Trade Policy: Incomplete Information, Antidumping and Political Economy

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Abstract

This thesis focuses on different aspects of trade theory and policy. One of the main objections to the theory of strategic trade policy is that it presumes too much knowledge on the part of governments. The design of an optimal tariff in the presence of incomplete information is analysed in Chapter 2. In a Cournot duopoly model of international competition between a domestic and a foreign firm, it is shown that when the domestic firm and government have incomplete information about the marginal cost of a foreign firm, trade policy can be effectively designed. It is shown that when the foreign firm's output signals costs, there is a unique separating sequential equilibrium. There is a distortion in output due to signalling which is costly in terms of welfare. So, the optimal import tariff when signalling is lower than when the firm does not signal its costs through output. Expected foreign production is lower when signalling, and domestic firm's output and profits are higher. Incomplete information lessens the rent extracting and profit shifting argument for a tariff.

An area of conflicting views in trade policy is that of antidumping (AD). In Chapter 3, a descriptive analysis of the use of AD worldwide and in Europe is presented, including an explanation of AD laws and of the implementation of these laws in Europe. An analysis of European antidumping decisions made by the European Commission between 1985 and 2003 is presented in Chapter 4. Using data on legal AD investigations, industry, imports and political influences, the Commission decision-making on dumping and injury is modelled weighing the relative impact of economic and political factors in predicting policy outcomes. Two hypotheses are formulated. The empirical findings confirm that Europe is operating a double track antidumping mechanism. Mainly economic variables are associated with a positive decision on dumping whereas only political variables are positively associated with affirmative decisions on injury.

Besides, antidumping laws allow countries to settle antidumping actions either by levying duties or by demanding price undertakings from the foreign exporting (or importing) firms. A price undertaking is an agreement by the foreign exporter to eliminate injury by increasing its price or ceasing exports. However, countries have considerable discretion in allowing price undertakings. An empirical analysis of the acceptance of price undertaking decisions in Europe is presented in Chapter 5. A number of hypotheses are formulated. The econometric analysis indicates that the share of European exports to the country of the defendant; indicators of political pressure as well as the country of origin of certain defendants (non-market economies) are positively associated with the decision to refuse price undertakings.

The research hypotheses in chapters 4 and 5 are examined using a legal database containing information about 805 antidumping investigations initiated in Europe published in the Official Journal of the European Communities and associated trade and industrial statistics. An overview of the thesis with a summary of conclusions and contributions is presented in Chapter 1. A summary of the main findings of the thesis is presented in Chapter 6.

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1   Introduction

This thesis focuses on different aspects of trade theory and policy. It analyses the design of trade policy when a domestic government decides on an import tariff on a foreign competitor whose costs it does not know. It shows that an optimal tariff can be chosen and that strategic trade policy can effectively be designed in the presence of informational asymmetries.

It also analyses a particular tool of trade policy, that of antidumping (AD). It empirically analyses the European dumping and injury decisions in the period 1985-2003, based on the Finger-Hall-Nelson's (1982) model of the political economy of administered protection. This model distinguishes between political and technical determinants of the antidumping decision. The hypotheses tested are that technical determinants are significant in the determination of dumping and political determinants are significant in the determination of injury decisions. The empirical analysis confirms that Europe operates a double track AD mechanism. The thesis also analyses the determinants of the acceptance of price undertakings in the European Union. The European legislation on antidumping allows the administration to settle antidumping actions by levying duties or by demanding price undertakings from the foreign exporting firms. A data set of European legal documents and associated trade and industrial statistics is constructed to analyse the determinants of the AD decisions of the European Commission.

This introduction gives the background to the research questions examined in the thesis. It describes the motivation and the relevance of the research that has been carried out and discusses the methodology used as well as how this research fits into the previous literature. The third section of this chapter presents the thesis structure, which summarises the key elements of each chapter. The fourth section, presents the results and contributions.

2 Trade Policy under Incomplete Information and Antidumping

A body of literature has investigated the implications of incomplete information in strategic trade policy theory, especially following the seminal paper by Brander and Spencer (1985). The theory of strategic trade policy presumes too much knowledge on the part of governments. Several papers have relaxed the assumption of complete information and have explored different types of informational asymmetries in international trade and trade policy. Some research has focused on the idea that governments could be less informed than firms are about production and markets (asymmetry between governments and firms). Other research has concentrated on the fact that, in certain industries, governments know the characteristics of domestic firms but not those of foreign competitors. In certain industries, what the government knows about domestic and foreign firms could be extremely important. So, the analysis of asymmetries between domestic and foreign firms has deserved special attention in the literature. When a government supports R&D projects, for example, in microelectronics and aerospace, there is a high degree of government intervention and informational asymmetries could be important. A government that knows the cost structure of the industry can use an export subsidy to signal the competitiveness of domestic firms to international markets. The theoretical model analysed in this thesis is relevant for those industries in which domestic firms and the government are uncertain about foreign competitors' costs. The model discussed in Chapter 2, concentrates on the design of trade policy when a domestic government and a local firm do not know certain characteristic of the foreign competitors. While previous work has concentrated on asymmetries of information about the nature of competition and about the demand function, this chapter has focused on the unknown cost efficiency of a foreign firm. It is shown that the government has the ability to impose a different tariff (separate the different types) on foreign firms according to their efficiency and that strategic trade policy could effectively be designed in the presence of informational failures.

Several types of asymmetries of information have been analysed in the related literature. The trade policy instruments that have been most commonly analysed are export and import subsidies and export and import taxes and tariffs. Collie and Hviid (1993) and Qui (1994 and 2003) examine the design of optimal export subsidies in the presence of asymmetries of information between a domestic producer and foreign firms. Collie and

Hviid (1993) analyse a situation in which foreign competitors do not know the cost structure of domestic firms but the domestic government does. The domestic government can use an export subsidy to signal how competitive the local firms are to its foreign competitors. When the export subsidy is big the foreign firm infers that the domestic firm has low costs. In a rational response, it reduces its output conferring higher profits for the domestic firm. There is an extra signalling effect that reinforces the profit shifting effect and the export subsidy is larger than the one that would prevail if information was complete. The authors also analysed the presence of a rival interventionist government. There is a strategic interaction effect but it is not big enough and the original results still hold. In a similar context, Wright (1998) studies export subsidies when foreign competitors and a domestic government do not know the cost structure of a domestic firm. In a signalling model, he shows that optimal subsidies are smaller than under uncertainty.

Qui (1994 and 2003) analyses the importance of governments in facilitating strategic information revelation. In these papers a domestic government and a foreign firm are uninformed about a domestic firm's costs. The government uses two policy instruments to induce information revelation: a per-unit subsidy and a lump-sum transfer. In this way, the domestic firm reveals its type. Moreover, because the foreign firm is also uninformed, there is a mixture of signalling and screening. The domestic firm signals its costs through its policy selection. Screening also takes place when selecting the policy menu. The paper shows that, under Cournot competition, a government would choose a menu of subsidy programs that induces separation by the firms and that the allocation that results is the same as in the full information case.

Brainard and Martimort (1996, 1997 and 1998) consider the role of cost-based informational asymmetries when subsidies are imposed on exports to third markets. However, the asymmetry of information they consider is between governments and firms. These models differ from the one developed by Collie and Hviid (1993) and Qiu (1994 and 2003) in that the foreign firm knows the domestic firm's costs, so that only governments are uninformed. The government faces a trade-off between increasing the profits of possibly wealthy firms and raising funds from the taxpayer. The cost of public funds becomes an important determinant in the design of the optimal export policy. Policy objectives are to reinforce the strategic position of local firms and to minimize the informational rent, which is socially costly. Lacking precise knowledge of the firms' profits functions, the government faces a trade-off between manipulating the payoffs to the local firm in a way

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that enhances its strategic advantage, and preventing the firm from deriving distortionary rents from its private information. In Brainard and Martimort (1997) there is a downward distortion of the optimal subsidy, which may be severe enough to force the subsidy below zero. This is a "screening" effect. A two dimensional policy is used to deal with both distortions: strategic pre-commitment and informational rent seeking. They found that the optimal policy is to implement a menu of contracts specifying a per-unit subsidy and a lump-sum tax as a function of the firms reported costs. The announcement of the subsidy serves as a credible commitment to expand the firm's output, while the lump-sum transfer serves as a screening device. They show that under unilateral intervention (one government) there is a downward distortion in the optimal subsidy.

Governments have limited information not only about the cost structure of the industry but about the nature of competition. Maggi (1996) analyses the sensitivity of strategic trade policy to the type of competition. By developing a model of capacity-price competition, he shows that capacity subsidies can increase the welfare of the domestic country regardless of the type of competition that prevails. Kolev and Prusa (1999) examine the incentives of a government to impose an import tariff on a foreign monopolist in a model with an infinite number of periods. The government does not know a foreign firm's costs. They show that a policy of optimal uniform tariffs (pooling equilibrium) is better than a discriminatory one. Matschke (2003) examines the equivalence of tariffs and quotas in the presence of asymmetric information. She shows that asymmetric information destroys the equivalence of tariffs and quotas that exists under complete information assumptions.

Chapter 2 explores the effects of asymmetric information on trade policy when a domestic government decides on the level of an import tariff on a foreign competitor whose costs it does not know. In the presence of incomplete information and Cournot competition, output can be taken as a signal of costs to the government and a domestic firm. A firm that has low costs has an incentive to misrepresent them and to pretend it has high costs in order to obtain a lower import tariff on its exports. In equilibrium, this incentive does not exist because the government can anticipate the action of the foreign firm and act rationally to choose the optimal tariff. The government faces a trade-off. The optimal policy should equate the marginal loss of consumer welfare with the marginal gain from profit shifting and tariff revenue. It is shown that a unique separating sequential equilibrium exists and strategic trade policy can effectively be designed in the presence of informational

asymmetries. Signalling creates a distortion that is costly in terms of welfare so the specific tariff is lower than in the absence of signalling. Incomplete information lessens the rent extracting argument for a tariff. In a model with domestic competition the results remain qualitatively unchanged. In a dynamic setting, tariffs are higher in duopoly than in the case of a foreign monopoly because the government has an additional incentive to shift profits from the foreign to the domestic firm. While previous work has concentrated on asymmetries of information between governments and domestic firms, Chapter 2 focuses on the unknown cost efficiency of a foreign producer. Strategic trade policy can be designed in the presence of informational asymmetries.

Chapter 2 concentrates on the analysis of optimal tariffs on imports in the presence of asymmetric information. However, it could be argued that the problem of choosing an optimal tariff under incomplete information is of limited practical relevance. The General Agreement on Tariffs and Trade (GATT) has delivered substantial tariff reductions during the post-war period through a sequence of negotiating rounds. These rounds of trade negotiations have narrowed the scope for the widespread use of tariffs as a trade restrictive device. Instead, in the mid-seventies the trade liberalising effects of tariff reduction began to be offset by a growth in non-tariff barriers. The attempt to tariff discriminate among exporters is not feasible under the most favoured nation (MFN) clause of GATT/WTO. The presence of domestic production has allowed the proliferation of contingent protection such as antidumping duties. Among other non-tariff barriers, antidumping has emerged as an increasingly used trade restrictive device. Antidumping laws allow countries to impose unilateral measures against dumped imports that cause material injury to domestic firms. In the presence of dumping, governments can apply an antidumping duty on a foreign product.

The problem of choosing an optimal tariff under incomplete information could be compared with that of choosing an optimal antidumping duty on dumped foreign imports. The model discussed in Chapter 2 could be seen as a repeated game in which a domestic government that does not know foreign firms' costs has to choose an AD duty based on the level of output observed. The model shows that the government could effectively separate both types of firms and impose a higher AD duty on those foreign firms that have the lowest costs. This comparison constitutes an oversimplification of the workings of AD laws on at least two counts. First, the model assumes that when firms compete in quantities AD duties are automatically imposed (without the need for an investigation to be carried out). Second, it assumes that AD duties are chosen according to the observed levels of

production of the foreign firm, whereas in reality the imposition of AD duties is based on the dumping margin, which is the price difference between the import price and the "fair" value. In a model where a domestic government has incomplete information about a foreign firm's costs, Kolev and Prusa (2002) show that the rise in AD protection may be related to increases in voluntary export restraints (VER) since firms with low costs will voluntarily restraint exports before an AD investigation. These and other considerations are discussed in further detail in the analysis of antidumping presented in Chapters 3, 4 and 5.

A growing amount of research in the area of trade policy has concentrated in the study of antidumping. The Agreement on Implementation of Article VI of GATT 1994 (GATT 1994) regulates antidumping. It allows countries to impose unilateral measures against dumped imports causing material injury to domestic firms. But, it is more often being used as pure protection than as a trade remedy. Antidumping legislation is intended to remedy a situation in which foreign firms sell at a price that is below the "fair" or "normal" value. By doing this, foreign firms will be dumping their products in the recipient country. When dumping exists and the industry in the host country is materially injured (or threatened with material injury), the government of the host country can apply an AD duty equal to the dumping margin on the foreign firm's product[1].

The problem with this definition of dumping mainly relates to its implementation. The important questions are how to define "normal" value and how to calculate it and what constitutes "material" injury or the threat of such injury. In practice, there are two main ways to calculate "fair" value. One is the price charged by the exporting firm in its own market for the same product. The other one is the cost of the product constructed from firm-level accounting data. The measure most commonly used is that of total costs (including fixed costs) adding an estimate for what should be a normal profit. Practices like price discrimination and setting prices below cost are included as "unfair" under the antidumping laws but are not necessarily considered as harmful by economists. It is not pricing below total cost that is *per se* harmful and it should not be considered illegal. It must be shown that this practice is intended to harm competition.

The most recent research on antidumping has been directed at understanding the effects as well as how the determinants of antidumping actions legitimise selective protection and an excellent review of it is presented in Blonigen and Prusa (2003a). Earlier

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[1] In the European Union the level of the antidumping duty has to be limited to the amount required to eliminate injury if this is less than the margin of dumping. This rule is sometimes called "the lesser duty rule".

research has focused on the existence of a rationale for antidumping laws but the several substantial revisions of the statutes over the past 25 years had made the legal definition of dumping to be totally divorced from the economic notion of dumping. Conventional economic rationale for antidumping actions is based on the notions of predatory pricing, discriminatory monopoly and cyclical dumping. The argument against predation states that if dumping is predatory domestic producers and consumers could be harmed, because in spite of the short-run gains to the consumers, it will lead to the failure of domestic producers and subsequent exposure to monopoly pricing. An extensive literature exists on the theory of predatory pricing (Milgrom and Roberts 1982a, 1982b, Saloner 1987, Kreps and Wilson 1982b). This justification is the motive that originally prompted the implementation of AD laws in the early twentieth century. Another situation in which firms might sell abroad at lower prices than in their domestic market is due to discriminatory pricing. Discriminatory pricing is likely to make some firms in the industry smaller and gain lower profits than if their rivals did not price discriminate but it will benefit consumers, since they can buy the goods at lower prices. It is sometimes argued that selling in foreign markets at prices different from the one prevailing for their own consumers is not a sufficient reason to justify AD action, unless there is predatory intention. However, the predatory motive for antidumping has rarely been found to exist. Very few cases in the 1980's were brought against instances of possible predatory pricing as shown by Messerlin (1996) and Shy (1998).

The definition of dumping based on the comparison of prices charged in different national markets has led to a cost-based definition of dumping in some countries. In the US, the implementation of the Tokyo Round made it easier to claim cost dumping. It is argued that selling at prices below average cost could be an indication of dumping since a discriminatory monopoly will not normally sell at a price below cost. Making domestic sales at prices below cost are, however, not prohibited by antitrust laws if they are to unload inventories of seasonal items or apparel out of style. If there is uncertainty about demand, pricing below cost is normal behaviour for any firm as a short-run response to a depressed market. This leads us to the notion of cyclical dumping where exporters would price their exports cyclically while setting stable prices in the home market. Ethier (1982) shows that even when firms are perfectly competitive, but there is uncertainty about demand coupled with imperfect adjustments in factor markets, cyclical dumping can emerge. In the presence of rigidities, it is possible to explain why certain industries and countries are prone to

cyclical dumping where others are not (i.e. to maintain stable employment conditions). Under these circumstances, AD policy could end up being used to avoid structural adjustment.

There are a growing number of countries that are using antidumping as an effective device to restrict imports. An overview of the changes in the geographical distribution in the use of AD worldwide is presented in Chapter 3. The traditional users of AD were Canada, the United States (US), Australia and Europe. But a growing number of "new" users have made intensive use of these laws since the 1980s. The widespread use of AD actions in the last two decades has raised concerns about its implementation and use. The increasing use of AD by developing countries has raised concerns about the motives of the users of AD. Strategic motives - like retaliation – have been found to be important (Prusa and Skeath, 2002). There is an asymmetry in the geographic distribution of AD actions. The South East Asian (SEA) countries and the non-market economies have become the main targets and their share as users of the mechanism is still below 6%. Europe is considered to be one of the "traditional" users and is still one of the main users of this trade protective device. However, the number of antidumping investigations in Europe has remained relatively constant in the period 1985-97. Europe is overall a net "importer" of investigations. More investigations are launched against Europe than from Europe towards other countries. These and other features of AD activity are analysed in Chapter 3.

An extensive body of literature has concentrated on the implications of the existing AD laws for the strategic behaviour of firms in imperfectly competitive markets. Blonigen and Prusa (2003a) present a survey that distinguishes the different stages of antidumping trade policy: the pre-investigation, the investigation and the post-investigation. Several studies have examined various aspects of AD, countervailing duty (CVD) and the decisions made by the International Trade Commission (ITC) in the US.

The generally liberalising trend in world trade is perhaps being undermined and the rules that, in theory, were there to constrain "unfair" practices serve as an effective tool for protection. The vagueness of the antidumping code has allowed countries to unilaterally interpret the laws that claim consistency with World Trade Organisation (WTO) rules, especially in the definition of dumping, the determination of "normal" value and more significantly in the determination of injury. The AD laws and its implementation contain loopholes that could introduce influences other than the criteria for determining dumping and injury. This makes an affirmative finding more likely and broadens the scope for its

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use. This thesis empirically analyses the determinants underlying the European antidumping decisions. It analyses economic factors (technical) and the political influences that affect the AD cases decided in the European Union in the period 1985-2003.

The AD regulations are of a complex nature. The legal and institutional framework contained in Chapter 3 provides the necessary background information to empirically analyse the determinants of antidumping decisions presented in later chapters.

A controversial administrative practice that introduces a bias in favour of protection is that of "cumulation" by which investigating authorities aggregate imports originating in all the countries named in an investigation. When an investigation is initiated, the complaint refers to a narrowly defined product and the accusation of dumping could refer to several countries. However, a decision is made for each individual one. More specifically, when dumping is found, the investigating authorities proceed to a calculation of the dumping margin for the product involved for each individual country included in the legal case. In a similar fashion they have to find "material" injury and decide on each country of origin separately. In 1984, the US Congress amended the AD and CVD laws, mandating that the ITC "cumulate" imports across countries. The WTO Antidumping Agreement of 1994 explicitly allows for imports to be cumulatively assessed. From 1994, the European regulations allowed the cumulation of imports from several countries under certain conditions. They provide discretion to decide whether or not to cumulate the imports from the different countries under consideration. However, European firms have tended to file investigations against multiple producers and the European Commission (EC) has made ample use of this practice even before 1994. To clarify how this rule introduces a bias towards protection, imagine that an investigation refers to imports originating from Korea, Taiwan, Singapore and Thailand. Assume that each individual country has a market share of 5%. The four countries considered together will represent 20% of the EU market. It would be difficult to argue that a market share of 5% is causing material injury to the EU industry, if considered individually. However, cumulating imports allows the authorities to easily find injury. This rule provides discretion in the injury decisions and will be, therefore, taken into account in the statistical analysis of the determinants of the dumping and injury decisions.

The European AD legislation differs from that of the US. The differences are outlined and the investigation procedure in Europe is explained in detail in Chapter 3. The regulations contain a very precise timing in which a decision has to be made. The main

stages are the opening of the investigation, the preliminary decision stage and the definitive decision stage. The explanation of the workings of AD law in Europe will prove useful in understanding the econometric results discussed.

Research into the political economy of trade policy has tried to give answers to the question of why industries receive protection and why certain industries receive more protection than others. In the second section of Chapter 4, I present a brief survey of the theoretical and empirical literature on the political economy of trade policy and antidumping.

The main findings of the empirical research on the political economy of trade policy are summarised in what follows. There is support for the voting model that suggests that elected officials tend to favour industries with the greater number of voters, so that protection is related to employment. It is also found that industries with low wages and high levels of labour per unit of output tend to receive more protection. There is also support for the pressure group model (Olson, 1965), since the number of firms in an industry has been found to be negatively related to the level of protection. Comparative advantage factors such as the import penetration and export ratios matter a lot in the determination of non-tariff barriers (NTB). Treffler (1993) finds that they are at least five times as important as business interest factors, as measured by concentration and capital measures.

