

Dependent variable1/:	Named imports			Non-named imports		
<i>unit value of imports</i>	(1)	(2)	(3)	(1)	(2)	(3)
inreso	0.2690 (0.2090)	0.3940 (0.2086)	0.3954 (0.2090)	0.5135 (0.2697)	0.4093 (0.2622)	0.4805 (0.2623)
po	0.1665 (0.2664)			1.3589*** (0.3425)		
fo	-0.9544*** (0.1363)			0.1071 (0.1809)		
pd		-0.0012 (0.0030)			0.0125*** (0.0035)	
fd		-0.0133*** (0.0016)			-0.0005 (0.0019)	
duty			-0.0109*** (0.0014)			0.0070*** (0.0019)
rer80	0.0054** (0.0022)	0.0071** (0.0022)	0.0078*** (0.0022)	-		
imports (-1)	0.5112*** (0.0126)	0.5272*** (0.0131)	0.5368*** (0.0131)	0.0134*** (0.0029)	-0.0149*** (0.0028)	-0.0141*** (0.0028)
constant	1.6264*** (0.2733)	1.4103*** (0.2677)	3.3886*** (0.2782)	0.4817*** (0.0141)	0.5338*** (0.01393)	0.5317*** (0.0141)
sigma_u	1.6264*** (0.2733)	1.4103*** (0.2677)	3.3886*** (0.2782)	0.9911*** (0.3904)	3.2054*** (0.3402)	1.1308** (0.3608)
sigma_e	3.6657*** (0.0992)	3.5014*** (0.0969)	3.4679*** (0.0954)	4.0093*** (0.1930)	3.9493*** (0.1407)	3.4665*** (0.1380)
	4.3899*** (0.0404)	4.2788*** (0.0410)	4.2870*** (0.0411)	5.5980*** (0.0545)	5.3325*** (0.0528)	5.3279*** (0.0529)
estimated $\lambda$	0.15	0.16	0.15	0.17	0.14	0.14
cross-section observations	62	58	58	62	58	58
panel observations	8122	7598	7598	8098	7574	7574
Log likelihood	-20698.29	-19077.126	-19114.187	-20548.94	-19248.149	-19251.927
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1/Box-Cox transformed variable.

Standard errors in parenthesis; \*\*\*denotes significance at 1% level, \*\*significance at 5% level and \*significance at 10% level.

**Table 17. Box-Cox Tobit Random Effects estimates for the value of imports with no US cases, with no developed countries cases and with no steel cases.**

Dependent variable1/: <i>value of imports</i>	Named imports			Non-named imports		
	NO US	NO DEV	NO STEEL	NO US	NO DEV	NO STEEL
inreso	-0.2232 (0.5325)	0.3378 (0.5791)	-0.3998 (0.2286)	0.0173 (0.1162)	0.0492 (0.1401)	0.3432 (0.4237)
po	-0.9873 (0.5749)	-0.1986 (0.6104)	-0.4682 (0.2602)	-0.1917 (0.1203)	-0.2155 (0.1411)	0.8589* (0.4409)
fo	-1.8261*** (0.3174)	-1.5481*** (0.3350)	-1.4265*** (0.1716)	-0.0738 (0.0638)	-0.0774 (0.0767)	0.3214 (0.2642)
rer80	0.0100 (0.0058)	0.0085 (0.0065)	-0.0057** (0.0025)	0.0010 (0.0012)	0.0013 (0.0015)	-0.0431*** (0.0049)
imports (-1)	0.9166*** (0.0258)	0.9957*** (0.0287)	0.6840*** (0.0139)	1.0570*** (0.0074)	1.0728*** (0.0086)	0.6172*** (0.0170)
constant	-2.6480*** (0.7589)	-1.6315* (0.8140)	2.3381*** (0.3602)	-0.5154** (0.1654)	-0.6887** (0.2050)	5.6192*** (0.5977)
sigma_u	2.6576*** (0.2603)	3.1941*** (0.3101)	1.3685*** (0.1284)	0.2049*** (0.0501)	0.2461*** (0.0627)	4.2420*** (0.2073)
sigma_e	5.5173*** (0.1084)	5.3420*** (0.1222)	3.4617*** (0.0411)	1.2363*** (0.0196)	1.3031*** (0.0239)	6.2329*** (0.0815)
estimated $\lambda$	0.16	0.15	0.13	0.09	0.10	0.12
cross-section observations	19	15	32	19	15	32
panel observations	2489	1965	4192	2489	1965	4192
Log likelihood	-5219.602	-3814.575	-10474.132	-4163.181	-3376.329	-11342.466
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1/Box-Cox transformed variable.

Standard errors in parenthesis; \*\*\*denotes significance at 1% level, \*\*significance at 5% level and \*significance at 10% level.