Although legislative delegation is at the core of the implementation of AD laws, the extent to which agencies are isolated from political pressure varies across countries. The investigations on dumping and injury in Europe are carried out independently by two different administrative units within the European Commission. Accordingly, two separate equations are estimated.

The model analysed in Chapter 4 makes a distinction between economic and political determinants of antidumping decisions. The model distinguishes between the low and high track of decision-making. In the low or technical track cases are determined according to rules and decisions are delegated to government agencies. In the high track cases are decided and they are less constrained by rules and regulations.

In Chapter 4, the hypotheses tested are:

- Hypothesis 1 - The political variables are not significant in the determination of dumping

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- Hypothesis 2 - The technical variables (comparative costs) are not significant in the determination of injury

In each regression, economic and political variables are included but it is expected that mainly economic variables (comparative costs) are significant in the dumping decisions whereas mainly political variables are significant in the injury decisions.

Law specialists have documented the bias that exists in the decisions against non-market economies, so a dummy variable is used to capture this effect. The political variables can be divided into international and domestic. Among the former is the proportion of European exports that are exported to the country of the defendant as a proportion of total European exports. One could expect that the main channel through which retaliation can affect the decisions made may operate at the level of the government agency involved, namely the Commission. It is expected that the higher the proportion of European exports to the country of the defendant on the volume of total exports, the less likely it is that there would be a positive finding of dumping. Another variable included as an international determinant is an indicator one, which takes value one if the country of the defendant is a less developed country (LDC). The sign of this variable is left unspecified. On the one hand, the Antidumping Agreement establishes that "…special regard must be given by developed country Members to the special situation of developing country Members when considering the application of antidumping measures…" But, on the other hand, Bown et al. (2003) find evidence of a bias against developing countries in the analysis of US antidumping. They argue that some of the factors that may explain the observed bias facing developing countries could be the differences in administrative and institutional "capacity" as well as limited retaliatory ability.

Among the domestic political variables several measures of political influence are used. A measure of concentration is included in order to capture the potential for lobbying in the industry that initiates the case. It is the market share of the five biggest firms in an industry in the European Union. The sign of this variable is expected to be positive, reflecting the presumption that the more concentrated the industry the more likely it is to overcome free rider problems and the more likely to lobby for the case. Another domestic political variable is the size of the case as measured by the imports of the products in the year in which the investigation was initiated. Higher imports are expected to increase the

probability that a final decision on dumping will be affirmative. Moreover, the larger the industry filing a complaint the greater the electoral impact it could have, so the hypothesis is that larger industries can exert greater political pressure either directly on the Commission or on country members' representatives. The variable that best captures this effect is employment.

The economic determinants attempt to capture any bias in favour of producers with a comparative disadvantage in international trade. They refer to relative factor endowments, factor prices and costs. The first variable included in this group is the capital-labour ratio. Based on the Hecksher-Ohlin model, a highly developed country is expected to have a comparative advantage in capital-intensive industries. Therefore, the sign of the capital-labour ratio is expected to be negative. Another variable in this group is the average wages and salaries per worker employed in the industry concerned. This variable could be expected to have a negative (on neo-factor proportions grounds) or a positive (on strategic trade policy grounds) sign. In the latter it would capture the extent to which Europe tends to protect industries with high human capital content. To check for robustness of the comparative cost measures the labour share was also used. The specification included the number of different products covered by the case, as the decision on dumping is a pricing decision and it applies better to specific products than to larger aggregations. The more narrowly defined the products and industry affected by the imports, the easier it becomes for domestic producers to demonstrate dumping and injury. Finally, a variable that represents the number of countries involved in a case was defined. The firm or group of firms requesting an investigation provide the information that documents the existence of "unfair" trade. This and additional information will be used as evidence in the case. This information is costly and assumed to increase with the number of countries involved in the case. I explore the possibility that this could have an impact on the AD decisions since the information provided by the petitioning firms constitutes the starting point on which the Commission investigates.

The empirical findings suggest that Europe is operating a double track AD mechanism. Mainly economic determinants are significant in the dumping regression whereas only political determinants are important in the injury regression. Several comparative costs variables are individually significant in the determination of dumping but only one political variable was found to be significant in the determination of injury. Europe has a technical and political track for the dumping decisions and a political track for

the injury decisions. This pattern is similar to that found for the US. The results are in accordance with the findings of Finger et al. (1982), Moore (1992), Tharakan and Waelbroeck (1994) and Hansen and Prusa (1997), who have found that antidumping decisions are captured by political pressure.

A distinctive feature of European AD is that when an affirmative decision is made, the investigating authorities can choose whether to end the case with the imposition of a duty or whether to accept price undertakings. In chapter 5, I empirically assess the determinants of the European Union's choice of accepting price undertakings as opposed to imposing definitive antidumping duties in those cases in which both dumping and material injury have been found. The price undertakings could take the form of a price increase by the exporter or of a restraint of the volume of exports. From a welfare point of view the acceptance of undertakings will always be costly. There will always be a welfare loss compared with the imposition of AD duties. The acceptance of price undertakings generates rents for the foreign firms, because it raises European prices, with a negative impact on welfare. The price increase of imports will accrue to foreign producers, not to the importing country.

In spite of the fact that undertakings are disadvantageous for Europe, they have been widely used in the 1980s. They may be suggested by the exporter(s) or by the Commission. A similar provision, called the Suspension Agreements, is available in the US antidumping law. These agreements can remove dumping or the injury or they may require a temporary withdrawal from the market, but they are very rarely used in the US. Prusa (1992) points out that while the US does not have a formal mechanism for price undertakings as the EU, private price arrangements could occur and lead to withdrawals of petitions, motivated by collusion agreements.

In Europe, it is not clear what the criteria for suggesting undertakings are. No information is available in the legal documents published in the Official Journal as to what the motive might be. On the other hand, the EU administration has considerable discretion in allowing price undertakings and there are no written guidelines in the European regulations.

Theoretical papers that analyse the motives for the acceptance of undertakings are few. Belderbos et al. (2004) show that the decision to accept undertakings depends on the objective function of the EU administration that may range from caring only about industry interests to including the interest of consumers and other users. They analyse price

undertakings when there is a possibility of foreign direct investment (FDI). They show that if the EU values producers' surplus only, it is more likely to negotiate price undertakings rather than impose duties. In their model, the option of undertakings acts to persuade the foreign firm not to engage in FDI, since FDI increases price competition in the EU market due to the cost advantage of foreign producers.

Some other papers have concentrated on the effects of price undertakings instead of their motivation. Vandenbussche and Wauthy (2001) show that price undertakings lead to lower product quality in the protected industries. Their framework considers vertical product differentiation. In their model, although price undertakings loosen price competition when the quality of products is given, quality choices are affected in a detrimental way to European firms compared to free trade. When quality is endogenous, price undertakings make the foreign firm compete more aggressively in quality terms. Everaert (2003) shows that price undertakings always delay technology adoption compared to free trade. This result is valid whether protection is temporary or permanent.

The determinants of price undertakings in Europe have been analysed by Tharakan (1991b). This paper analyses the decisions made in the period 1980-87 in which the majority (72%) of affirmative cases ended with the acceptance of undertakings. Factors such as the prevalence of bilateral trade deficits, the country of origin of certain defendants and the lobbying potential of the domestic industry were found to be correlated with the decision to refuse the offer of undertakings.

However, the popularity of undertakings has decreased enormously since. The number of investigations in Europe has remained relatively constant between 1985 and 2003. Price undertakings have been used decreasingly less as a form of imposing definitive measures in Europe. Its use has decreased dramatically towards 1990 and has continued to decrease in recent years. It is likely that the determinants of its acceptance may also have changed considerably.

In this thesis, I analyse the determinants of the undertaking decisions in Europe. A data set of all European AD investigations initiated between 1985 and 2003 together with other associated trade and industrial statistics is constructed and used to empirically test several hypotheses.

In Chapter 5, the hypotheses are:

- An important factor influencing the decision to accept price undertakings is the possibility to monitor the price agreement. This ability to monitor is clearly established in the WTO AD Agreement (1994) and in the EU regulations;

- There is a rent transfer to exporters implicit in price undertakings. It is feasible that these transfers will be conceded to countries that do not have excessive surpluses in their trade with the EU. Several measures of bilateral trade are included;

- Deciding on "softer" remedies like the acceptance of undertakings instead of duties might reduce the potential loss from retaliation. The potential loss from retaliation is expected to be high when the share of exports from the EU to the country of the defendant is big;

- The GATT/WTO Agreement recommends the possibility for constructive remedies to be explored when developing countries are involved. To test whether the EU is being especially tough or soft with less developed countries, a set of dummies is included to account for this possibility.

- It is possible that the political influences relative to industry size or bargaining power could play an important role in the acceptance of undertakings. The bigger the lobbying potential the less likely that the softer remedy is imposed. Several measures of industry size and bargaining potential are used;

- The Commission may be more reluctant to accept the offer of price undertakings by foreign exporters in high technology industries in order to foster these EU industries;

- Many practitioners describe that in cases involving Japanese firms price undertakings are likely to be rejected. A dummy variable is included to analyse this effect;

- In cases involving exporting firms in non-market economies the Commission could be more likely to accept price undertakings. Some firms in non-market economies operate under a "soft budget constraint" in this period. More importance is given to quantity targets than profitability. Imposing AD duties can induce firms to decrease prices even more with no effect on imports because the state would absorb the firms' losses. So, the Commission may choose to use undertakings instead of duties, forcing exporters to increase their price.

A probit model is used to analyse the data. The sample includes information on 343 investigations initiated between 1985 and 2003 that ended either with the imposition of definitive AD duties or with the acceptance of undertakings. The results of the empirical analysis are consistent with some of the hypotheses formulated.

3   Thesis Structure

This thesis aims to contribute to the understanding of different aspects of trade theory and policy. It is composed of six chapters. This introductory chapter provides an overview of the research together with the motivation and relevance of the study and a summary of the contribution it has made in the field. In Chapter 2 the focus is on the design of optimal policies in the presence of incomplete information. Chapter 2 contains an analysis of the design of an optimal import tariff in the presence of incomplete information from the part of governments. Another controversial area of a conflicting view in trade policy is the existence of international dumping and the implementation and use of antidumping regulations. The political economy aspects of antidumping decisions are analysed in chapters 3, 4 and 5.   Chapter 3 is dedicated to provide the descriptive analysis and the background information that would help to understand the issues analysed in the subsequent two chapters. Political economy aspects are important in administered protection, in general, and in antidumping, in particular. The first two sections of this chapter use a variety of data sources to map the evolution of antidumping investigations worldwide and in Europe. The third section describes the antidumping laws at the GATT/WTO level as well as the implementation of these laws in Europe. It also contains a

description of the differences of these regulations with those of the US. A detailed description of the whole investigation procedure in Europe and of its timeline as well as the main institutional features is discussed. Finally, a description of the institutions involved in European AD investigations is presented together with an analysis of the final outcomes of all antidumping investigations carried out by the European Commission (EC) for every year between 1985 and 2003.

Chapter 4 includes the analysis of the determinants of European dumping and injury decisions in the period 1985-2003. This chapter includes a review of the theoretical framework with a focus on previous work to explain the political economy of antidumping. Before the technical analysis is made, an overview of the theoretical and empirical literature on the political economy of trade policy and antidumping is introduced. Then, I empirically analyse the European decisions on dumping and injury based on the Finger-Hall-Nelson model of the political economy of administered protection, using a newly constructed data set on legal cases and associated trade and industrial statistics. This model distinguishes between political economy and technical (economic) determinants in the antidumping decisions. First, two hypotheses are tested. Second, the robustness of the model is discussed. Third, the impact of the cumulation rules, by which the European Commission aggregates the imports from all the countries named in an investigation, is analysed. Fourth, I analyse the determinants of positive findings where both dumping and injury have been found. This enables to explore whether the determinants of "affirmative" decisions are driven by political economy factors or not. Finally, the economic relevance of the econometric findings is discussed. Chapter 5 analyses empirically the determinants of the decisions to accept price undertaking in Europe. After dumping and injury have been found, legal provisions allow the European administration to settle antidumping actions either by levying duties or by demanding price undertakings from the foreign exporting firms. Price undertakings are price agreements between firms that allow the dispute to be settled, as long as the price changes by foreign firms eliminate the margin of dumping or injury. A data set of European antidumping decisions initiated in the period 1985-03 together with other trade and industrial statistics is compiled to analyse the hypothesised determinants of the acceptance of undertakings versus the imposition of definitive antidumping duties. First, the legal framework that regulates price undertakings at the GATT/WTO and European level is introduced. Second, a brief review of the literature that has analysed price undertakings in Europe is presented. The discretion held by the

European Commission in allowing price undertakings makes it important to assess the determinants of these decisions empirically. Building on the previous studies, several hypotheses are presented and empirically assessed. Finally, Chapter 6 summarises the main findings of the research and frames them within the broader context of trade theory and policy. The theoretical and empirical relevance of the thesis is discussed.

4   Results and Contributions

The motivation of this thesis is to understand different aspects of trade theory and policy. One of the aspects analysed is the design of an optimal tariff on a foreign monopolist that faces competition from a domestic firm in the presence of incomplete information. The other main focus of the thesis is the empirical analysis of the determinants of European antidumping investigations.

One of the main objections to the theory of strategic trade policy is that it assumes the government has prefect knowledge of things such as the nature of competition or the cost structure of certain industries. There is an established body of literature that has investigated the implications of incomplete information in strategic trade policy theory. The analysis discussed in Chapter 2 suggests that a firm that has low costs has an incentive to misrepresent them and to pretend it has high costs in order to obtain a lower import tariff on its exports. In equilibrium, this incentive does not exist because the government anticipates the action of the foreign firm and acts rationally when choosing the optimal tariff. First, it is shown that a unique separating sequential equilibrium exists and that strategic trade policy can effectively be designed in the presence of informational asymmetries.

Second, the government chooses a tariff that is lower to the tariff that would prevail in the absence of signalling. The efficient firm has an incentive to mimic the inefficient firm. So, the latter should distort output away from the complete information output. The firm with low costs chooses to produce at the full information output level while the high cost firm distorts equilibrium output downwards. Overall expected foreign output is smaller; therefore, the tariff is lower than in the absence of signalling. Third, pooling equilibria can be ruled out because it requires unreasonable beliefs to support them.

Finally, because expected foreign output is lower when signalling, domestic output and profits of the domestic firm are higher. Because a lower specific tariff is needed to commit the home firm to greater expected output, the efficient firm output is higher due to a "lower tariff" effect. The firm with low costs is able to obtain full information profits but its output is greater than when no signalling occurs, due to the lower tariff on imports. On the contrary, for the inefficient foreign firm the signalling effect is stronger than the lower tariff effect. Therefore, for a given level of the tariff and domestic firm's output, the equilibrium output chosen by the high-cost foreign firm is lower. Overall, the signalling effect prevails over the lower tariff effect. Expected foreign production is lower and domestic production is higher. Incomplete information lessens the rent extracting argument for an import tariff.

The descriptive analysis in the third chapter provides the background information about the antidumping activity worldwide and in Europe that helps understand the empirical analysis described in Chapters 4 and 5. First, it describes the changes in the geographic distribution of AD activity worldwide since 1987. Antidumping emerges as the most widespread impediment to trade. Over time, rules have changed so that dumping is easier to be found and dumping margins are higher over time. The South East Asian countries (including Japan) and the non-market economies are the target of most activity. Second, it includes a descriptive analysis of the investigations initiated by European firms. Although relatively constant over in the period 1985-2003, the composition of industries filing investigations has changed. Firms in the chemical and iron industries were traditionally heavy users of antidumping but those in the textile sector have taken an increasingly predominant role. Third, it describes the workings of the intricate AD law and its recent evolution at the GATT/WTO level. Fourth, it presents a detailed account of the procedures followed to establish dumping and injury and highlights the mains differences with the regulations prevalent in the US.

The institutions in Europe have in common with other countries the delegation of the investigation procedure to a government agency. However, there are some distinctive features in the European case that may have implications for the way the political influences can affect the decision making process. In particular, final AD decisions in Europe have to be approved by the Council of Ministers (COM). Lobbying efforts can, therefore, be directed at the European Commission and/or the Council. Even tough the

decision making process is supposed to be purely statutory and purely reflecting market circumstances, the institutional setup suggests that political influences may be prevalent.

Chapter 4 and 5 analyse the determinants of the decisions on dumping, injury and the acceptance of price undertakings in Europe. Chapter 4 considers the role of the double track model of administered protection. The main empirical findings are:

- First, the evidence suggests that Europe operates a double track AD mechanism. Mainly economic variables are significant in the dumping decisions whereas only political variables are important in the injury decision;

- Second, the number of countries named in the investigations is significant. There is a non-linear effect on the probability of a positive decision being made. Filing investigations against a larger number of countries decreases the probability of dumping and injury to start with until it reaches a critical value of four countries. When more than four countries are named in the investigation the probability of dumping and injury increases;

- Third, the model is robust to the use of different proxies;

- Fourth, the main results remain unchanged when cumulated imports from the other countries named in the case are considered;

- Finally, the main significant determinants remain unchanged when excluding different sectors of economic activity.

The present study improves upon previous research in that by using a unique dataset with information collected from the reports published in the Official Journal of the European Commission and other sources, it gathers a data set of 805 legal cases covering the period 1985-2003. The econometric analysis improves on previous studies in that it explicitly controls for industry heterogeneity and macroeconomic effects. It is shown that a decision on dumping and injury being positive can be explained by the general features of

the double track model of administered protection as captured by the main regressors. The economic significance of the results is analysed.

Chapter 5 concentrates on the analysis of the determinants of European price undertaking in the period 1985-2003. The results of the empirical analysis are consistent with some of the hypothesis formulated and can be summarised as follows:

- First, the estimates show that there is a statistically significant effect of the share of European exports to the country against which an investigation is carried out on the probability of acceptance of price undertakings. The evidence suggests that the potential loss from retaliation has not prevented the Commission from imposing AD duties. Greater exports to the country of the defendant may be associated with a lower probability that price undertakings are accepted. Instead, the "tougher" remedy of AD duties is more likely to be imposed to those countries that are receivers of EU exports. This result is very robust since it is found in all specifications of the model. This proxy, however, could also be referring to stable trade relations between the EU and its trade partners, in which case it can be argued that the choice of imposing "tougher" measures on AD investigations is less likely to affect the volume of exports to trade partners.

- Second, there is some evidence that bilateral trade deficits have an impact on the EC choice between the acceptance of price undertakings and the imposition of duties.

- Third, there is some evidence to confirm the alleged ease or ability to "monitor" the price undertakings hypothesis, as indicated in the guidelines of the GATT/WTO Agreement.

- Fourth, political economy and bargaining power variables are significant in the decision to refuse price undertakings. Domestic political influences as represented by the level of industrial concentration result in "tougher" measures being imposed. The level of industrial concentration result in the "tougher" measures (duties) being imposed. There is also some evidence that industry and case size, increases the probability of acceptance of price undertakings.

- Fifth, some of the countries' characteristics are found to be significant. Some of the evidence suggests that the EU is less likely to apply the "softer" remedy of price undertaking in cases involving non-market economies.

This chapter contributes to the existing literature in the following respects. It analyses the decision to accept price undertakings for investigations initiated between 1985 and 2003. It uses a data set of 517 European legal cases in which a positive affirmative decision has been made, and either AD duties have been imposed or price undertakings have been accepted. The econometric analysis improves on previous studies in that it explicitly controls for macroeconomic effects and industry heterogeneity. It assesses the importance of political economy factors influencing the decisions. It includes a sensitivity analysis and it presents the economic significant of the results.

Overall, this thesis makes a contribution to our understanding of several aspects of trade theory and policy. In particular, it contributes to the analysis of optimal tariff policy in the presence of incomplete information as well as to the understanding of the determinants of European decisions on dumping, injury and the choice of antidumping measures.

Chapter 2   Tariffs under Incomplete Information[2]

1   Introduction

This chapter explores the effects of asymmetric information in trade policy when a domestic government decides on an import tariff on a foreign competitor whose costs it does not know. It is shown that when a foreign firm's costs are private information, its level of output can signal costs to the government. The competitive firm has an incentive to misrepresent its costs - by pretending its costs are high - in order to obtain a lower tariff and make higher profits. In a two-period signalling equilibrium, the government anticipates this incentive and sets a first period optimal tariff that is lower than would be if the firm does not signal cost through output. The optimal tariff could be chosen and strategic trade policy could be effectively designed in the presence of informational asymmetries.

One of the main objections to the theory of strategic trade policy is that it presumes too much knowledge on the part of governments. To implement an optimal tax or subsidy the government must have a good idea of the cost structure in the industry, demand and the nature of competition. It seems reasonable to believe that governments are less informed about such things than the firms themselves. It seems desirable that the role of asymmetric information be explored. Recent research has focused on the specific ways in which informational failures might affect policy and modifying policy recommendations to account for such failures.

Under asymmetric information firms have an incentive to mislead governments if they are able to. If governments do not know firms' costs, there is adverse selection. When the government does not know the cost of a foreign competitor, the latter could have an incentive to persuade it that its marginal cost is higher than it actually is. In this way, it could obtain a lower import tariff in order to produce more output and obtain higher profits.

This chapter contributes to understanding the role of strategic trade policy under incomplete information and it can be related to antidumping. It analyses the role of asymmetries of information in trade policy for a simple case where a domestic government

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[2] This chapter is based on the paper "Tariff under incomplete information" which is published as a Discussion Paper in the Discussion Papers Series of the University of Bristol, DP No. 00/510, December 2000.

faces a foreign firm whose costs it ignores. In practice, there are often deviations from the uniform tariff levels and are due in part to the government's desire to fine-tune the tariff structure to the exporter's efficiency. Cost-based antidumping can be viewed as a vehicle for implementing cost-contingent tariff policies. Under cost-based dumping, the domestic government estimates the foreign firm's production costs and then imposes and AD duty designed to insure "fair" prices. Two different situations are explored. First, I present a model in which there is a single foreign provider of a homogenous good. Second, I analyse the case in which the foreign firm competes with a domestic producer. In the first case, the government is concerned about consumer welfare and tariff revenue. In the second one, it is also concerned about profits of the domestic producer. It is assumed that the foreign firm know the cost structure of the domestic firm, whereas neither the domestic government nor the domestic firm know the cost structure of the foreign firm. This assumption captures the situation in which a well-established domestic firm faces competition from an emerging market. The cost structure of the incumbent is known but the cost structure of the foreign potential entrant is not.

The domestic government faces a trade-off. If setting a high tariff it can obtain higher revenue but a lower output reducing consumers' welfare. The optimal policy should equate the marginal loss of consumers' welfare with the marginal gain from tariff revenue, shifting profits from the foreign firm to the domestic country (when there is competition). In a dynamic setting, the domestic government can anticipate the incentive of the foreign firm to misrepresent its costs and, therefore, set a tariff that differs from the complete information case and from the case where the firm does not signal its costs through output.

The chapter addresses two main issues. The first is the consequences of a signalling effect on the incentive of the government to impose a tariff on imports, when there is no domestic production in a dynamic framework where interaction occurs in two periods. We want to know what happens when the government anticipates the incentive of the foreign firm to misrepresent itself. This repeated interaction is analysed in a two-period setting. Secondly, competition is introduced. I allow for the existence of a domestic firm that supplies the same good to which the tariff is imposed.

This chapter is organized as follows. The theoretical issue of strategic trade policy under incomplete information is reviewed in Section 2. In Section 3, I present the basic model and a characterization of the optimal policies. I analyse the case in which there is no domestic competition. The good is only produced by a foreign firm. The game and the

government's objective function are discussed. The informational asymmetry is analysed in the form of adverse selection between the domestic government and the foreign firm and the optimal unilateral policy is derived in a dynamic setting. I compare the optimal policy when the firm's output signals its cost with the case where no signalling occurs and with the full information case. Section 4 analyses the optimal policies when a foreign firm competes with a domestic producer. Section 5 concludes.

2   Asymmetric Information and Trade Policy: Related Literature

Several papers have investigated the role of asymmetric information have investigated the role of informational asymmetries on trade policy theory. These asymmetries are about the nature of competition (Maggi 1996), the cost structure in the industry (Qui 1994, Brainard and Martimort 1996, 1997 and 1998; and Kolev and Prusa 1999) and demand (Collie and Hviid 1994 and Maggi 1999). Some research has concentrated on the implications for the rent-shifting trade policy of the type proposed by Brander and Spencer's (1985) model of optimal export subsidies. Under complete information, the government is able to give its firm a strategic advantage because it has full pre-commitment power. Under incomplete information, if governments ignore the real cost of domestic firms, the latter would have an incentive to persuade him that its marginal cost is lower than it actually is. In this way, they could get higher subsidies and would make foreign firms produce less output. When this is the case, the domestic government might anticipate the domestic firm's incentive to misrepresent its costs.

Collie and Hviid (1993) and Qiu (1994 and 2003) examine the use of strategic trade policy as a signalling device when the informational asymmetry is between domestic and foreign firms. The informational asymmetry considered in these models seems a realistic one for some industries. It is plausible that foreign competitors in an oligopolistic industry would not know the domestic firm's costs, but the domestic government does. This kind of asymmetry may be present when government supports R&D projects, as it is the case in high technology industries, i.e. microelectronics, aerospace. In these industries there is a high degree of government intervention. Collie and Hviid (1993) show that a domestic

government can use an export subsidy to signal the competitiveness of its firms to its foreign competitors. A larger export subsidy leads the foreign firm to infer that the domestic firm has lower costs. In response it reduces its output, which increases the profits of the domestic firm. The firm then receives a larger export subsidy than it would under complete information. There is then a signalling effect that reinforces the usual profit shifting effect. When the action of a rival interventionist government is introduced there is a strategic interaction effect that emerges where the foreign government has an incentive to increase its export subsidy, but this effect is not big enough and the previous results still hold. The export subsidies under incomplete information are larger than the profit-shifting export subsidies under complete information. In a signalling model in which neither domestic government nor the foreign firm know the costs of a domestic firm, Wright (1998) shows that optimal subsidies are smaller than under uncertainty. The model in this chapter is similar but it analyses the role of an import tariff as a rent-extracting and strategic policy instrument. In contrast with Collie and Hviid (1993), Qiu (1994) and Wright (1998), the model analysed here focuses on import tariffs and on an unknown cost efficiency of a foreign firm. The type of informational asymmetries analysed is between a domestic government (and firm) and a foreign competitor.

Qiu (1994 and 2003) highlights the importance of the government in facilitating strategic information revelation. The government can design a menu of policies to induce information revelation. By setting up a menu of per unit subsidies it is able to make the domestic firm reveal its type. But, because the foreign firm is also uninformed, there is a mixture of signalling and screening. When information revealing is desirable, a policy menu plays a role in inducing this revelation. Each choice of the menu consists of two policies: a specific export subsidy and a level of lump-sum transfer. By setting up a menu of subsidies, the domestic firm is able to signal its cost through its policy selection. The government carries out screening but signalling also occurs when the domestic firm selects from the menu proposed by the government. It is shown that, under Cournot competition, a government would choose a menu of subsidy programs that induces separation by the firms. The interesting result is that the allocation that results is the same as if the government had full information about costs.

Brainard and Martimort (1996, 1997 and 1998) study the same basic economic environment, in the sense of considering the role of cost-based informational asymmetries when subsidies are imposed on exports to third markets. However, the asymmetry of

information they consider is between governments and firms. This kind of asymmetry may be present in the airframe manufacturing industry, where manufacturers have a precise knowledge about the costs of their rivals and governments have only access to consolidated profits for tax purposes. The model is different to the one presented by Collie and Hviid (1993) and Qiu (1994 and 2003) in that the foreign firm knows the domestic firm's costs, so that only governments are uninformed. They assume that the government faces a trade-off between increasing the profits of possibly wealthy firms and raising funds from the taxpayer. The cost of public funds becomes an important determinant in the design of the optimal export policy. Policies therefore have two objectives: to reinforce the strategic position of local firms and to minimize the informational rent, which is socially costly. The effect of government pre-commitment and asymmetric information works in opposite directions. Lacking precise knowledge of the firms' profits functions, the government faces a trade-off between manipulating the payoffs to the local firm in a way that enhances its strategic advantage, and preventing the firm from deriving distortionary rents from its private information. Brainard and Martimort (1997) show that the government's lack of information weakens the commitment value of the subsidy. There is a downward distortion of the optimal subsidy, which may be severe enough to force the subsidy below zero. This is a "screening" effect. A two dimensional policy is used to deal with both distortions: strategic pre-commitment and informational rent seeking. The optimal policy is to implement a menu of contracts specifying a per-unit subsidy and a lump-sum tax as a function of the firms' reported costs. The announcement of the subsidy serves as a credible commitment to expand the firm's output, while the lump-sum transfer serves as a screening device. Qui (1994) uses a combination of signalling and screening whereas Brainard and Martimort (1996, 1997 and 1998) develop a screening model. In both papers it is assumed that the government can use two policy instruments, a per-unit subsidy and a lump-sum reimbursement. Instead, the model in this chapter is a signalling model. I assume that there is only one policy instrument (a specific tariff) available to the government[3].

Governments cannot only have limited information about firms' competitiveness or the level of demand, but they may have limited understanding about the nature of competition in an industry. Maggi (1996) develops a model of capacity-price competition

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[3] In choosing a tariff it seems unfeasible that any government could suggest a contract to foreign firms that would involve lump-sum transfers to foreign producers.

to analyse the sensitivity of strategic trade policy to the type of competition. The equilibrium outcome (in the absence of trade policy) ranges from Bertrand to the Cournot result as capacity constraints become more important. He shows that capacity subsidies can increase the domestic country's income regardless of the type of competition. Maggi (1999) analyses the role of non-linear subsidies. He shows that when firms are better informed than governments about the profitability of the industry, information asymmetries may increase trade policy distortions and worsen the "prisoner's dilemma" between governments.

A similar line of research has concentrated on the use of tariffs in the presence of incomplete information. Collie and Hviid (1994) focus on the case where a domestic government is better informed about demand in the domestic market than a foreign monopolist that exports into the domestic market. Then, the government can use its tariff to signal about demand. In a signalling equilibrium, the domestic government uses a tariff that is larger than the optimal tariff under complete information. The signalling effect strengthens the usual rent-extracting argument for the tariff. In the signalling equilibrium, however, welfare is lower than when the government is uncertain about demand. There is a cost of signalling that can be avoided by delegating tariff setting to a revenue-maximizing agent. The model analysed in this chapter takes a different approach. It considers a cost-based asymmetry and the dynamic interaction between a government (and domestic firm) and a foreign firm in a two-period policy setting. It examines the design of an optimal tariff in the presence of a foreign monopolist and compares the outcome with a situation in which there is a domestic firm competing with foreign imports. Tariffs are higher in duopoly than in the foreign monopoly case because there is an additional incentive to use the tariff to shift profits from the foreign to the domestic firm.

Collie et al. (1999) analyse trade policy under asymmetric information when integrated, instead of segmented markets are considered. They show that in the presence of incomplete information about the level of domestic costs there is an incentive for the domestic government to use its trade policy to signal about the costs of the domestic firm. If there was complete information, the optimal policy would be an import tariff (export subsidy) when the domestic country is a net importer (exporter). In equilibrium, the low cost country gives an export subsidy, which is countervailed by the import tariff of the other country. The signalling effect increases the export subsidy (and decreases the import tariff).

Similarly, Kolev and Prusa (1999) examine the incentives of a government to impose an import tariff on a foreign monopolist with unknown costs in a framework where exports take place over an infinite number of periods. They show that a policy of optimal uniform tariffs (pooling equilibrium) is better than a discriminatory one. Matschke (2003) analyses the equivalence of tariffs and quotas in the presence of asymmetric information. Using a screening model, she shows that asymmetric information destroys the equivalence of tariffs and quotas that exists when complete information exists. In common with Kolev and Prusa (1999), the model in this chapter analyses a cost-based informational asymmetry in a signalling framework. In contrast with this paper the model examined in this chapter does not limit the ability of the government to intertemporally change its policy. The government is allowed to change its policy in the second period.

In the context of antidumping protection, Kolev and Prusa (2002) show that the rise in AD protection may be related to an increase in voluntary export restraints (VER). In a model where a domestic government has incomplete information about a foreign firm's costs, they show that firms with low costs will voluntarily restraint exports before an AD investigation. They show the resulting AD duties are much higher. They assume that the foreign firm chooses its output first and then its rival (the home firm) chooses quantity. The home firm is a Stackelberg follower. In contrast with this paper, the model presented in this chapter assumes that firms choose output simultaneously.

3   The Dynamic Model: no Domestic Provision of the Good

A quantity setting foreign monopolist supplies the domestic market for the product and the domestic government uses a tariff to extract rents from the firm. Assuming that the monopolist has constant marginal costs and that the markets are segmented, the domestic market can be analysed independently of the foreign market. The government is assumed to have incomplete information about the firm's costs, whereas the firm is assumed to have complete information. This asymmetry means that the firm can use output to signal about costs. The government is assumed to announce and commit to a tariff in each period. This

implies that trade policies are made public and cannot be secretly renegotiated. If trade policies are observable to foreign firms they keep their commitment value.

The foreign firm chooses quantities to maximize profits. The inverse demand function is assumed to be linear, $p = a - q$. Let us consider an economy with two goods where good q represents imports and good y represents the consumption of all other goods. In the domestic country the representative consumer has utility function $U(q, y)$ that is strictly quasi-concave and has positive marginal utility for each good. Assume that the utility function is additive separable, $U(q, y) = f(q) + y$, a utility function of this form is quasi-linear and implies that there are no income effects in the demand functions for q and y. Consumer surplus is given by $CS(q) = \int_0^q (a - x)dx - (a - q)q$.

The information structure of the game is as follows. The foreign firm's costs are private information, they are unknown by the domestic government. There are two types of firm: a high-cost (inefficient) firm and a low-cost (efficient) firm. The domestic government ignores which firm is which but knows the probability distribution of the unknown cost level. This is common knowledge. The government knows that the foreign firm has superior information about costs and the foreign firm knows that the government knows this, and so on. The structure of the game is common knowledge.

The sequence of this two-period signalling game is described in Figure 2.1. At the beginning of the first period, nature chooses the foreign firm's type: c_L or c_H. Marginal costs take the value c_H with probability μ and c_L with probability $(1 - \mu)$, where $c_L < c_H$ and $\mu \in (0,1)$. I assume that $c_L \langle c_H \langle a$. In the first stage, the domestic government chooses and commits to a tariff and, in a second stage, the foreign firm chooses its output. First period output level of the firm signals foreign firm's costs to the policy maker. At the end of period one, the domestic government updates its beliefs about the foreign firm's costs. The beliefs of the domestic government are conditional on the firm's first period output. After observing the firm's output it can make an inference (update beliefs) of firm's costs. If the government does not have any means of extracting information about costs from the firm, it sets an optimal tariff as if the cost parameter equalled $\mu * c_H + (1 - \mu) * c_L$. At the beginning of the second period, with this updated probability assessment, the government announces an import tariff. I assume that the government commits to the level of tariff chosen. In a second stage, the firm chooses output. The solution concept is sequential equilibria. A sequential equilibrium is a set of first and second period output levels for each type of firm,

a tariff for each period and a system of beliefs that is consistent with each other and satisfies sequential rationality at every information set. Equilibrium output in the first period is chosen after the policy maker has set and committed to a tariff. Similarly, equilibrium output level is chosen optimally given second period tariff and the updated beliefs.

The optimal tariff under complete information, when the government first sets and commits to a tariff in the first period and then a foreign firm chooses output, is $t = \dfrac{(a-c)}{3}$.
A tariff leads the foreign firm to increase its price by less than the amount of the tariff. Thus, a small tariff will increase domestic welfare since the loss of consumer surplus is less than the gain in tariff revenue.

Under incomplete information, because the foreign firm prefers a low tariff, it clearly wants to convey the information that it has high costs. The problem is that it has no direct means of doing so, even if it indeed has high costs. The indirect way is to signal by choosing a low level of output (corresponding to a high cost type). The foreign firm wants to signal a high cost output level, even if it has low costs. But this does not mean that the government will set a low tariff in the second period after observing this level of output. A rational government, knowing that it is in the foreign firm's self-interest to lie in this manner, will not necessarily infer that the foreign firm has indeed high costs. In turn, the foreign firm knows that the government knows about this incentive, and so on (common knowledge). The correct way to analyse this dynamic game of incomplete information is to find a sequential equilibria. I consider pure strategies only. There are two possible potential equilibria in such a model: separating and pooling equilibria.

Separating Equilibria

In a separating sequential equilibrium, the foreign firm does not choose the same first and second period output when its costs are high as when they are low. The first period quantity fully reveals the cost of the entrant. In a pooling equilibrium, the first period quantity is independent of the cost level. The government learns nothing about costs and its posterior beliefs are identical to its prior. For a separating sequential equilibrium to exist two necessary conditions must hold: the low-cost firm must not choose the high cost equilibrium quantity and vice-versa, in both periods. The characterization of the equilibria is complete when beliefs that are off-the-equilibrium path are chosen (for quantities that are

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              ┌─────────────────────────────┐
              │    Nature draws firm's type  │
              └─────────────────────────────┘
High cost                    │                        Low cost
─────────────────────────────┼────────────────────────────────
                             │
              ┌─────────────────────────────┐
              │    Government sets tariff    │
              └─────────────────────────────┘
                             │
              ┌─────────────────────────────┐
              │    Firm(s) choose output     │
              └─────────────────────────────┘
                             │
─────────────────────────────┼────────────────────────────────
Output high cost             │                 Output low cost
                             │
              ┌─────────────────────────────┐
              │  Government updates beliefs  │
              └─────────────────────────────┘
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              ┌─────────────────────────────┐
              │    Government sets tariff    │
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              ┌─────────────────────────────┐
              │    Firm(s) choose output     │
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Output high cost                              Output low cost
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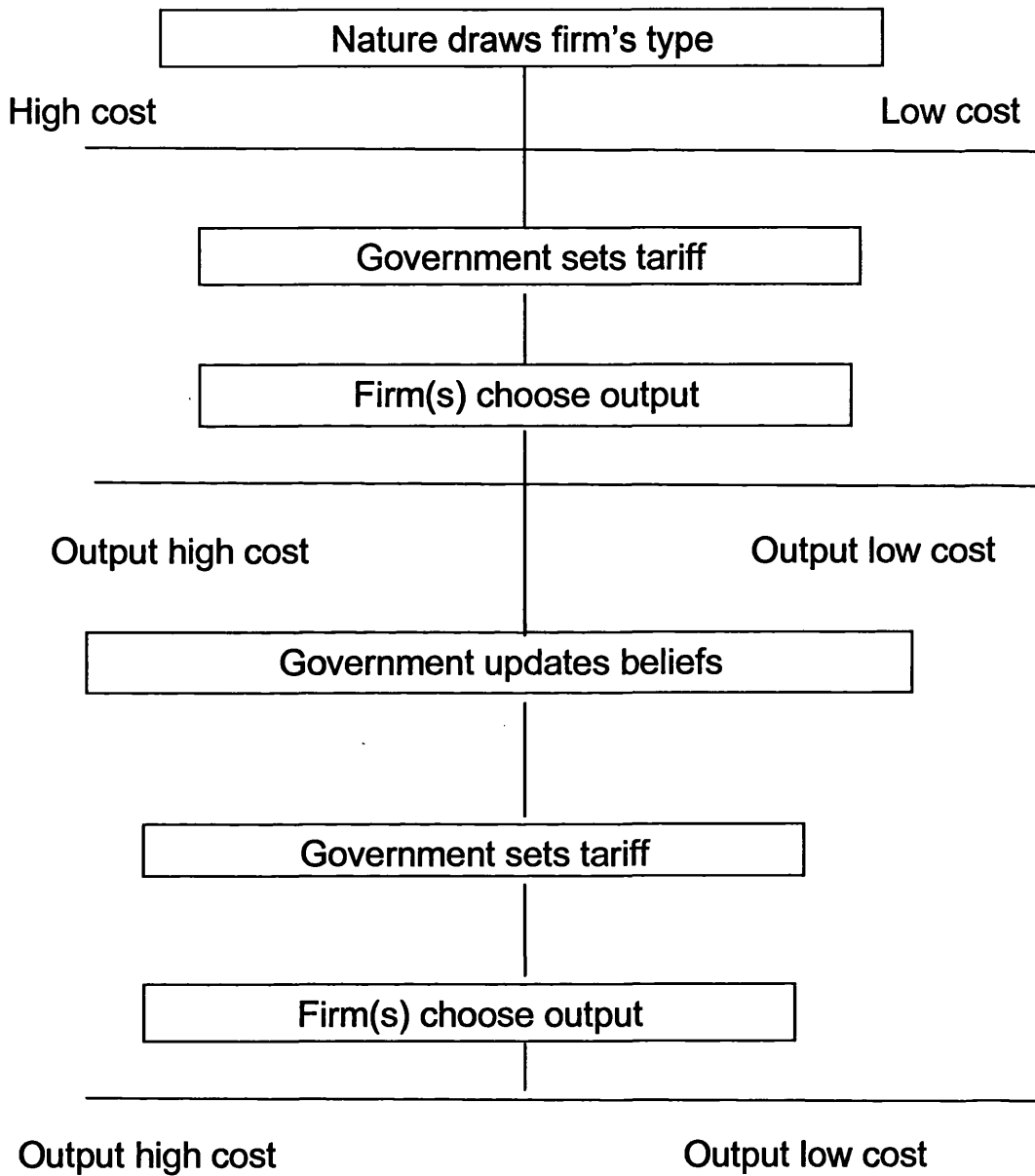
Figure 2.1: Sketch of the Model

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off-the-equilibrium quantities) and that deter the two types from deviating from their equilibrium strategies. Thus, the necessary conditions are also sufficient in the sense that the corresponding quantities are equilibrium quantities. I solve the game backwards.