**Table 18. Box-Cox Tobit Random Effects estimates for the volume of imports with no US cases, with no developed countries' cases and with no steel cases.**

Dependent variable1/: <i>volume of imports</i>	Named imports			Non-named imports		
	NO US	NO DEV	NO STEEL	NO US	NO DEV	NO STEEL
inreso	-0.2439 (0.5449)	0.3336 (0.5848)	-0.3545 (0.2381)	0.0450 (0.1403)	0.1208 (0.1662)	0.4589 (0.4854)
po	-1.0564 (0.5932)	-0.3366 (0.6167)	-0.4211 (0.2875)	-0.1197 (0.1452)	-0.1170 (0.1671)	0.9368* (0.5755)
fo	-1.7742*** (0.3121)	-1.5865*** (0.3445)	-1.3701*** (0.1698)	-0.0538 (0.0767)	-0.0387 (0.0903)	0.3916 (0.3184)
rer80	0.0123* (0.0060)	0.0101 (0.0066)	-0.0039 (0.0026)	0.0013 (0.0015)	0.0013 (0.0018)	-0.0456*** (0.0056)
imports (-1)	0.9286*** (0.0236)	0.9981*** (0.0285)	0.6899*** (0.0137)	1.0545*** (0.0080)	1.0702*** (0.0091)	0.6569*** (0.0168)
constant	-1.6747** (0.7189)	-2.9979*** (0.8184)	1.9048*** (0.3470)	-0.5879** (0.1971)	-0.7416** (0.2375)	4.0940*** (0.7208)
sigma_u	3.4955*** (0.3122)	2.3838*** (0.2640)	1.5533*** (0.1144)	0.2368*** (0.0602)	0.2667*** (0.0712)	3.2754*** (0.2122)
sigma_e	5.6827*** (0.1106)	5.3931*** (0.1233)	3.6087*** (0.0428)	1.4951*** (0.0237)	1.5488*** (0.0285)	7.1009*** (0.0932)
estimated $\lambda$	0.14	0.14	0.13	0.08	0.09	0.11
cross-section observations	19	15	32	19	15	32
panel observations	2489	1965	4192	2489	1965	4192
Log likelihood	-5256.566	-3817.968	-10610.199	-4560.805	-3647.496	-11654.426
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1/Box-Cox transformed variable.

Standard errors in parenthesis; \*\*\*denotes significance at 1% level, \*\*significance at 5% level and \*significance at 10% level.

**Table 19. Box-Cox Tobit Random Effects estimates for the unit value of imports with no US cases, with no developed countries' cases and with no steel cases.**

Dependent variable1/ <i>unit value of imports</i>	Named imports			Non-named imports		
	NO US	NO DEV	NO STEEL	NO US	NO DEV	NO STEEL
inreso	-0.0136 (0.7266)	0.6791 (0.7085)	-0.0243 (0.2099)	0.0213 (0.1080)	-0.0206 (0.1332)	0.3917 (0.3544)
po	-0.7717 (0.7895)	0.3326 (0.7366)	-0.0739 (0.2201)	-0.2857** (0.1119)	0.3483*** (0.1341)	0.9948** (0.4651)
fo	2.6073*** (0.4248)	1.9853*** (0.4093)	0.9747*** (0.1454)	-0.0734 (0.0584)	-0.1012 (0.0716)	-0.2753 (0.2186)
rer80	0.0134 (0.0078)	0.0115 (0.008)	-0.0001 (0.0023)	0.0006 (0.0011)	0.0013 (0.0014)	0.0303*** (0.0040)
imports (-1)	0.8221*** (0.0268)	0.9675*** (0.03289)	0.5256*** (0.0161)	1.0622*** (0.0084)	1.0820*** (0.0097)	0.3961*** (0.1929)
constant	-1.9812* (1.0107)	3.4812*** (0.9946)	3.0393*** (0.3059)	-0.4527** (0.1482)	0.6551*** (0.1853)	5.7623*** (0.4941)
sigma_u	3.8780*** (0.9142)	2.9446*** (0.3009)	1.6614*** (0.0952)	0.1434*** (0.0462)	0.1632*** (0.0554)	5.7139*** (0.1889)
sigma_e	7.4741*** (0.1468)	6.5294*** (0.1516)	3.0706*** (0.0375)	1.1449*** (0.0182)	1.2320*** (0.0227)	5.2442*** (0.0691)
estimated $\lambda$	0.12	0.14	0.15	0.11	0.12	0.16
cross-section observations	19	15	32	19	15	32
panel observations	2489	1965	4192	2489	1965	4192
Log likelihood	-5715.66	-4053.473	-10902.45	-4006.157	-3289.792	10802.867
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1/Box-Cox transformed variable.

Standard errors in parenthesis; \*\*\*denotes significance at 1% level, \*\*significance at 5% level and \*significance at 10% level.

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