The separating equilibrium in the second period is a game of complete information. The policy-maker knows the foreign firm's costs. Given these costs, it chooses the tariff to maximize welfare. The foreign firm incurs a fixed cost of entry F and maximises profits conditioned on the tariff $Max_{q_2^i(t)}\left\{\pi_2^i \equiv \left(p^i - c^i - t_2^i\right)q_2^i - F\right\}$ (1). The first order condition for profit maximisation gives equilibrium output. Once output is substituted into the profit function, maximized profits are $\hat{\pi}_2^i = \left(\dfrac{a - c^i - t_2^i}{2}\right)^2 - F$. In the tariff-setting stage of the game the domestic government sets its specific tariff to maximise domestic welfare. I assume that the government cares about consumer surplus and tariff revenue $Max_{t_2^i}\left\{W \equiv V\left(p^i(q_2^i(t_2^i))\right) + t_2^i q_2^i(t_2^i)\right\}$ (2) where, $V\left(p^i(q_2^i(t_2^i))\right) = \dfrac{1}{2}\left(q_2^i(t_2^i)\right)^2$ is consumer surplus. Solving the first order condition of this problem gives the optimal tariff $t_2^i = \dfrac{a - c^i}{3}$ (3). The home country has an incentive to levy a tariff proportionate to the efficiency of the exporter.

Before analysing the solution in the first stage of the game, let's define $\pi_2^{i/k}$ as maximized profits when the true costs of the firm are i but the firm signals that its type is k.

Then, $\pi_2^{i/k}\left(c^i(t_2(c^k))\right) = \left(\dfrac{2a - 3c^i + c^k}{6}\right)^2 - F$.

The marginal cost of the foreign firm in the first period is private information and unknown to the government. The tariff is announced and committed to before output is chosen. In a separating sequential equilibrium, the foreign firm chooses different levels of output when its cost is low than when it is high. The first period output fully reveals the cost of the firm. The two necessary conditions for the existence of separating equilibria are that the high-cost firm would prefer to produce q_1^H in the first period and be perceived as high-cost in period two, rather than be perceived as low-cost in second period and be forced to produce q_1^L in the first period ; and, vice-versa for a low-cost firm. Equilibrium output must also satisfy incentive rationality constraints (profits should be non zero, interior

solutions should exist). The necessary conditions are also sufficient when appropriate beliefs are specified. When a quantity that differs from the equilibrium quantities is observed, beliefs are arbitrary. The easiest way to obtain equilibrium is to choose beliefs such that the two types will not be tempted to deviate from their equilibrium strategies. So q_1^H can be associated with the updated belief that the firm is of high-cost type μ $(c^H/q^H) =$ 1. Conversely, q_1^L can be associated with the belief that the firm is indeed low-cost μ $(c^H/q^L) = 0$ and it suffices for any other signal to be associated with beliefs μ $(c^H/q^i) = 0$ for $i \neq H$. The government sets a higher tariff if it believes that the foreign firm has low costs rather than high costs, so that output and profits are higher when the high-cost firm signals the true type. However when a low-cost firm "mimics" a high-cost one, the government sets a lower tariff, so that the output and tariffs are higher when a low-cost firm signals she is a high-cost one. The low-cost firm has an incentive to deviate.

To derive the intervals of separating equilibrium quantities, one should note that it is more costly for the low-cost type to reduce output. This is the monotonicity property. In this context, it means that $\dfrac{\partial}{\partial c}\left(\dfrac{d\pi}{dq_1}\right) < 0$. This condition is satisfied here. The lower the foreign firm's cost the more the benefits from deviating.

Using these properties one can obtain the intervals $(0, \underline{q}_1^H]$ and $(\overline{q}_1^H, (a\text{-}c)]$ in which incentive compatibility for the low cost firm (IC_L) is satisfied given $q_1^L(t_1) = \arg\max \Pi_1^L(q_1^L, t_1)$ and t_1. However, not all of these output levels survive as part of equilibrium once dominated strategies are eliminated. In signalling games one can exclude some of these equilibria by eliminating dominated strategies when forming out-of-equilibrium beliefs. The only equilibrium output levels are $q_1^L(t_1)$ and $\underline{q}_1^H(t_1) < q_1^H(t_1)$. The efficient firm achieves the first best profit level whereas the inefficient firm must distort its output away from the complete information profit maximizing output.

The unique separating sequential equilibrium is obtained from simultaneously solving $\quad q_1^L(t_1) = \arg\max \pi_1^L(q_1^L, t_1) \quad$ (4), $\quad \pi_1^L(q_1^L, t_1) + \hat{\pi}_2^L < \pi_1^L(q_1^H, t_1) + \hat{\pi}_2^{L/H} \quad$ (5)

and $q_1^H(t_1) = \arg\max \pi_1^H(q_1^H, t_1)$ (6). Equation (4) gives optimal output for the low-cost
$$\text{st·}q_1^L(t_1) = \arg\max \pi_1^L(q_1^L, t_1)$$
firm. Condition (5) makes incentive compatibility for the low-cost firm binding. Equation (6) gives optimal output for the high-cost firm subject to the constraint that the low-cost

firm has an incentive to deviate. The firm would choose the level of output that gives the minimum distortion. Condition (5) when satisfied with equality is a quadratic expression that has two levels of output as a solution, from which one dominates the other and is to be chosen by the high-cost firm. The solution to the above problem gives the unique sequential equilibrium of the signalling game, $q_1^L(t_1) = \dfrac{a - c^L - t_1}{2}$ and $q_1^H(t_1) = \dfrac{a - c^L - t_1}{2} - \dfrac{\sqrt{\Theta}}{6}$

where $\Theta = (c^H - c^L)(4a - 5c^L + c^H)$. These are equilibrium output levels as a function of government beliefs. The domestic government takes the unique equilibrium as given and chooses the tariff to maximize expected welfare.

$$Max_{t_1} \left\{ EW \equiv \mu[V(p(q^H(t_1))) + t_1 q^H(t_1)] + (1 - \mu)[V(p(q^L(t_1))) + t_1 q^L(t_1)] \right\}$$ (7). The

optimal tariff is: $\hat{t}_1 = \dfrac{1}{3}\left[(a - c^L) - \dfrac{\mu}{3}\sqrt{\Theta} \right]$ (8); and optimal outputs are:

$$\hat{q}_1^L = \dfrac{1}{3}\left[(a - c^L) + \dfrac{\mu}{6}\sqrt{\Theta} \right]$$ (9) and $$\hat{q}_1^H = \dfrac{1}{3}\left[(a - c^L) - \dfrac{(3 - \mu)}{6}\sqrt{\Theta} \right]$$ (10).

Proposition 1   *The solution defined by equations (8), (9) and (10) constitutes a unique separating sequential equilibrium of the signalling game, when the foreign firm's output signals costs and there is no domestic provision of the good.*

Proof. See Appendix 2.

The intuition for this result is as follows. Proposition 1 has revealed that when choosing output in the first period, the efficient firm has an incentive to misrepresent itself as having high costs because if it is thought to have high costs the government fixes a smaller tariff. The government anticipates this incentive and allows for it when determining the optimal tariff and when updating its probability assessment at the end of the first period. Expected foreign production is lower when signalling, because of the distortion due to informational asymmetries.

It can also be shown that, provided that the probability of a high cost firm is not too low, the tariff in the first period is lower than under the full information case.

Pooling Equilibria

A pooling equilibrium is an equilibrium in which the low and high-cost firms choose the same action in the first period. For the game of incomplete information described in the

previous section, there is a continuum of pooling equilibria as well as a separating equilibria presented. In the Cournot game that we are analysing the foreign firm independently of its type would choose a level of output q_1^p. In a pooling equilibrium, the government sets a tariff that does not depend upon the level of costs of the foreign firm and, therefore, cannot infer the true value of the marginal cost. It does not update beliefs when observing the equilibrium action and has to make its choice of tariff based on its prior beliefs about costs. No additional information is provided by first period output. At the beginning of the second period, the government continues to use its prior beliefs as the probability assessment.

Given beliefs and the tariff, the foreign firm chooses q_2^i in order to maximise

$$Max_{q_2^i} \left\{ \pi_2^i \equiv (p^i - c^i - t_2)q_2^i - F \right\}, \qquad i = H, L \qquad (11)$$

The first order condition gives equilibrium output: $q_2^i(t_2) = \dfrac{(a - c^i - t_2)}{2}$.

Substituting into the firm's profits, maximized profits are: $\pi_2^i(t_2) = \left(\dfrac{a - c^i - t_2}{2} \right)^2 - F$. The

policy maker chooses the tariff to maximize expected domestic welfare

$$Max_{t_2} \left\{ EW \equiv \mu[V(p(q_2^H(t_2))) + t_2 q_2^H(t_2)] + (1 - \mu)[V(p(q_2^L(t_2))) + t_2 q_2^L(t_2)] \right\} \qquad (12)$$

where $V(p(q_2^i(t_2)))$ denotes consumer surplus. The optimal tariff in the second period

is $t_{2p} = \dfrac{a - \bar{c}}{3}$ (13). Note that $\bar{c} = \mu c^H + (1 - \mu)c^L$ represents the expected level of foreign

firm's costs. The firm's optimal output is $\hat{q}_{2p}^i = \dfrac{2a - 3c^i + \bar{c}}{6}$ (14). The low-cost firm is

better off when pooling than when revealing its type, while the high-cost is worse off, because $\hat{q}^L < \hat{q}_{2p}^L$ and $\hat{q}_{2p}^H < \hat{q}^H$.

In each period the tariff is announced and committed to before output is chosen by the firm. A necessary condition for a quantity to be a pooling equilibrium is that none of the types of firm wants to deviate. The necessary conditions are also sufficient when

appropriate beliefs are specified. The conditions that should hold for a pooling sequential equilibrium to exist are

$$IC_H : \pi_{1p}^H(q_{1p}^H, t_1) + \hat{\pi}_{2p}^H \geq \pi_1^H(q_1^H, t_1) + \hat{\pi}_2^H$$

$$IC_L : \pi_{1p}^L(q_{1p}^L, t_1) + \hat{\pi}_{2p}^H \geq \pi_1^L(q_1^L, t_1) + \hat{\pi}_2^L$$

With beliefs μ $(c^H/q) = 0$ if $q < q_1^p$, μ $(c^H/q) = 1$ if $q > q_1^P$ and μ $(c^H/q) = \mu$ if $q = q_1^p$ the above quantities can form part of a pooling sequential equilibria when forming out-of-equilibrium beliefs. This means that any level of output between q_1^H and q_1^L constitute pooling equilibria (Figure 2.3). Multiple equilibria are common in games of incomplete information and a number of equilibrium refinements have been proposed to eliminate some of them. In this model, there are only two types of firm and it is appropriate to use the intuitive criteria as an equilibrium refinement (Cho and Kreps 1987). The government perceives each out-of-equilibrium quantity as a possible signal and place probability zero on a type that is unlikely to send it.

It can be shown that multiple equilibria are eliminated when the intuitive criterion is applied.

The effect of Signalling on the Optimal Tariff

In this section, I compare the optimal tariff and associated equilibrium output levels of the foreign firm between the signalling and no signalling equilibria. Differences in $\hat{t}_1$ and $\hat{t}_{2p}$, $\hat{q}_1^L$ and $\hat{q}_{2p}^L$, $\hat{q}_1^H$ and $\hat{q}_{2p}^H$ reflect the role of the foreign firm's output as a signal of costs. A comparison of output levels and tariffs allows the analysis and decomposition of the different effects.

Proposition 2 *The optimal tariff when the foreign firm signals its costs through output is smaller when than when the firm does not signal cost, as indicated by the inequality in (15).*

$$\hat{t}_1 < \hat{t}_{2p} \qquad (15)$$

Proof. See Appendix 2.

The intuition behind Proposition 2 is clear. Because expected foreign production is lower when signalling, the optimal tariff is lower than when the firm does not signal its costs through output. This in turn means that a lower tariff tends to increase output for both the high-cost and the low-cost firm. In the first period, a low-cost firm has an incentive to misrepresent its costs as high because if it is thought to be high-cost it gets a lower tariff. Therefore, for a high-cost firm to convince the government that in fact it has high costs requires it to distort its output below the level that would maximize profits in the absence of signalling. There are two forces influencing the output of the high-cost firm. A signalling effect induces output downwards while a lower tariff induces higher level of output. However, the signalling effect dominates and finally output is lower than when signalling does not occur. On the contrary, only the lower tariff effect influences the output of the low-cost firm, inducing a higher level than when output does not signal costs. Overall, expected output of the foreign firm is lower when signalling. Because expected output is lower under signalling, there is a distortion that is costly in terms of expected output and domestic welfare. Accordingly, the policy maker reduces the tariff below the no-signalling level, $\hat{t}_{2p}$.

4 The Dynamic Model with Competition

Alternatively, the tariff game can be modelled introducing competition in the industry concerned, the simplest case being a Cournot duopoly. One firm in each country compete in quantities and produce identical commodities. Assuming that the markets are segmented, the domestic market can be analysed independently of the foreign market. This assumption is made to isolate the profit shifting effect of the tariff from considerations of terms of trade. The inverse demand function is assumed to be linear $p = a - (q + q^*)$. Consider an economy with two goods: good q for which there is domestic production and imports q^* and good y, which represents all other goods. In the domestic country the representative consumer has utility function $U(q, q^*, y)$ that is strictly quasi-concave and has positive marginal utility for each good. Assuming that the utility function is additive separable, $U(q, q^*, y) = f(q, q^*) + y$. A utility function of this form is quasi-linear and implies that

there are no income effects in the demand function for q and q^*. Consumer surplus is given

by $CS(q) = \int_0^q (a-x-q^*)dx - (a-q-q^*)q$.

The information structure is similar to the previous model. The foreign firm's marginal cost is private information. The foreign firm has complete information about the marginal cost of the domestic firm but the foreign firm's costs are unknown by the domestic government and the domestic firm. Marginal costs are of two types: c^L and c^H. The domestic government and firm do not know the foreign firm's marginal cost but they know the probability distribution of the unknown cost level. This is common knowledge. This assumption captures the situation in which a well-established domestic firm faces competition from an emerging market. The cost structure of the incumbent is known but the cost structure of the foreign potential entrant is not.

The signalling game has the following stages. At the beginning of the first period, nature chooses the foreign firm's marginal cost parameter: c^L or c^H. In the first stage, the domestic government chooses and commits to a tariff and, in the second stage, firms choose their outputs. First period output of the foreign firm signals foreign firm's costs to the domestic firm and policy maker. At the end of period one, the domestic government and the home firm update their beliefs about the foreign firm's costs. At the beginning of period two, with this updated probability assessment, the government announces an import tariff. Then, firms choose output. In the first period, output form Bayesian Cournot equilibria and in the second period outputs are chosen optimally given the updated beliefs.

The equilibrium concept is sequential equilibria. At any decision node, a player takes an action that maximizes its expected payoff, given its updated beliefs and given that other players will follow the prescribed equilibrium strategies. Beliefs must be consistent with the players' initial beliefs, with any information that may be available (directly or by inference) and with the hypothesis that play has evolved to each point under the equilibrium strategies. As usual in signalling games, there is a continuum of pooling and separating equilibria because of the wide range of beliefs that can be specified off-the-equilibrium path. Most of these beliefs are unreasonable and we will refine the sequential equilibria by employing the Cho-Kreps (1987) intuitive criteria.

Under complete information, the model can also be interpreted in a slightly different way. It captures a situation in which firms compete in prices but face capacity constraints. Each firm has a constant marginal cost of production up to the capacity level and then it

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becomes infinitely large. In a two-stage game both firms simultaneously choose capacities and then, knowing each other's capacity, simultaneously choose prices. By introducing capacity constraints and considering the Cournot profit function as a reduced-form profit function in which later price competition has been subsumed, Kreps and Scheinkman (1983) have shown that if demand functions are concave and if the rationing rule is the efficient one, the outcome of this two-stage game is the same as that of a one-stage Cournot game.

4.1 Separating Equilibria

A separating equilibrium is an equilibrium in which the two types of the foreign firm (denoted by * in what follows) choose two different actions in the first period. Here, it means that the low-cost firm chooses to produce its optimal low-type equilibrium output and vice-versa for the high-cost firm. In a separating equilibrium the home firm and home government have complete information in the second period. Therefore, $\mu(c^{*H} / q^{*H}) = 1$ and $\mu(c^{*L} / q^{*L}) = 1$. They correctly infer the marginal cost of the foreign firm from the level of output chosen by it.

The separating equilibrium in the second period is a game of complete information. Both the policy-maker and the home firm know the foreign firm's costs. Given these costs, the policy maker chooses the tariff to maximize welfare. The tariff is chosen before the output game is played. The foreign firm's solves

$$Max_{q^{*i}_2(t^i)} \left\{ \pi^{*i}_2 \equiv \left(p^i - c^{*i} - t^i_2 \right) q^{*i}_2 - F \right\} \qquad (16)$$

where t^i_2 is the tariff in period two. The home firm only produces for the domestic market and faces a similar problem. The home firm's problem is

$$Max_{q^i_2(t^i)} \left\{ \pi^i_2 \equiv \left(p^i - c \right) q^i_2 \right\} \qquad (17)$$

From each maximization problem the first order conditions for a maximum give the

following reactions functions: $q_2^{*i}(q_2^i) \equiv \dfrac{a - c^{*i} - t_2^i - q_2^i}{2}$ and $q_2^i(q_2^{*i}) \equiv \dfrac{a - c - q_2^{*i}}{2}$. The

second order conditions for existence of a maximum are satisfied. Solving simultaneously,
the equilibrium output levels are obtained. Considering an interior solution, the equilibrium
outputs are given by

$$q_2^{*i}(t_2^i) \equiv \frac{a + c - 2c_2^{*i} - 2t_2^i}{3} \qquad \text{and} \qquad q_2^i(t_2^i) \equiv \frac{a - 2c + c^{*i} + t_2^i}{3}$$

Substituting into the profit functions, we obtain maximized profits for both firms

$$\pi_2^{*i}(t_2^i) \equiv \left(\frac{a + c - 2c^{*i} - 2t_2^i}{3}\right)^2 - F \text{ and } \pi_2^i(t_2^i) \equiv \left(\frac{a - 2c + c^{*i} + t_2^i}{3}\right)^2.$$

The government's problem is to maximize consumer surplus, domestic firm's profits
and tariff revenue. Then, solving the following expression

$$Max_{t_2^i} \left\{ EW \equiv [V(p^i(q(t_2^i), q^*(t_2^i))) + \pi(q(t_2^i), q^*(t_2^i)) + t_2^i q_2^{*i}(t_2^i)] \right\} \qquad (18)$$

we obtain the optimal tariff

$$t_2^i = \frac{a - c^{*i}}{3} \qquad (19)$$

Substituting, maximized profits become $\pi_2^{*i} \equiv \left(\dfrac{a + 3c - 4c^{*i}}{9}\right)^2 - F$ and

$\pi_2^i \equiv \left(\dfrac{4a - 6c + 2c^{*i}}{9}\right)^2$. Following the same steps as in Section 3.1, let's define $\hat{\pi}_2^{*i/k}$ as

maximized profits when the true costs are i but the firm signals k. Then,

$$\pi_2^{*i/k}(q_2^{i/k}(c^{*i}, t_2(c^{*k})), q_2^{*i/k}(c^{*i}, t_2(c^{*k})) \equiv \left(\frac{a + 3c - 6c^{*i} + 2c^{*k}}{9}\right)^2 - F. \text{ In this case, the}$$

inefficient firm has no incentive to misrepresent itself in the second period $\hat{\pi}_2^{*H} > \hat{\pi}_2^{*H/L}$

while the efficient firm does, because $\hat{\pi}_2^{*L} < \hat{\pi}_2^{*L/H}$. By "mimicking" the inefficient firm it
obtains a lower tariff.

We assume that the level of tariff is known at the beginning of period 1 and that the
government can commit to the level of tariff chosen. The government and the domestic
firm do not know the marginal cost of the foreign firm. This is private information. We

solve the model backwards. First, the equilibrium of the Cournot game is found. Then, the optimal tariff is chosen, given equilibrium levels of output of foreign and domestic firm. Each level of output chosen by the foreign firm signals its costs. A level of output q^{*H} is associated with the updated belief that the firm is of high-cost type $\mu(c^{*H}/q^{*H}) = 1$. Conversely, a level of output q^{*L} can be associated with the belief that the firm is of low-cost type $\mu(c^{*H}/q^{*L}) = 0$. In this context, incentive compatibility means that

$$IC_H : \pi_1^{*H}(q_1^{*H}, q_1, t_1) + \hat{\pi}_2^{*H} \geq \pi_1^{*H}(q_1^{*L}, q_1, t_1) + \hat{\pi}_2^{*H/L}$$

$$IC_L : \pi_1^{*L}(q_1^{*L}, q_1, t_1) + \hat{\pi}_2^{*L} \geq \pi_1^{*L}(q_1^{*H}, q_1, t_1) + \hat{\pi}_2^{*L/H}$$

Because the government fixes a higher tariff and the home firm produces a lower output if they believe the foreign firm has low costs rather than high costs, foreign output and profits are higher when the high-cost firm signals the true type, $\hat{\pi}_2^{*H} \geq \hat{\pi}_2^{*H/L}$. In addition, $\pi_1^{*H}(q_1^{*H}, q_1, t_1) \geq \pi_1^{*H}(q_1^{*L}, q_1, t_1)$ (see Figure 2.2). However, note that $\hat{\pi}_2^{*L} < \hat{\pi}_2^{*L/H}$, which means that the low-cost firm has an incentive to deviate. Given $q_1^{*L}(t_1)$ and t_1, there are many outputs $q_1^{*H}(t_1)$ that satisfy IC_L. In Figure 2.2, these are represented by q_1^{*H} such that $q_1^{*H} \leq \underline{q}_1^{*H}$ and $q_1^{*H} \geq \overline{q}_1^{*H}$. In spite of there being two intervals of multiple equilibria, only one survives as part of a separating sequential equilibrium. Dominated strategies are eliminated when considering out-of-equilibrium beliefs[4].

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[4] Any output smaller than $\underline{q}_1^{*H}$ is a separating sequential equilibrium because posterior belief after observing an out-of-equilibrium output like $\underline{q}_1^{*H}$ is that $\mu(c^{*H}, \underline{q}_1^{*H}) = 0$. But any output smaller than $\underline{q}_1^{*H}$ is a dominated strategy for the low-cost firm by output q_1^{*L}. If the home firm and the government believe that the foreign firm would never choose a dominated output, the only posterior belief after observing $\underline{q}_1^{*H}$ is that $\mu(c^{*H}, \underline{q}_1^{*H}) = 1$. This overturns any equilibrium involving output smaller than $\underline{q}_1^{*H}$ because the beliefs are implausible. The high-cost firm would deviate from output smaller than $\underline{q}_1^{*H}$ to $\underline{q}_1^{*H}$, because it yields higher profits. A similar argument shows that any output bigger than $\overline{q}_1^{*H}$ cannot be an equilibrium. The only separating sequential equilibrium after dominated strategies are eliminated when forming out-of-equilibrium beliefs are $q_1^{*L}(t_1)$ and $\underline{q}_1^{*H} < q_1^{*H}$.

The low-cost foreign firm is able to obtain complete information profits given the tariff because $q_1^{*L}(t_1)$ would only be chosen by a low-cost firm. On the other hand, the high-cost foreign firm must distort its output away from the complete information profit maximizing output, given the tariff, to convince the home firm and the government that it has indeed high costs. The minimum distortion necessary to achieve this involves output $\underline{q}_1^{*H}$. The information asymmetry imposes a cost on the high-cost foreign firm. To derive the intervals of separating equilibrium quantities, one should note that it is more costly for the low-cost type to reduce output. This is the monotonicity property.

$$\frac{\partial^2\big((p(q_1)-c-t)q_1-F\big)}{\partial c\partial q_1} = \frac{\partial^2\big((a-q_1-c-t)q_1-F\big)}{\partial c\partial q_1} < 0$$

The equilibrium output of the foreign firm that satisfy IC_L are $q_1^{*L}(t_1)$ and $\underline{q}_1^{*H}(t_1)$. Given that the efficient foreign firm maximizes profits, IC_L binds $\pi(q_1^{*H}) = \max\{\pi(\underline{q}_1^{*H}), \pi(\overline{q}_1^{*H})\}$, the high-cost foreign firm does not choose a dominated output and the domestic firm maximizes expected output, the unique separating sequential equilibrium is obtained from simultaneously solving

$$q_1^{*L}(t_1) = \arg\max \pi_1^{*L}(q_1^{*L}, q_1, t_1) \tag{20}$$

$$\pi_1^{*L}(q_1^{*L}, q_1, t_1) + \hat{\pi}_2^{*L} < \pi_1^{L}(q_1^{*H}, q_1, t_1) + \hat{\pi}_2^{*L/H} \tag{21}$$

$$\pi_1^{*H}(t_1) = \arg\max_{st \cdot q_1^{*L}(t_1) = \arg\max \pi_1^{*L}(q_1^{*L}, q_1, t_1)} \pi_1^{*H}(q_1^{*H}, q_1, t_1) \tag{22}$$

$$q_1 = \arg\max\{E\pi \equiv \mu\pi_1^H(q_1^{*H}, q_1, t_1) + (1-\mu)\pi_1^L(q_1^{*L}, q_1, t_1)\} \tag{23}$$

The first condition gives optimal output for the efficient foreign firm. The second one states that incentive compatibility for the efficient type binds and gives a quadratic expression in q_1^{*H} which has two solutions $\underline{q}_1^{*H}$ and $\overline{q}_1^{*H}$ (see proof of proposition 3 in Appendix 2). The high-cost foreign firm would choose a distorted output in order to convince the home firm and the government that it has indeed high costs. One of these

output levels gives higher profits to the high-cost foreign firm than the other one and it is reasonable to expect that the foreign firm will not choose a dominated output. Therefore, the unique sequential equilibrium is given by q_1^{*L} and $\underline{q}_1^{*H}$. The equilibrium output levels

for domestic and foreign firms are $q_1(t_1) = \dfrac{(a - 2c + t_1 + c^{*L})}{3} + \dfrac{2\mu}{27}\sqrt{\Omega}$,

$q_1^{*L}(t_1) = \dfrac{(a + c - 2t_1 - 2c^{*L})}{3} - \dfrac{\mu}{27}\sqrt{\Omega}$ and $q_1^{*H}(t_1) = \dfrac{(a + c - 2t_1 - 2c^{*L})}{3} - \dfrac{(3 + \mu)}{27}\sqrt{\Omega}$,

where $\Omega = (c^H - c^L)(4a + 12c - 17c^{*L} + c^{*H})$. These output levels are used to analyse the tariff-setting stage of the game where the domestic government sets its specific tariff to maximise domestic welfare. The domestic government takes this equilibrium as given and chooses its specific tariff to maximize domestic expected welfare. The government's problem is

$$Max_{t_1} \left\{ \begin{array}{l} EW \equiv \mu[V(p^H(q(t_1), q^*(t_1))) + \pi^H(q(t_1), q^*(t_1)) + t_1 q^{*H}(t_1)] + \\ (1 - \mu)[V(p^L(q(t_1), q^*(t_1))) + \pi^L(q(t_1), q^*(t_1)) + t_1 q^{*L}(t_1)] \end{array} \right\} \quad (24)$$

The optimal tariff is obtained by solving the first order condition of this problem

$$\hat{t}_1 = \frac{(a - c^{*L})}{3} - \frac{(1 + 2\mu)}{27}\sqrt{\Omega} \quad (25)$$

Substituting into optimal output gives

$$\hat{q}_1 = \frac{1}{3}\left(\frac{4a - 6c + 2c^{*L}}{3} + \frac{(4\mu - 1)}{27}\sqrt{\Omega} \right) \quad (26)$$

$$\hat{q}_1^{*H} = \frac{1}{3}\left(\frac{a + 3c - 4c^{*L}}{3} + \frac{(\mu - 7)}{27}\sqrt{\Omega} \right) \quad (27)$$

$$\hat{q}_1^{*L} = \frac{1}{3}\left(\frac{a + 3c - 4c^{*L}}{3} + \frac{(2 + \mu)}{27}\sqrt{\Omega} \right) \quad (28)$$

Proposition 3 *The solution defined by (25), (26), (27) and (28) constitute the unique separating sequential equilibrium of the signalling game, when the foreign monopolist's output signals costs and it faces competition of a domestic firm.*

Proof. See Appendix 2.

The intuition behind Proposition 3 is clear. In the duopoly case, deviating is beneficial for the low-cost foreign firm. The low-cost foreign firm has an incentive to deviate since it induces the government to set a lower tariff. There is a distortion of foreign output level.

4.2 Pooling Equilibria

A pooling equilibrium is an equilibrium in which both the low-cost and high-cost foreign firms choose the same action in the first period. In a pooling equilibrium, no additional information is provided to the domestic firm and government by the choice of first period output. Therefore, in the second period, the home firm and the government continue to use the prior beliefs as their probability assessment. The domestic firm and the government choose output and commit to a tariff that does not depend on the competitiveness of the foreign firm.

In the second period, given the tariff, the foreign firm maximizes profits conditional on beliefs

$$Max_{q_{2p}^{*i}} \left\{ \pi \equiv \left(p^i - c^{*i} - t_2 \right) q_{2p}^{*i} - F \right\} \qquad (29)$$

The home firm's problem is to maximize expected profits by choosing sales in the domestic market. Therefore, the home firm maximizes expected profits

$$Max_{q_{2p}^i} \left\{ E\pi \equiv \mu \left(p^L - c \right) q_{2p} + (1-\mu) \left(p^H - c \right) q_{2p} \right\} \qquad (30)$$

Bayesian-Cournot equilibrium output are obtained by solving for the market-stage

equilibrium outputs $\hat{q}_{2p} = \dfrac{a - 2c + t_2 + \bar{c}}{3}$, $\hat{q}_{2p}^{*L} = \dfrac{2a + 2c - 4t_2 - 3c^{*L} - \bar{c}}{6}$ and

$\hat{q}_{2p}^{*H} = \dfrac{2a + 2c - 4t_2 - 3c^{*H} - \bar{c}}{6}$. Substituting optimal output into the home firm's expected

profits we get maximized expected profits $\pi(c, c^{*i}, t_2) = \left(\dfrac{a - 2c + t_2 + \bar{c}}{3}\right)^2$. In the presence

of a domestic firm, the domestic government cares about consumer welfare, profits of the
domestic firm and tariff revenue. Using domestic firms' maximized profits the policy maker
maximizes expected domestic welfare.

$$Max_{t_2} \left\{ \begin{array}{l} EW \equiv \mu[V\big(p^H(q_2(t_2), q_2^*(t_2))\big) + \pi^H(q_2(t_2), q_2^*(t_2)) + t_2 q_2^{*H}(t_2)] + \\ (1 - \mu)[V\big(p^L(q_2(t_2), q_2^*(t_2))\big) + \pi^L(q_2(t_2), q_2^*(t_1)) + t_2 q_2^{*L}(t_2)] \end{array} \right\} \quad (31)$$

The optimal tariff is

$$\hat{t}_{2p} = \frac{a - \bar{c}}{3} \quad (32)$$

Substituting into optimal outputs gives

$$\hat{q}_{2p} = \frac{4a - 6c + 2\bar{c}}{9} \quad (33)$$

$$\hat{q}_{2p}^{*L} = \frac{2a + 6c - 9c^{*L} + \bar{c}}{18} \quad (34)$$

$$\hat{q}_{2p}^{*H} = \frac{2a + 6c - 9c^{*H} + \bar{c}}{18} \quad (35)$$

The pooling equilibrium output represents an attractive option for the low-cost
foreign firm ($\hat{q}_{2p}^{*L} > \hat{q}^{*L}$) but not for the high-cost one ($\hat{q}_{2p}^{*H} < \hat{q}^{*H}$). In the first period,
foreign firm's output is a pooling sequential equilibrium if the same output level is chosen
by the high and low-cost firm. A necessary condition for the existence of a pooling

equilibrium is that none of the types wants to deviate. When appropriate beliefs are specified the necessary condition becomes also sufficient. The following incentive compatibility conditions should hold

$$IC_H : \pi_{1p}^{*H}(q_{1p}^{*H}, q_1, t_1) + \hat{\pi}_{2p}^{*H} \geq \pi_1^{*H}(q_1^{*H}, q_1, t_1) + \hat{\pi}_2^{*H}$$

$$IC_L : \pi_{1p}^{*L}(q_{1p}^{*L}, q_1, t_1) + \hat{\pi}_{2p}^{*L} \geq \pi_1^{*L}(q_1^{*L}, q_1, t_1) + \hat{\pi}_2^{*L}$$

An interval of multiple equilibria exists (see Fig. 2.3). A pooling equilibrium output for the foreign firm would be such that $q_1^{*H} < q_{1p}^{*} < q_1^{*L}$. These output levels constitute a pooling sequential equilibrium if and only if reasonable beliefs are specified. One possible specification of government and domestic firm's beliefs that will support these quantities to be equilibrium are $\mu(c^{*H}, q^{*}) = 0$ if $q^{*} < q_{1p}^{*}$, $\mu(c^H, q^{*}) = 1$ if $q^{*} > q_{1p}^{*}$ and $\mu(c^{*H}, q^{*}) = \mu$ if $q^{*} = q_{1p}^{*}$. However, no equilibrium output level survives as a pooling sequential equilibrium if one uses the intuitive criteria. The argument is similar to the one used in Section 3, when the foreign firm faces no competition in the domestic market. Output level q_{1p}^{*} forms a pooling sequential equilibrium only because after observing output q_1^{*L} the home firm and government believe that the firm has high costs, $\mu(c^{*H}, q_1^{*L}) = 1$. But, due to the concavity of the profit function, output q_1^{*L} is dominated by q_{1p}^{*} for the high-cost firm. Therefore, if the home firm and the government believe that the foreign firm would never choose a dominated equilibrium output, the only posterior belief on observing q_1^{*L} is $\mu(c^{*H}, q_1^{*L}) = 0$. This destroys the equilibrium involving q_1^{*L}. The posterior beliefs in which it is based are unlikely[5]. Consequently, there is no pooling equilibrium.

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[5] Similarly, consider output q_{1p}^{*}. This output constitutes equilibrium because the home firm and the domestic government's posterior beliefs after observing an out-of-equilibrium output like q_1^{*H} is that the firm is low cost. However, q_1^{*H} is dominated by the equilibrium output q_{1p}^{*} for the high-cost firm. Then, if the home firm and the government believe that the foreign firm would never choose a dominated equilibrium output, they should think that the firm has high costs. This destroys the original belief. The only consistent belief after observing an out-of-equilibrium output like q_1^{*H} is that the foreign firm is of a high-cost type. The government would accordingly choose a low tariff. Accordingly, the only consistent and sequentially rational equilibrium output for the high type firm is q_1^{*H}.

4. 3 The effect of Signalling on the Optimal Tariff

Similar to the analysis in section 3, I compare the level of the optimal tariff when signal and compare it with the situation in which no signalling exists. The main result is summarized below

$$\hat{t}_1 < \hat{t}_{2p} \qquad (36)$$

Proposition 4 *The optimal tariff, when the foreign firm signals its cost through output and faces competition of a domestic firm, is smaller than when the firm does not signal costs, as indicated by the inequality in (36).*

Proof. See Appendix 2.

The intuition behind the results presented above can be analysed and summarized by a decomposition of the effects as follows. There is a signalling effect. An efficient foreign firm has an incentive to misrepresent its cost and "mimic" an inefficient one because if it is thought to have high costs it gets a lower tariff and makes higher profits. Due to the monotonicity property, it is more costly for the efficient firm to deviate from its optimal output level. Therefore, in order for an inefficient foreign firm to convince the home firm and the government that in fact it has high costs requires it to choose its output below the level that would maximize profits in the absence of signalling. This distortion is costly in terms of welfare. As a consequence of this distortion expected foreign output is lower when signalling. For a given level of domestic firm's output and tariff, signalling commits the high-cost foreign firm to a smaller first period output. This increases the domestic firm equilibrium output and shifts profits to the domestic firm. The overall signalling effect benefits the domestic firm. As a result of this, a lower specific tariff is required to commit the home firm to greater expected output. The optimal tariff when signalling is lower than when the firm does not signal its costs through output. In addition, the efficient firm's output is higher due to a lower tariff effect. The low-cost foreign firm is able to obtain full information profits but because the tariff is smaller the level of output is greater.

In summary, the expected foreign production of the good is lower when signalling due to a distortion in foreign output. This, increases domestic firm equilibrium output and

shifts profits. Incomplete information lessens the rent extracting and profit shifting argument for a tariff. The signalling effect prevails over the tariff reducing effect.

The optimal tariff under asymmetric information is lower than under the full information case provided that the probability of a high cost foreign firm is sufficiently high as it is shown in Lemma 1 and 2. I compare the level of the optimal tariff under incomplete information with the situation of complete information. Note that for a firm with costs i, the optimal tariff under complete information is

$$\hat{t}_{FI}^i = \frac{a - c^i}{3} \quad (37)$$

Lemma 1   *The optimal tariff under asymmetric information - when the foreign firm signals its costs through output and there is domestic competition - is smaller than under full information if the foreign firm has low costs, as indicated by the inequality* $\hat{t}_1^L < t_{FI}^L$.

Proof – See Appendix 2

The intuition is as follows. Under incomplete information the optimal tariff in period one decreases with the probability that costs are high (μ). If it is more likely that foreign firm's costs are high it is more likely that a there is a distortion of optimal output chosen by the foreign firm. The government, in turn, takes this into account when maximising expected welfare in period one and chooses a tariff that is smaller than it would be under full information.

Lemma 2   *The optimal tariff under asymmetric information - when the foreign firm signals its costs through output and faces domestic competition - is smaller than under full information if the foreign firm has high costs and* $\mu > \frac{9}{2}\sqrt{\frac{(c^H - c^L)}{(4a - 5c^L + c^H)}} - \frac{1}{2}$, *as indicated by the inequality* $t_1^H < t_{FI}^H$.

Proof – See Appendix 2

The intuition is as follows. Under incomplete information the high cost foreign firm has to distort output away from the full information case in order to persuade the government that it has indeed high costs, given that the low cost foreign firm has an incentive to "mimic" the high cost firm. This distortion is costly in terms of welfare. The

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government anticipates this distortion and allows the tariff in the first period to be smaller than under full information if the probability of high cost is sufficiently high.

When the domestic firm files an AD investigation

In order to introduce a filing decision of the domestic firm the setting of the game has to change to allow for sequential decisions about output. One way of doing this would be to allow the foreign firm to move first. The game will be such that at the beginning of the first stage, nature chooses the foreign firms costs type and foreign exports are subject to an initial tariff. Then, the foreign firm chooses first period output. Following the decision of its rival, the domestic firm chooses output and whether or not to file an AD investigation. At the end of the first stage, the government observes the level of foreign and domestic output and forms beliefs about foreign firms' costs. If an investigation is filed, the government selects a per-unit AD duty, $t_2>0$, which will remain in effect during the second period and is higher than the initial tariff. Given the level of the AD duty the two firms compete simultaneously in quantities in the second stage.

I assume that the domestic government uses a cost-based policy to implement an duty that maximises welfare. Although AD procedures do not always follow this rule, this is consistent with the objective of designing efficient protection policies. Interpreting the game in this manner would require that the home government has and AD statute and the home firm can file an investigation at the end of the first period. It would be the high level of trade associated with an efficient firm what would trigger the domestic firm's decision and not the foreign firm's costs themselves as these are private information. As before, if the domestic government could observe the true cost of the foreign firm, the optimal AD duty would be $t_2^i = \dfrac{a-c^i}{3}$.

The foreign firm has an incentive to reduce exports in the first period in order to avoid the potential AD duty. The incentive compatibility constraint for a foreign firm of type can be visualised using the isoprofit curve consisting of combinations of duty t_2^i and output q^{*i} that give the same total profit. The curve is implicitly given by $\bar{\pi}_2^{*i}(q^{*i}, t_2^i) \equiv \dfrac{1}{2}q^{*i}(a - q^{*i} - 2c^{*i} - 2t_1 + c) + \dfrac{1}{9}(a + c - 2c^{*i} - 2t_2^i)^2$. Two candidates for

equilibria will exist: separating and pooling. In a separating equilibrium, the government correctly infers the true costs of the foreign firm and will set an optimal duty. It is easy to check that the incentive compatibility constraint implicitly defines a function that is concave in q^{*i} and symmetric around q_L^{*i} and a separating equilibrium would exist. Regarding the pooling equilibria, the government does not learn anything about foreign firms' costs after observing output. It will maximise welfare based on its prior beliefs. However, the equilibrium might not be unique.

When the outcome is a separating equilibrium, the effect on policy is that the potential imposition of a higher duty in the second period distorts trade for some types who voluntarily restrain production in order to separate themselves. The outcome will have the desirable property that optimal duties are imposed.

5   Conclusions

Incomplete information lessens the rent extracting and profit shifting argument for a tariff, when a foreign competitor is better informed than a domestic government and firm about the cost structure of a foreign competitor. When foreign firm's costs are private information, output can signal costs to a domestic government. The competitive foreign firm has an incentive to misrepresent its costs - by pretending to have high costs - in order to obtain a lower tariff. In equilibrium, this incentive no longer exists and this type chooses its first best equilibrium output. However, because the efficient foreign firm has an incentive to "mimic" the inefficient one, the latter should distort output away from the complete information optimal production level. The foreign firm with high costs distorts equilibrium output downwards. When the incentive of the foreign firm to misrepresent its costs is anticipated by the government, a separating sequential equilibrium exists. The government uses a tariff in the first period, which is lower than the optimal tariff when no signalling occurs. Signalling creates a distortion, which is costly in terms of domestic welfare. Because signalling is costly, it is optimal to lower the tariff on imports in the first period. Pooling equilibria can be ruled out because they require unreasonable beliefs to support them. This leaves the separating equilibrium as the unique reasonable outcome of the game.

In a dynamic model, I allow the government and the domestic firm to learn about foreign firms' costs over time. Because of informational rents, there is a distortion in the level of foreign output and consequently the optimal tariff is lower when there is signalling. Incomplete information, when a foreign firm is better informed about costs than a government who designs trade policy and a domestic competitor, allows government to discriminate the two types of foreign firm and gain efficiency. The optimal tariff is lower than under complete information.

The model can be related to antidumping. Cost-based antidumping can be viewed as a vehicle for implementing cost-contingent tariff policies. Under cost-based dumping, the domestic government estimates the foreign firm's production costs and then imposes and AD duty designed to insure "fair" prices.

The model can be extended to analyse the filing decision of the domestic. One way of doing this would be to allow the foreign firm to move first. At the beginning of the first stage foreign exports are subject to an initial tariff. Then, firms choose output sequentially. The foreign firm chooses first period output. Following the decision of its rival, the domestic firm chooses output and whether or not to file an AD investigation. At the end of the first stage the government, after observing the level of foreign and domestic output, forms beliefs about foreign firms' costs. If an investigation is filed, the government selects a per-unit AD duty that is higher than the initial tariff. Given the level of the AD duty the two firms compete simultaneously. This should not alter the results in any qualitative manner. The government would design policy optimally and the outcome will have the desirable property that optimal duties are imposed.

The importance of informational problems for the design of strategic trade policy has recently been considered in the literature. While previous work has concentrated on asymmetries of information from governments and domestic firms, this chapter has focused on the unknown cost efficiency of a foreign firm. It has been shown that the government has the ability to separate the different types of firms and that strategic trade policy could effectively be designed in the presence of informational failures.

Figure 2.2: Separating Equilibria

Incentive-Compatible Output:
Pooling Equilibria
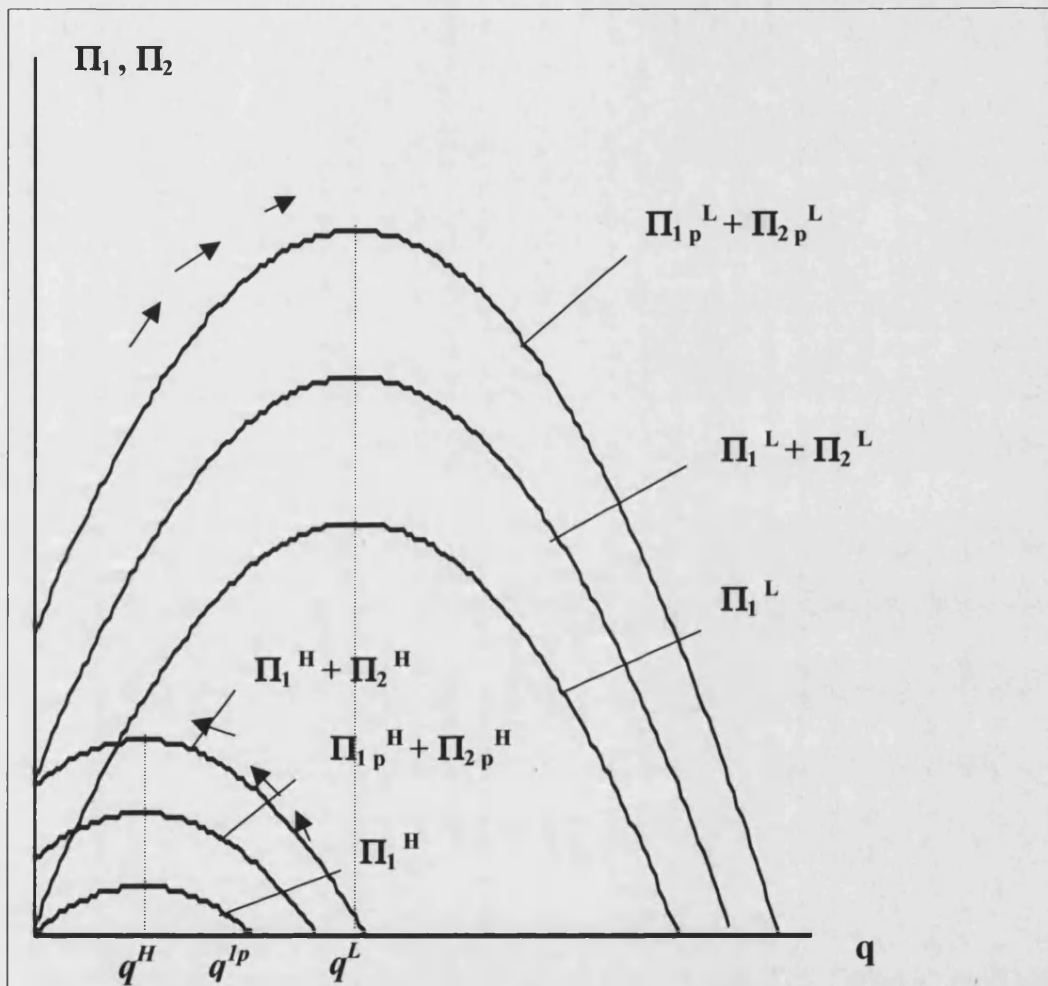
Figure 2.3: Pooling Equilibria

Appendix 2

Proof of Proposition 1. To obtain $\hat{q}_1^L$ and $\hat{q}_1^H$. Given that the low-cost foreign firm maximizes profits IC_L binds and the high-cost firm chooses the level of output that gives the minimum distortion and higher profits, the unique separating sequential equilibrium is obtained by simultaneously solving equations (4), (5) and (6). The low-cost firm

chooses $q_1^L(t_1) = \arg\max \pi_1^L(q_1^L, t_1)$. Then, substitute this solution, $q_1^L(t_1) = \dfrac{a - c^L - t_1}{2}$ into

$\pi_1^L(q_1^L, t_1) + \hat{\pi}_2^L = \pi_1^L(q_1^H, t_1) + \hat{\pi}_2^{L/H}$. Substituting gives the following quadratic equation in

$$q_1^H : (q_1^H)^2 - q_1^H(a - c^L - t_1) + \left(\frac{a - c^L - t_1}{2}\right)^2 + \left(\frac{a - c^L}{3}\right)^2 - \left(\frac{2a - 3c^L + c^H}{6}\right)^2 = 0$$

Solving this equation, gives the following solutions: $q_1^H(t_1) = \left(\dfrac{a - c^L - t_1}{2}\right) \pm \dfrac{\sqrt{\Theta}}{6}$. But,

only one of these solutions gives higher profits to the high-cost firm. One can disregard the dominated equilibrium output. The unique solution should satisfy: $\pi\left(\underline{q}_1^H(t_1)\right) > \pi\left(\bar{q}_1^H(t_1)\right)$.

Then, the unique solution to the problem is: $q_1^H(t_1) = \left(\dfrac{a - c^L - t_1}{2}\right) - \dfrac{\sqrt{\Theta}}{6}$. For a sufficiently

large level of demand, $\Theta = (c^H - c^L)(4a - 5c^L + c^H)$ is positive. Considering an interior

solution, the equilibrium output for the low-cost firm is: $\dfrac{(a - c^L)}{3} > 0$. Multiplying the

numerator by 4 and adding $\dfrac{(c^H - c^L)}{3} > 0$, we obtain $(4a - 5c^L + c^H) > 0$. It suffices to

multiply the previous expression by $(c^H - c^L)$ to obtain $\Theta = (c^H - c^L)(4a - 5c^L + c^H)$ which is positive.

Proof of Proposition 2. It follows from the comparison of equilibrium output levels chosen by the foreign firm and the equilibrium first period tariffs when it signals costs though output and output and tariff when the firm does not signal costs. To show that the inequality in equation (15) holds, $\hat{t}_1 < \hat{t}_{2p}$, it suffices to compare the tariff when

signalling with that of a no signalling model. Since $\hat{t}_1 = \dfrac{1}{3}\left[(a - c^L) - \dfrac{\mu}{3}\sqrt{\Theta}\right]$ and

$\hat{t}_{2p} = \dfrac{(a - \bar{c})}{3}$ after operating and simplifying, it is simple to show that $\hat{t}_1 < \hat{t}_{2p}$ if and only if

$a > 2c^H - c^L$. This inequality always holds for a sufficiently large demand level, a.

In order to decompose the different effects of the separating sequential equilibrium outcome, it is necessary to compare the output of the inefficient firm when signalling exists

with that of no signalling and accordingly prove that the inequality $\hat{q}_1^H < \hat{q}_{2p}^H$ holds. Since

$$\hat{q}_1^H = \frac{1}{3}\left[(a - c^L) - \frac{(3-\mu)}{6}\sqrt{\Theta}\right] \quad \text{and} \quad \hat{q}_{2p}^H = \frac{(2a - 3c^H + \overline{c})}{6}$$ it can be shown that,

operating and simplifying, $\hat{q}_1^H < \hat{q}_{2p}^H$ if and only if $a > 2c^H - c^L$. This inequality holds if the demand intercept, a, is sufficiently large.

Similarly, the following inequality $\hat{q}_1^L > \hat{q}_{2p}^L$ allows us to compare the signalling equilibrium output with that in the absence of signalling. In this case, since $\hat{t}_1^H = \frac{1}{3}\left[(a - c^L) + \frac{\mu}{6}\sqrt{\Theta}\right]$ and $\hat{q}_{2p}^L = \frac{(2a - 3c^L + \overline{c})}{6}$ it can be easily shown that after

operating and simplifying $\hat{q}_1^L > \hat{q}_{2p}^L$ if and only if $a > 2c^H - c^L$. This inequality holds if the demand intercept, a, is sufficiently large.

Finally, the inequality $E\hat{q}_1 < E\hat{q}_{2p}$ shows that domestic firm's output is higher in the signalling equilibrium, by calculating expected output $E\hat{q}_1 = \mu\hat{q}^H + (1-\mu)\hat{q}^L$ which

becomes $E\hat{q}_1 = \frac{1}{3}\left[(a - c^L) - \frac{\mu\sqrt{\Theta}}{3}\right]$ and comparing it with $E\hat{q}_{2p} = \frac{(a - \overline{c})}{3}$ it can be

shown that $E\hat{q}_1 < E\hat{q}_{2p}$ if and only if $a > 2c^H - c^L$. This inequality holds if the demand intercept, a, is sufficiently large.

Proof of Proposition 3. To obtain $\hat{q}_1^{*L}$ and $\hat{q}_1^{*H}$. Given that the low cost foreign firm maximizes profits IC_L binds and the high cost foreign firm chooses the level of output that gives the minimum distortion and higher profits, the unique separating sequential equilibrium is obtained by simultaneously solving equations (20), (21), (22) and (23). The low-cost foreign firm chooses $q_1^{*L}(t_1) = \arg\max \pi_1^{*L}(q_1^{*L}, q_1, t_1)$. The domestic firm chooses $q_1 = \arg\max\{E\pi \equiv \mu\pi_1^H(q_1^{*H}, q_1, t_1) + (1-\mu)\pi_1^L(q_1^{*L}, q_1, t_1)\}$. Solving (20) and (23) gives q_1^{*L} and q_1 which are then substituted into the binding incentive compatibility constraint (IC_L): $\pi_1^{*L}(q_1^{*L}, q_1, t_1) + \hat{\pi}_2^{*L} = \pi_1^L(q_1^{*H}, q_1, t_1) + \hat{\pi}_2^{*L/H}$. This is a quadratic equation in q_1^{*H}: $(a - q_1^{*L} - q_1 - c^{*L} - t_1)q_1^{*L} - (a - q_1^{*H} - q_1 - c^{*L} - t_1)q_1^{*H} - (\hat{\pi}^L - \hat{\pi}^{L/H}) = 0$. Solving, gives two solutions. But, only one of them gives higher profits to the high-cost firm. We choose the non-dominated solution that satisfies: $\pi(\underline{q}_1^H(t_1)) > \pi(q_1^H(t_1))$. The unique

solution to the problem is: $q_1^H(t_1) = \frac{a + c - 2(t_1 - c^{*L})}{3} - \frac{(3+\mu)\sqrt{\Omega}}{27}$,

$\hat{q}_1^L(t_1) = \frac{a + c - 2(t_1 - c^{*L})}{3} + \frac{\mu\sqrt{\Omega}}{27}$ and $q(t_1) = \frac{a - c + t_1 + c^{*L}}{3} + \frac{2\mu\sqrt{\Omega}}{27}$. For a sufficiently

high demand level $\Omega = (c^{*H} - c^{*L})(4a + 12c - 17c^{*L} + c^{*H})$ is positive. Considering an interior solution, the equilibrium output for the low-cost firm is given by

$q_L^* = \frac{a + 3c - 4c^{*L}}{9} > 0$. Multiplying the numerator by 4 and adding $(c^{*H} - c^{*L})$ it becomes

$4a + 12c - 17c^{*L} + c^{*H} > 0$. It suffices to multiply the previous expression by $(c^{*H} - c^{*L})$ to obtain $\Omega = (c^{*H} - c^{*L})(4a + 12c - 17c^{*L} + c^{*H}) > 0$.

Proof of Proposition 4. The proof follows from the comparison of equilibrium output levels chosen by the foreign, the domestic firms and the equilibrium tariff when the foreign firm signals costs through output and when the foreign firm does not signal costs. This is represented in the following inequality (36), $\hat{t}_1 < \hat{t}_{2p}$. From equation (25) and (32) respectively, $\hat{t}_1 = \dfrac{a - c^{*L}}{3} - \dfrac{(1 + 2\mu)\sqrt{\Omega}}{27}$ and $t_{2p} = \dfrac{a - \bar{c}}{3}$. It follows that, $\hat{t}_1 < \hat{t}_{2p}$ if and only if

$$(4a + 12c - 17c^{*L} + c^{*H}) > \frac{\mu^2}{(1 + 2\mu)^2}(c^{*H} - c^{*L}).$$ Because $0 \le \mu \le 1$,   then

$0 \le \dfrac{\mu^2}{(1 + 2\mu)^2} \le \dfrac{1}{9}$. Therefore, for a demand intercept a sufficiently large the above inequality holds.

To show that output of the inefficient foreign firm is lower in the presence of signalling it suffices to prove that $\hat{q}_1^{*H} < \hat{q}_{2p}^{*H}$. From equations (27) and (35) respectively,

$$q_1^{*H} = \frac{1}{3}\left[\frac{a + 3c - 4c^{*L}}{3} + \frac{(\mu - 7)\sqrt{\Omega}}{27}\right] \quad \text{and} \quad q_{2p}^{*H} = \frac{2a + 6c - 9c^{*H} + \bar{c}}{18}.$$ Then,   after

substituting   and   simplifying $\hat{q}_1^{*H} < \hat{q}_{2p}^{*H}$ if   and   only   if

$$(4a + 12c + c^{*H} - 17c^{*L}) > \frac{81}{2}\frac{(1 - \mu)}{(7 - \mu)}(c^{*H} - c^{*L}).$$ Because $0 \le \mu \le 1$,   then

$0 \le \dfrac{81}{2}\dfrac{(1 - \mu)}{(7 - \mu)} \le \dfrac{81}{4} \cong 5.8$. Therefore, for a demand intercept a sufficiently large the above inequality holds.

To prove that the output of the efficient firm is higher when signalling, it is enough to prove that the following inequality, $\hat{q}_1^{*L} > \hat{q}_{2p}^{*L}$, holds. From equations (28) and (34) respectively, $\hat{q}_1^{*L} = \dfrac{1}{3}\left[\dfrac{a + 3c - 4c^{*L}}{3} + \dfrac{(2 + \mu)\sqrt{\Omega}}{27}\right]$ and $\hat{q}_{2p}^{*L} = \dfrac{1}{3}\left[\dfrac{2a + 6c - 9c^{*L} + \bar{c}}{18}\right]$. After

substituting   and   simplifying $\hat{q}_1^{*L} > \hat{q}_{2p}^{*L}$ if   and   only

if$(4a + 12c - 17c^{*L} + c^{*H}) > \dfrac{\mu^2}{(1 + 2\mu)^2}(c^{*H} - c^{*L})$. Because $0 \le \mu \le 1$ then,

$0 \le \dfrac{81\mu^2}{(2 + \mu)^2} \le 9$. Therefore, for a demand intercept a sufficiently large the above inequality holds.

In order to prove that expected foreign output is lower when signalling it suffices to prove that the following inequality holds, $E\hat{q}_1^* < E\hat{q}_{2p}^*$. Expected output of the foreign firm in the presence of signalling is $E\hat{q}_1^* = \mu q_1^{*H} + (1-\mu)q_1^{*L}$ obtained using (27) and (28). After operating, $E\hat{q}_1^* = \frac{1}{3}\left[\frac{a+3c-4c^{*L}}{3} + \frac{(1-8\mu)\sqrt{\Omega}}{27}\right]$ is obtained. Similarly, for

$E\hat{q}_{2p}^* = \frac{a+3c-4\bar{c}}{9}$. Then, after substituting and simplifying $E\hat{q}_1^* < E\hat{q}_{2p}^*$, if and only if

$(4a+12c-17c^{*L}+c^{*H}) > 1296\frac{\mu^2}{(8\mu-1)^2}(c^{*H}-c^{*L})$. Because $0 \le \mu \le 1$, then,

$0 \le 1296\frac{\mu^2}{(1-8\mu)^2} \le \frac{1296}{49} \cong 26$. For a demand intercept a sufficiently large the above inequality holds.

Finally, in order to prove that expected output of the domestic firm is higher when signalling, it suffices to show that $\hat{q}_1 > \hat{q}_{2p}$. From equations (41) and (50) respectively,

$\hat{q}_1 = \frac{1}{3}\left[\frac{4a-6c+2c^{*L}}{3} + \frac{(4\mu-1)\sqrt{\Omega}}{27}\right]$ and $q_{2p}^{*L} = \frac{4a-6c+2\bar{c}}{9}$. After operating and

simplifying, $E\hat{q}_1 > E\hat{q}_{2p}$ if and only if $(4a+12c-17c^{*L}+c^{*H}) > 324\frac{\mu^2}{(4\mu-1)^2}(c^{*H}-c^{*L})$.

Because $0 \le \mu \le 1$, then, $0 \le 324\frac{\mu^2}{(4\mu-1)^2} \le 36$. Therefore, for a demand intercept a sufficiently large the above inequality holds.

Proof of Lemma 1. It follows from the comparison of the optimal tariff under separating equilibrium in period one $\hat{t}_1 = \frac{(a-c^L)}{3} - \frac{(1+2\mu)}{27}\sqrt{\Omega}$ and the optimal tariff under full information when the costs of the foreign firm are low $t_{FI}^L = \frac{(a-c^L)}{3}$. It is simple to show that $\hat{t}_1 < t_{FI}^L$ since $\mu > 0$.

Proof of Lemma 2. It follows from the comparison of the optimal tariff under separating equilibrium in period one $\hat{t}_1 = \frac{(a-c^L)}{3} - \frac{(1+2\mu)}{27}\sqrt{\Omega}$ and the optimal tariff under full information when the costs of the foreign firm are high $t_{FI}^H = \frac{(a-c^H)}{3}$. After operating and simplifying, it is easy to show that the optimal tariff under asymmetric information is lower than under full information if and only if $\mu > \frac{9}{2}\sqrt{\frac{(c^H-c^L)}{(4a-5c^L+c^H)}} - \frac{1}{2}$. This inequality is easily satisfied for a sufficiently high demand intercept, a (relative to cost differentials).

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Chapter 3   Antidumping: Descriptive Analysis, Law and Institutions

1   Introduction

Over the last decades, there has been a reduction in the average tariff and other traditional trade tools after several multilateral trade talks at the GATT/WTO level. At the same time, the number of AD investigations has been growing over time as well as the protection granted through this policy instrument. This suggests that perhaps in the absence of tariff barriers AD has remained a valid available tool to grant protection. However, the several modifications introduced in the law at the GATT and the organisation of the AD code in the WTO may also have contributed to its widespread use.

This chapter provides the background information necessary to understand the issues discussed in Chapters 4 and 5. Since the nature of the AD mechanism is quite intricate and complex, the legal issues and the institutional background are explained that would help to understand the hypotheses formulated and empirically tested in subsequent chapters. Section 2 presents a descriptive analysis of the proliferation of this trade policy tool and the geographical distribution in the use of AD worldwide. It also presents a descriptive analysis of the investigations initiated by European firms. Section 3 describes the workings of the AD law at the General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) level and the regulations prevalent in Europe. It presents a detailed description of European AD regulations, the decision making process and the institutions involved. Section 4 presents a concluding summary.

2   Antidumping: Descriptive Analysis

2. 1   Antidumping at the World Level: an Increasing Trend

The number of antidumping petitions initiated has been growing over the years (See Fig. 3.1 in Appendix 3). Although this increasing trend is not statistically significant, it is an indication of the increasing use of AD worldwide. During the period 1987-91 the average

number of cases per year worldwide was around 147 and during the period 1992-97 this average was 244, indicating an increase of more than 65%, as can be seen from Table 3.1[6].

Not only has the number of cases increased over time but also the protection granted seems to be growing substantially. The average dumping margin between 1980 and 1989 for the EU is estimated to be 37% (Bourgeois and Messerlin, 1993) and 33% for the US (Morkre and Kelly, 1994). Besides, these estimated dumping margins tend to increase over time. The US cases have weighted average dumping margins that are becoming higher over time (U.S.I.T.C., 1995) making AD actions very attractive as shown in Table 3.2. Blonigen (2003) also documents that the percent of cases ruled affirmative by the US International Trade Commission – which investigates injury – has also been rising over time, from 45% to 60% between 1980 and 2000. The analysis shows that the upward trend in US dumping margins occurs primarily through evolving discretionary practices at the US Department of

Table 3.1: Total Number of AD Investigations initiated: 1987-1997

Years	U.S.	EU	Worldwide
1987	28	15	120
1988	27	40	124
1989	18	24	96
1990	48	34	165
1991	29	63	228
1992	42	83	326
1993	21	32	299
1994	43	48	228
1995	33	14	156
1996	25	22	221
1997	41	16	233
1998[b]	28	44	299
1999[b]	43	41	320
2000[b]	17	49	250
2001[b]	77	29	337
Total	**520**	**554**	**3402**

Source: WTO Secretariat, Rules Division Antidumping
Measures Database, based on Miranda et al. (1998)
(b) Zanardi (2004b)

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[6] A new and improved GATT/WTO data set is presented in Zanardi (2004b). The data is corrected for mistakes and inconsistencies, missing data but more importantly it covers countries that were not members of the WTO (China, Taiwan, Russia, Ukraine, etc.). In this data set the role of new users is more prominent but only from 1997, which is beyond the period of analysis considered in this thesis.

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Commerce, with little or no role for changing country composition of investigated cases or legal changes. Using a computable partial equilibrium model Tharakan et al. (1997) find evidence that in Europe the injury margins are excessive.

The increase in the number of countries using AD measures may suggest that AD legislation is being used as a mechanism for retaliation. Twenty-nine countries initiated antidumping investigations in 1987-97. Over this period the number of users for a given year has tripled, from seven in 1987 to twenty-two in 1997 (Table 3.9). Whereas the traditional users of AD were the US, Canada, Australia and the EU, the number of other countries using AD has increased quite dramatically in recent years (Table 3.10 and Fig. 3.2).

Table 3.2: Average Dumping Margins in the United States for Different Periods

1980-85	20.9%
1986-90	32.8%
1990-93	37.7%

Source: US-International Trade Commission in Messerlin and Reed (1995)

The use of antidumping has been rapidly growing in less developed countries. Table 3.3 shows that South Africa, Argentina, India and Brazil have become important users of this instrument. There has been a dramatic change in the composition of countries that use antidumping in the last decade. The OECD countries initiating AD investigations represented 84% of the total in 1987 whereas they only represented 53% ten years later

Table 3.3: Antidumping Cases: Main Users and Main Targets

Main Users	1997(a)	1995-2001(b)	Main targets	1997(a)	1995-2001(b)
Australia	42	127	China	31	236
EU	41	242	South Korea	16	137
South Africa	23	183	Taiwan	16	84
U.S.	16	230	U.S.	15	101
Argentina	15	157	Germany	14	66
South Korea	15	46	Japan	12	84
Canada	14	102	Indonesia	9	68
India	13	183	India	7	67
Brazil	11	85	Britain	6	39
Total	233	1785		233	1785

Source: (a) WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998) and (b) Zanardi (2004b)

(Fig. 3.5). Mexico has become the fifth main user of the instrument worldwide reporting 8.6% of the investigations followed by Argentina, Brazil and South Africa with 5.6%, 4.4% and 4.0%, respectively (Table 3.9). The percentage of new users has gone from 20% in 1987 to a maximum of 67% in 1996 (Table 3.10 and Fig. 3.2).

There is also a geographical asymmetry in the use of AD (Table 3.11 and 3.12). The countries most frequently targeted have been the South East Asian countries, including Japan, and the countries with non-market economies[7] with more than 50% of all cases. While these countries are the targets for AD actions in 50.2% of all cases, their share in the use of this policy instrument against other countries represents only a minor 5.8% (Fig. 3.5). The country that seems to be a net "exporter" of investigations is the United States of America. The number of AD investigations initiated by the US more than doubles the number of investigations undertaken by other countries against it (Figure 3.4).

Every year, countries that have been investigated by others in the past begin to initiate their own AD complaints against other countries. Prusa and Skeath (2002) suggest that countries are using AD law for reasons other than punishing unfair trade. They analyse the motives for AD actions. They distinguish between the traditional response to unfair trade and a newer idea that describes AD as "special protection" (Bagwell and Staiger, 1990) - as the protection tacitly agreed to maintain cooperation in volatile trade periods. They find that strategic considerations are an important explanation for AD filings. Blonigen and Bown (2003) investigate the effects of the threat of foreign retaliation on US antidumping case filing behaviour and find that the threat of foreign reciprocal AD duties can reduce the likelihood of US AD cases being filed against certain countries[8].

Some studies even suggest that the impact of AD enforcement is even greater than that reflected by the imposition of AD duties. Prusa (1992) has pointed out that from the number of petitions initiated, only one third of antidumping cases actually result in dumping duties and nearly as many are withdrawn or are voluntarily terminated and shows that the withdrawn cases have at least as big an effect as the cases that resulted in duties. The amount of investigations that are withdrawn seems to be smaller in Europe. Only 9%

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[7] This group is defined in a broad sense and includes all Eastern European countries, the USSR and the independent Republics, China, etc.

[8] Several studies (Prusa, 1997; Konings et al., 2002) analyse the existence of trade diversion from named to non-named countries. Prusa (1997) finds that when considering a period of six years after the initiation of a case most of the protective effect of import duties is offset by increased imports from non-named countries. However, Konings et al. (2002) show that trade diversion in the European Union is limited.

of investigations initiated were withdrawn in the period 1985-2003. However, this figure may be understating the real number of withdrawals as suggested in Kempton (2001).

2. 2 Antidumping Investigations in Europe

The number of antidumping investigations[9] initiated in Europe has decreased or remain nearly constant in the period 1987-97 as shown in Table 3.5 below and Figure 3.7. Although this trend is not statistically significant, the average number of cases per year was twenty-eight between 1985 and 1990 and it amounted to twenty-two between 1991 and 1997. Moreover, Europe seems to be using AD against other countries with nearly the same strength as it is a target of all other countries.

The number of AD investigations initiated by Europe against other countries amounted to 355 in the period 1987-97 whereas the number of AD investigations initiated against Europe is 400 in the same period[10]. Europe is overall a net "importer" of investigations. However, a year-by-year analysis of the figures shows a clearer pattern. Over this period, Europe was a net "importer" of AD cases for all years of lower economic activity such as the periods 1991-93 and 1996-97 (Table 3.5). Knetter and Prusa (2003) confirmed the hypothesis that AD activity is cyclical for Australia, Canada, the European Union and the US. However, Europe more than other regions seems to be loosing in favour of other countries in periods of economic downturn and in quite a dramatic way (Figure 3.8). The average size (value of imports at the 8-digit product level) of a legal case is 104 million 1990 dollars in the period 1985-94. The maximum case size is of 1,520 million dollars. On average, it amounts to of 1.3% of total EU imports per year.

Some interesting features of AD in the European case emerge from analysing its geographic dimension. Nearly three quarters of all European investigations against other countries are concentrated in South East Asian countries (33%) and non-market economies

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[9] The term antidumping investigation in Europe will be used loosely to refer to antidumping and countervailing duties, since previous to Council Regulation 384/96 of 15 December 1995, the regulations referred to dumped and subsidised imports.

[10] The information contained in the Tables and Figures in Appendix 3 originate from two sources: the WTO Secretariat and the European Commission. Data from WTO does not match perfectly with the information reported by the European Commission because the time of reporting is different. The cases reported by the WTO correspond to the 12-month period from 1st July until 30th June whereas the cases reported by the European Commission refer to the calendar year.

Table 3.4: Cases filed from Europe to Other Countries and Against Europe (1987-1997), by Blocks of Countries

	Reporting	%	Affected	%
OECD	41	11.5	276	77.7
South East Asia	117	33.0	17	4.8
Non-market economies	142	40.0	23	6.5
Others	55	15.5	120	33.8
Total	355		436	

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

(40%). On the contrary, nearly two thirds of investigations against Europe are concentrated in OECD countries (63%) as displayed in Figures 3.9 and 3.10.

Table 3.5: Cases Filed Against Europe and from Europe to Other Countries (1987-1997), by year

Years	Cases filed against Europe	%	Cases filed by Europe against Others	%	Balance
1987	25	6.3	28	7.9	3
1988	18	4.5	27	7.6	9
1989	11	2.8	18	5.1	7
1990	22	5.5	48	13.5	26
1991	59	14.8	29	8.2	-30
1992	66	16.5	42	11.8	-24
1993	46	11.5	21	5.9	-25
1994	29	7.3	43	12.1	14
1995	30	7.5	33	9.3	3
1996	37	9.3	25	7.0	-12
1997	57	14.3	41	11.5	-16
Total	400		355		-45

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

The number of investigations filed by Europe against other countries seems to be geographically more dispersed than the number of countries that act against it, as shown in Table 3.6. The most affected country by European investigations is China (15%), which is followed by Japan, Korea, India, Thailand, Turkey, Russia, etc. However, only three OECD countries, namely Australia, the US and Canada amount to 56% of all investigations initiated against Europe. The rest of the users are in descending order South Africa (8%), Argentina (6%), Poland (5%), Brazil (5%), Mexico (5%) and South Korea (3%).

The biggest economies in Europe are the ones who face more investigations initiated by other countries. The European nation against which other countries file more investigations is Germany, having received 21.3% of all filings between 1985 and 1994, followed by the UK (12.4%), France (11.9%), Italy (11.4%) and Spain (8.6%). A breakdown of investigations against European firms by industry indicates that the basic

metal industry concentrates nearly one fourth of all cases in this period and the chemical industry nearly one fifth as shown in Table 3.14.

Table 3.6: Cases Filed Against Europe and From Europe to Other Countries (1987-1997), by Individual Countries

Reporting		Affected	
Country	Number of cases	Country	Number of cases
China	55	Australia	106
Japan	31	United States	96
Korea	31	Canada	44
India	18	South Africa	37
Thailand	17	Argentina	27
Turkey	14	Poland	23
Russia	13	Brazil	20
Indonesia	11	Mexico	20
Malaysia	11	Korea	13
Poland	11	New Zealand	11
Yugoslavia	10	Israel	10
Hong Kong	10	India	8
United States	9	Costa Rica	3
Romania	9	Turkey	3
Brazil	8		
Others	97	Others	15
Total	355		436

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

There is also a sector and country bias in investigations initiated by Europe. More than one third of all investigations (sub-cases) involve the chemical sector and, to a lesser degree, the electronics and electrical machinery (19%) and the iron and steel sectors (19%), as can be seen in Table 4.16 in Appendix 4A. In terms of products, those originating from Central and Eastern Europe and Russia are quite homogeneous and compete with European producers (mainly chemical products and iron and steel coils and sheets). Contrarily, the products originating from Japan, South Korea and Thailand are predominantly differentiated products (semiconductors, video players and recorders, CD-players, microwaves, etc.). In the period 1985-89, the majority of complaints were against Japan, China, Eastern European countries and South Korea; whereas in the 5-year period that follows the targeted countries were mainly China, Russia, Japan followed by Thailand and South Korea.

When dumping and injury have been found an investigation can end with the imposition of AD duties or with the acceptance of price undertakings. Sometimes an investigation is terminated because the period in which it should be conducted has expired or because the petitioning firms have withdrawn from the case. A summary of the final

outcome in the period 1985-2003 is presented in Table 3.7 below. The average size in terms of imports of those cases that ended up with the imposition of duties is 12% higher than the size of those that ended with price undertakings (50.8 versus 45.3 million European Currency Units, ECU).

Table 3.7: Final Outcome and Average Annual Imports of AD investigations initiated in Europe: 1985-1994

Final Decision	Number of cases	Percentage (%)	Average Annual Imports (case size) (In 1,000 ECU)
Rejection of the claim			
No dumping or injury	138	26	14,989
Community Interest	2	0	206,817
Imposition of duties	231	44	50,785
Acceptance of Undertakings	112	21	45,268
Withdrawals	35	7	51,011
Expired	7	1	5,712
Total cases initiated	**525**	**100**	
			Average Annual Imports (case size) (In 1,000 US dollars)
Rejection of the claim			
No dumping or injury	66	23	93,644
Community Interest	5	2	253,137
Imposition of duties	134	48	64,520
Acceptance of Undertakings	40	14	25,070
Withdrawals	35	13	65,156
Expired	n/a	n/a	
Total cases initiated	**525**	**100**	

Source: European Commission and EUROSTAT, Intra and extra-EU trade and United Nations COMTRADE.

3 The law

3.1 The Antidumping Law at the GATT-WTO Level

The agreement on Implementation of Article VI of GATT 1994 (GATT 1994) contains the definition of dumping. Members may not impose an AD measure unless there are dumped imports, material injury to a domestic industry and a causal link between the dumped imports and the injury. According to the agreement, dumping occurs when: the price of a product exported from one country to another i) is less than the comparable price, in the

ordinary course of trade, for the like product when destined for consumption in the exporting country, or ii) in the absence of such domestic price, is less than either a) the highest comparable price for the like product for export to any third country in the ordinary course of trade, or b) the cost of production of the product in the country of origin plus a reasonable additional amount for administrative, selling and general costs and for profits[11]. Although the first GATT regulation originates in 1947, worldwide AD rules remained relatively infrequently used for several years. The first wave of implementation once the GATT entered into force took place in the 1950s. During the Kennedy Round of trade negotiations (1964-67) there was the first significant discussion of Article VI in an attempt to standardise the implementation of AD laws. The first AD code came into force in 1967. From the Tokyo Round (1980) onwards the increase in the use of this instrument took place. The agreement included two key amendments that transformed this instrument into a highly used tool of protection. First, the definition of "less than fair value" sales was broadened in the Tokyo Round to capture not only price discrimination but also sales below cost. Cost based allegations are very commonly used in the US AD cases. Cost-based allegations account for between one half and two-thirds of cases in the US (Clarida, 1996). The second change related to the procedures involved to show material injury. The Kennedy Round required that dumped imports be "demonstrably the principal cause of material injury" for duties to be imposed. But in response to pressure from a number of developed countries, the Tokyo Code made this requirement unnecessary.

The Uruguay Round Antidumping Code came into force in 1995 and brought about another important change. Before this date, GATT members had to sign the codes. After this date, the code was an integral part of the WTO Agreement and it applies to all members (Finger 1993). This could explain the big increase in the number of cases that occurred from 1990.

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[11] Because Article VI alone is not specific enough, the Antidumping Agreement supplements it. The Agreement concluded at the end of the Tokyo Round and it was revised in the Uruguay Round. The purpose of devising it was to prevent abuse. The revised Agreement provides more precise definitions of critical concepts than are contained in Article VI. It emphasizes the triple requirement of determination of dumping, of injury and of a causal link between dumping and injury; it includes detailed procedural rules and it limits the scope and duration of antidumping remedies (GATT 1994, Articles 1-15). Since 1994, the GATT has been administered by the WTO. The 1994 Agreement also provides for an international surveillance and dispute settlement mechanism.

The antidumping and countervailing duty (AD/CVD) laws[12] have become the most popular form of import relief. Gallaway et al. (1999) provide estimates that place the collective effect of AD duties in the US as one of the biggest trade protection programmes. They report that the collective US welfare cost of US antidumping and countervailing duties are big enough to rank second only to the effects of the Multifibre Agreement in terms of most costly US trade protection programmes. Using a general equilibrium model, they estimate that the collective net welfare cost in 1993 was 4 billion dollars.

One extremely controversial administrative practice is "cumulation" by which investigating authorities aggregate similar imports from all countries under investigation and assess the combined impact upon the domestic industry. The most restrictive of all countries in this question have been the US and the European Union. In 1984, the US Congress amended the AD and countervailing duty (CVD) laws, mandating that the International Trade Commission (ITC) "cumulate" imports across countries when determining injury. According to Hansen and Prusa (1996) since 1984 the cumulation provision has been invoked in over 50 percent of the AD and CVD cases. They estimate that the cumulation increases the probability of an affirmative injury determination by 20 to 30 percent and has changed the ITC's decision (from negative to affirmative) for about one third of the cumulated cases. The effect increases with the number of countries involved even when the market share remains the same, creating a supper-additive effect on the decision-making process[13]. The WTO Antidumping Agreement of 1994[14] explicitly allows for imports of more than one country subject to the investigation to be cumulatively assessed provided the volume of imports of each country is not negligible. The volume of imports from an individual country is negligible if it accounts for less than 3% of imports unless countries, which individually account for less than 3% of the imports of the product collectively account for more than 7% of imports of the product.

In Europe, according to a GATT consistent regulation the firms (usually industry federations) requesting an investigation - who are very knowledgeable of the intricacies of the injury determination - tend to file AD complaints against multiple exporters of "like"

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[12] Countervailing duties laws provide for a duty when imported products are subsidised in some manner by a foreign government and material injury is caused. They are targeted at specific products and foreign firms or government.

[13] Tharakan et al. (1998) analyse this for Europe. They estimate that cumulation increases the probability of an affirmative decision by nearly 42%.

[14] Paragraph 3, Article 3.

products[15]. Since 1994, the regulation permits the cumulation of imports from several countries under certain conditions. It provides discretion to decide whether or not to cumulate the imports from the different countries under consideration and the EC has made ample use of this discretion.

3. 2 The Antidumping Regulations in Europe

Each member state is free to implement GATT/WTO consistent AD policies. The vagueness in the WTO guidelines means that each country interprets the guidelines differently. There is, therefore, a substantial variation in AD statues. In this section, the specificities of this interpretation for Europe are presented. Some of the main differences with the US implementation of AD laws are highlighted and the interplay of the different units involved in the investigations within the administration is discussed.

European antidumping legislation stipulates that the European Commission is allowed to take antidumping measures if i) a foreign firm is dumping on the European Market, ii) it causes injury to a European industry and iii) the Community Interest is taken into account. The first antidumping regulation dates from 1968 and it was first used in 1970. Since then and until 1995, there have been five other regulations reflecting either the outcomes of GATT Rounds or a need for improvement in the application of existing rules. New regulations were introduced in 1979, following the conclusion of the Tokyo Round and the new Antidumping Agreement. After that there were regulations in 1984, 1988 and 1994 – when the Uruguay Round concluded with a new Antidumping Agreement.

In the EU, the procedures concerning antidumping have to prove the existence of dumping, the existence of material injury and the causal link between these two as well as consider the community interest. This means that the benefits of imposing AD measures are superior to the damages for the European Community. The determination of dumping involves the determination of the 'normal value' (exporters' domestic market price), the determination of the 'export price' (price in the EU market), the adjustments to assure comparability and the calculation of the 'dumping margin' as the difference between the two. The community interest provision has always existed in European antidumping

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[15] Council Regulation (EC) 3283/94 on Protection against Dumped Imports from Countries non-Members of the European Communities, L349:1-22, and Council Regulation (EC) 384/96 of 22 December 1995.

legislation although it was in 1994 that a new article (Article 21) was added providing details on how this is applied. It is together with the injury criteria the least well defined. Some changes in the regulation of AD were introduced in 1996.[16]

When a petition is filed the calculation of the dumping and injury margin follows. Dumping is caused whenever there is a positive difference between the 'normal value' of a product sold by the foreign firm and the actual price it charges in the European market. It requires that the foreign firm sell below the 'normal value'. This is a problematic issue for non-market economy countries. If the exporter of the good operates in a market economy, the 'normal value' is the price charged by the foreign firm in its domestic market. If the firm operates in a non-market economy, the 'normal value' is taken to be the price of the like-product in a reference country that operates in a market economy regime. The choice of the reference country is determined by the Commission and cannot be influenced by the exporter. This could lead to some bias if the country chosen is highly protected, has reached a higher level of economic development, has higher prices and wages, or if the industry used for the comparison is characterized by high concentration. The constructed value is expected to be high, making the findings of dumping more likely. This could make exporters from non-market economies particularly vulnerable to a decision where dumping is found (see Vermulst 1987). For this reason, a dummy variable will be included in the econometric specification used in the next chapter, to capture the existence of a possible bias in the decisions on dumping.

The legal definition of injury is rather vague. It involves a checklist of injury criteria. This checklist includes the volume of "dumped" imports, prices of such imports and actual or potential trends in production, capacity utilization, market share, stocks, sales, profitability and returns on investment, cash flows, employment and wages. The actual calculation of an injury margin is kept confidential. Nevertheless, several authors have pointed out (Tharakan 1993, Vermulst and Waer 1991) that the injury margin equals the level of price undercutting or price under-selling. When the price of a foreign product sold in the European Union is lower than the European price for a similar product, the price difference is taken as an appropriate measure of price under-cutting. Price under-selling

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[16] Especially Council Regulation (EC) No.384/96 of 22 December 1995. This regulation is basically an amended version of regulation 3283/94 that was itself a response to the new WTO agreement. It incorporates a few changes to take account of the Uruguay Round Agreement in one or two very technical issues on the calculation of dumping and changes to some procedures (voting/ timing of the investigations) but they do not affect the sample period.

refers to the difference between European 'target' prices and the price of the foreign like product sold in the EU. A 'target' price is constructed as the European cost of production adding a reasonable profit margin for the industry involved. The calculation of price under-selling is appropriate for measuring injury when, after dumping has occurred, the domestic firm has reduced price in order to keep market share. The sales price of the EU producers is ignored.

It is worth mentioning that the European AD legislation differs from that of the US in several respects. First, in Europe there exists a "lesser duty rule" by which the level of any antidumping duty is limited to the amount required to eliminate the injury to the Community industry where this is less than the margin of dumping[17]. Whenever the price of the foreign product in the foreign market is higher than the domestic price in the EU the injury margin is lower than the dumping margin. In this way the rule partially shifts the emphasis from dumping to injury. Second, in the EU a large number of cases in which dumping and injury are established are terminated by the acceptance of price undertakings. A price undertaking is an agreement by the foreign exporter to eliminate injury by increasing its price in the European market or restrict its volume of exports towards this market. This will be the subject of Chapter 5. Third, AD duties are levied only after dumping and injury have been found. In the US a bond is deposited before the outcome of the investigation is known, although this is paid back in case of a negative finding. Fourth, the EU Sunset Clause establishes that AD measures lapse automatically after 5 years as opposed to the US where measures only lapse if the foreign firm shows that dumping has stopped[18].

There are separate antidumping rules for coal and steel products falling under the European Community Steal and Coal (ECSC) Treaty. The most notable difference between the regulations that apply to these two industries and the ones that apply to all others is on the relationship between the Commission and the Council of Ministers (COM). More precisely, the Commission without the approval of the Council can decide on the imposition of definitive measures. This feature will be reconsidered in the econometric analysis of the decisions presented in Chapter 4.

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[17] Article 13 (3) of Council Regulation (EEC) 2423/88.
[18] In the US, administrative duties can be adjusted by the Department of Commerce "administrative reviews" as often as every year to recalculate the dumping margin. In this way, foreign firms can affect future margins by their pricing decisions and can capture rents by increasing prices and obtaining lower future duties at considerable welfare cost (Gallaway et al. 1999).

3.3 The Investigation Procedure in Europe

In the first part of this section, I will explain the steps, duration and possible outcomes of an antidumping investigation process in Europe. This will be useful in helping to understand the econometric results presented in the following chapters. Only a firm or group of firms can initiate an antidumping investigation. The firms should present their evidence to the European Commission, which is the institution that carries out the investigations. The regulations require that at least 50% of the industry should be represented to initiate a petition. For this reason the majority of complaints are filed by a trade association on behalf of the firms in the industry. These associations often have coordinating ability, expertise and experience in the administrative procedures and requirements.

The regulations contain a very precise timing in which each decision has to be made. The main stages involved could be called opening, preliminary decision and definite decision. The complaint must contain *prima facie* evidence of dumping, injury and the causal link. The Commission should decide within 45 days of receiving the complaint whether or not to initiate an investigation. When a case is opened it is published in the Official Journal. The Commission then sends out questionnaires to the relevant parties: exporting firms in the targeted third countries, domestic producers and other interested parties, typically importers. The questionnaires are extremely detailed. Very detailed information has to be produced at the level of the specific product concerned. If detailed information is not provided the party concerned will be deemed not cooperating and the investigation can be terminated. A crucial aspect is the timescale within which the questionnaire must be completed. This is normally 30 days after its receipt. The Commission then conducts on-site verifications at the premises of the main exporters, complainant producers and importing interested parties. Later, there is a hearing that takes place at the offices in Brussels. Questionnaires, verifications and hearings along with other written submissions provide the Commission with the information it needs to determine dumping, injury and establish the causation of material injury. If the criteria are met, it imposes provisional AD measures. These provisional measures are imposed for six to nine months after the investigation is launched, although the whole process can take a maximum

of fifteen months. Provisional measures could be in place for no more than nine months. This is the maximum period allowed by the EU regulations. This preliminary decision is published in the Official Journal. If a provisional duty is imposed, it is not paid when the product comes through EC customs. Instead, the defendants must give a bank guarantee so that as and when the duty is made definitive the provisional duties can be collected. During the imposition of provisional duties and the definitive decision, the European Commission gives the working documents to the members, but no detailed information is provided.

The Commission has six months to reach a definitive decision. Over this period the Commission deals with responses to the provisional findings from the interested parties, in particular, the exporters and users/consumers opposing the imposition of measures. The conclusions may change, but usually only where new information or evidence is provided, errors are corrected, etc. and modifications are not substantial. Once the investigation is completed, the Commission makes a proposal to the Council of Ministers for the measures to become definitive. If approved, they will be put in place for five years. In the past, the decisions in the Council have to be approved by qualified majority. However, since 1994 decisions have to be approved by simple majority[19]. This definitive decision is published in the Official Journal. The econometric analysis discussed in Chapters 4 and 5 is based on the definitive decisions accordingly published.

The information contained in an investigation is kept confidential. The interested parties – for example, exporters and European firms – receive a disclosure notice from the EC prior to the imposition of provisional and definitive duties. The defendant can comment on it – usually on adjustments to the dumping and injury margins – but they have a very tight period in which they can do so. So, in practice, many defendants do not introduce modifications or comments on the case. Moreover, the disclosure notice does not contain detailed information. The information is similar to what it published in the Official Journal. In summary, the information disclosed to the defendant is very little[20].

Unlike in the US, in Europe two different administrative units within the European Commission conduct the investigations on dumping and injury. Both investigations are

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[19] Council Regulation (EC) No. 461/2004 amends Regulation (EC) No. 384/96 in that it changes the Council of Ministers voting rule. It requires that a simple majority of Member States in the Council to reject a Commission proposal for imposing definitive measures. Previously, abstentions counted effectively against a Commission proposal.

[20] Interested parties can have access to non-confidential files like the questionnaire response and other submissions in the offices in Brussels and make their own responses.

carried out independently[21]. When an investigation either on dumping or injury has been carried out a decision is made and it is published in the EC Official Journal. However, some investigations on injury are not carried out if the outcome of the investigation on dumping on that case is negative and vice versa.

The final outcome of an investigation could be: a) a rejection of the claim where no dumping or injury were found or it was in the community interest not to impose penalties, b) imposition of an antidumping duty, or c) the acceptance of undertakings. A case can be sometimes terminated because the firms withdraw the petition. It can also be terminated because the period in which it should have been completed expired[22]. A summary of the final outcomes of all investigations for each year in the period of study is presented in Table 3.8.

Table 3.8: Final Outcome of Antidumping Investigations Filed in 1985-2003, by year

Year	Negative	Affirmative (%)	Withdrawn	Expired	Total	Affirmative (%)
1985	18	33	0	0	51	64.7
1986	8	37	3	0	48	77.1
1987	5	40	0	0	45	86.7
1988	26	45	0	0	71	63.4
1989	30	17	0	6	53	32.1
1990	21	39	6	0	66	59.1
1991	1	35	1	0	37	91.9
1992	15	36	4	1	56	64.3
1993	8	30	4	0	42	71.4
1994	8	31	17	0	56	55.4
1995[a]	7	19	8	n.a	34	55.9
1996[a]	11	16	1	n.a	28	57.1
1997[a]	12	22	3	n.a	48	45.8
1998[a]	4	13	4	n.a	21	61.9
1999[a]	10	46	9	n.a	65	70.8
2000[a]	9	20	2	n.a	31	64.5
2001[a]	7	23	1	n.a	31	74.2
2002[a]	6	8	7	n.a	21	38.1
2003[a]	0	7	0	n.a	7	100.0
Total	204	517	70		805	100.0
Percentage	25.3	64.2	8.7		100	

Note: The unit of observation is the sub-case. a/ Data contains only some review cases
Source: European Commission, Official Journal, C and L series and Global Antidumping Database
Version 2.0 (Bown 2006)

[21] In the US, the Department of Commerce, which is a branch of the executive and the International Trade commission (ITC) are the institutions whose members implement AD policy. The dumping investigation is carried out by the former while the injury determination is done by the independent but politically appointed agency, the ITC.
[22] A previous investigation can be reinitiated if the firms that originally requested ask for a review or if the European Commission requests a review.

There are several European institutions and bureaucratic agencies involved in AD investigations. The most important ones are the European Commission (EC), the Council of Ministers (COM), the Antidumping Advisory Committee (ADAC) and the Courts. The European Parliament has only a very limited influence. It is consulted on proposals to change the antidumping regulations but it has no role at all in the investigation procedure. The European Commission carries out the investigations as outlined previously. The Council of Ministers has to give its approval for the definitive measures to take place. In the Council, there is one representative per member state. Before 1994, the decisions had to be approved by qualified majority. Since then, they have to be approved by simple majority. The regulations require a simple majority of Member States in the Council to reject a Commission proposal for imposing definitive measures. Previously, each member state was given a certain number of votes in the Council, weighted according to its size and population and abstentions counted effectively against a Commission proposal. Under the new rules, it is more difficult for a minority of countries to oppose a proposal. The requirement of approval by the Council is an exceptional one that does not exist in other areas of Community Law, i.e. in the domain of competition policy. Most of the involvement of member states comes from the Antidumping Advisory Committee (ADAC). It comprises relevant civil servants from national countries. Each member state is represented by one person. Its role is only consultative. The main consultations occur at the initial stage (initiation) and when provisional and definitive measures are proposed. The European Commission is the agenda setter and chair of this committee. From 1994, the validity of a decision can be questioned before the Court of First Instance. Before that date, any questioning fell under the jurisdiction of the European Courts of Justice. In practice, the Court simply ensures that the procedural requirements have been met. On average, eight cases are brought before the Courts each year (Kempton 2001). The issues raised are in most cases rather technical and on how certain aspects have been investigated. Generally, the Court has found in favour of the Commission.

4 Concluding Remarks

The purpose of this chapter has been to present a descriptive analysis of AD investigations worldwide, its prevalence in Europe as well as an explanation of the AD law and its implementation that provide the background for the analysis of the political economy aspects of AD in Europe.

In the next chapter an empirical analysis of the political and technical determinants of the dumping and injury decision by the European Commission in the period 1985-2003 will be presented. A discussion of the related literature on the political economy of trade policy, in general, and the political economy of administered protection and antidumping, in particular, is presented. This discussion provides the frame in which the empirical analysis is conducted. The hypotheses formulated will be analysed.

In chapter 5 of this thesis, the analysis will be extended further. An empirical analysis of the determinants of the European Commission's choice to accept price undertakings instead of imposing AD duties will be discussed. After a positive decision on dumping and injury has been made, legal provisions allow an AD case to end up with the imposition of duties or with the acceptance of price undertakings. In spite of the frequent use of undertakings in Europe, there are no clear-cut rules for its acceptance or rejection. So, several hypotheses will be presented and empirically analysed.

Appendix 3

Table 3.9: Antidumping Investigations Worldwide (1987-1997), by Reporting Country

Reporting Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total	%
U.S.	15	40	24	34	63	83	32	48	14	22	16	391	17.8
Australia	22	16	21	47	68	71	59	15	5	17	42	383	17.4
EU	28	27	18	48	29	42	21	43	33	25	41	355	16.2
Canada	31	15	13	15	11	46	25	2	11	5	14	188	8.6
Mexico	18	11	7	11	9	26	70	22	4	6	6	188	8.6
Argentina	0	0	0	0	1	14	27	17	27	22	15	123	5.6
Brazil	0	1	1	2	7	9	34	9	5	18	11	97	4.4
South Africa	0	1	0	0	0	0	0	16	16	33	23	88	4.0
New Zealand	0	9	1	1	9	14	0	6	10	4	5	59	2.7
India	0	0	0	0	0	8	0	7	6	21	13	55	2.5
Korea	1	0	1	5	0	5	5	4	4	13	15	53	2.4
Turkey	0	0	0	0	0	0	7	21	0	0	4	32	1.5
Poland	0	0	0	0	24	0	0	0	0	0	1	25	1.1
Colombia	0	0	0	0	2	3	6	3	4	1	1	20	0.9
Israel	0	0	0	0	0	0	1	1	5	6	3	16	0.7
Peru	0	0	0	0	0	0	0	3	2	7	2	14	0.6
Finland	5	5	2	0	1	0	0	0	0	0	0	13	0.6
Indonesia	0	0	0	0	0	0	0	0	0	9	4	13	0.6
Malaysia	0	0	0	0	0	0	0	0	3	2	8	13	0.6
Venezuela	0	0	0	0	0	0	3	0	3	2	4	12	0.5
Philippines	0	0	0	0	0	0	1	7	0	1	2	11	0.5
Sweden	0	0	0	0	1	0	0	0	0	0	0	11	0.5
Austria	0	0	8	2	0	5	4	0	0	0	0	9	0.4
Chile	0	0	0	0	0	0	1	1	4	3	0	9	0.4
Thailand	0	0	0	0	0	0	3	0	0	1	2	6	0.3
Costa Rica	0	0	0	0	0	0	0	0	0	4	1	5	0.2
Japan	0	0	0	0	3	0	0	1	0	0	0	4	0.2
Singapore	0	0	0	0	0	0	0	2	0	0	0	2	0.1
Guatemala	0	0	0	0	0	0	0	0	0	1	0	1	0.0
Total	120	124	96	165	228	326	299	228	156	221	233	2,196	100
Percentage	5.5	5.6	4.4	7.5	10.4	14.8	13.6	10.4	7.1	10.1	10.6	100	

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998).

Table 3.10: Traditional and New Users of Antidumping (1987-1997): Worldwide

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total
Traditional Users	96	107	77	145	180	256	137	114	73	73	118	1,376
New Users	24	17	19	20	48	70	162	114	83	148	115	820
Total	120	124	96	165	228	326	299	228	156	221	233	2,196
% of New Users	20	14	20	12	21	21	54	50	53	67	49	37

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)
Traditional Users: the United States, Australia, Canada and the European Union.
New Users: all other countries.

Table 3.11: Antidumping Investigations by Main Blocks (1987-1997): Reporting Countries

Year	OECD		South East Asia		Non- Market Economies		Others		Total	
	Reporting	%	Reporting	%.	Reporting	%.	Reporting	%.	Reporting	%
1987	101	84.2	1	0.8	0	0.0	18	15.0	120	100
1988	112	90.3	0	0.0	0	0.0	12	9.7	124	100
1989	87	90.6	1	1.0	0	0.0	8	8.3	96	100
1990	147	89.1	5	3.0	0	0.0	13	7.9	165	100
1991	185	80.9	3	1.3	24	10.7	16	7.1	228	100
1992	261	80.1	5	1.5	0	0.0	60	18.4	326	100
1993	148	49.5	9	3.0	0	0.0	142	47.5	299	100
1994	135	59.2	14	6.1	0	0.0	79	34.6	228	100
1995	73	46.8	7	4.5	0	0.0	76	48.7	156	100
1996	73	33.0	26	11.8	0	0.0	122	55.2	221	100
1997	122	52.6	31	13.4	0	0.0	79	34.1	232	100
Total	1,444	65.7	102	4.7	24	1.1	625	28.5	2,192	100

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Table 3.12: Antidumping Investigations by Main Blocks (1987-1997): Affected Countries

Year	OECD		South East Asia		Non- Market Economies		Others		Total	
	Affected	%	Affected	%	Affected	%	Affected	%	Affected	%
1987	55	45.8	35	29.2	18	15.0	12	10.0	120	100
1988	43	34.7	43	34.7	27	21.8	11	8.9	124	100
1989	26	27.1	25	26.0	28	29.2	17	17.7	96	100
1990	53	32.1	39	23.6	34	20.6	39	23.6	165	100
1991	96	42.1	45	19.7	57	25.0	30	13.2	228	100
1992	110	33.7	70	21.5	91	27.9	55	16.9	326	100
1993	94	31.4	52	17.4	94	31.4	59	19.7	299	100
1994	51	22.4	45	19.7	87	38.2	45	19.7	228	100
1995	49	31.4	38	24.4	43	27.6	26	16.7	156	100
1996	64	29.0	38	17.2	72	32.6	47	21.3	221	100
1997	77	33.0	53	22.7	68	29.2	35	15.0	233	100
Total	718	32.7	483	22.0	619	28.2	376	17.1	2,196	100

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Table 3.13: European AD Investigations (sub-cases) by Economic Status of Country

Type of Country	Number of sub-cases	(% of Total)
Industrialised Countries	103	19.6%
Developing Countries	204	38.9%
Non-Market Economies	218	41.5%

Source: European Commission, Official Journal, series C and L

Note: A sub-case is a subdivision of a petition (legal case) in which each country named is considered as an individual unit.

Table 3.14: Investigations Initiated Against Europe (1987-1997), by Industrial Sectors

Industrial Sector / Country	I: Animal Products	III: Vegetables	IV: Prepared Food-stuffs	V: Minerals	VI: Chemicals	VII: Plastics	XIX: Wood	X: Pulp and Paper	XI: Textiles	XIII: Glass and Ceramic	XV: Base Metals	XVI: Machinery	XVII: Foot-wear	XVIII: Instruments	XX: Other Manufactures	Total	Percentage
Austria	0	0	0	0	1	1	0	5	2	1	3	4	0	1	0	18	4.2
Belgium	1	1	1	0	12	2	0	2	0	3	9	1	1	1	0	34	8.0
Denmark	1	1	3	0	1	0	0	0	0	0	2	0	0	0	0	8	1.9
France	1	1	1	2	9	7	0	6	1	1	13	9	0	0	0	51	11.9
Germany	0	1	3	1	20	11	1	11	2	3	20	13	1	2	2	91	21.3
German Dem. Rep.	1	0	0	1	2	1	0	0	0	0	1	1	0	0	0	7	1.6
Greece	1	1	4	0	1	0	0	0	0	0	0	0	0	0	0	7	1.6
Ireland	1	1	1	0	1	0	0	0	0	0	1	1	0	1	0	7	1.6
Italy	1	1	8	0	4	4	1	3	1	2	15	5	0	3	1	49	11.4
Luxembourg	2	1	0	0	0	0	0	0	0	0	2	0	0	0	0	5	1.2
Netherlands	1	1	5	0	10	4	0	3	2	0	4	1	0	0	0	31	7.2
Portugal	1	1	0	0	0	0	1	0	2	0	0	0	0	0	0	5	1.2
Spain	1	1	3	1	4	3	0	1	0	3	11	8	0	1	0	37	8.6
Sweden	0	0	1	0	2	3	0	3	0	0	6	4	1	0	0	20	4.7
UK	1	1	1	0	11	6	0	3	2	2	15	9	0	1	1	53	12.4
EC	1	0	0	0	0	0	0	2	0	0	1	1	0	0	0	5	1.2
Total	14	12	31	5	78	42	3	39	12	15	103	57	3	10	4	428	100.0
Percentage	3.3	2.8	7.3	1.2	18.2	9.8	0.7	9.1	2.8	3.5	24.1	13.3	0.7	2.3	0.9	100.0	

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

AD Investigations Worldwide

Figure 3.2: Number of Cases: Traditional and New Users, 1987-1997
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Traditional and New Users

Affected countries in 1987

Rest
10%

EU
21%

NME
15%

OECD-EU
25%

SEA
29%

Affected countries in 1997

Rest
15%

EU
24%

NME
29%

OECD-EU
9%

SEA
23%
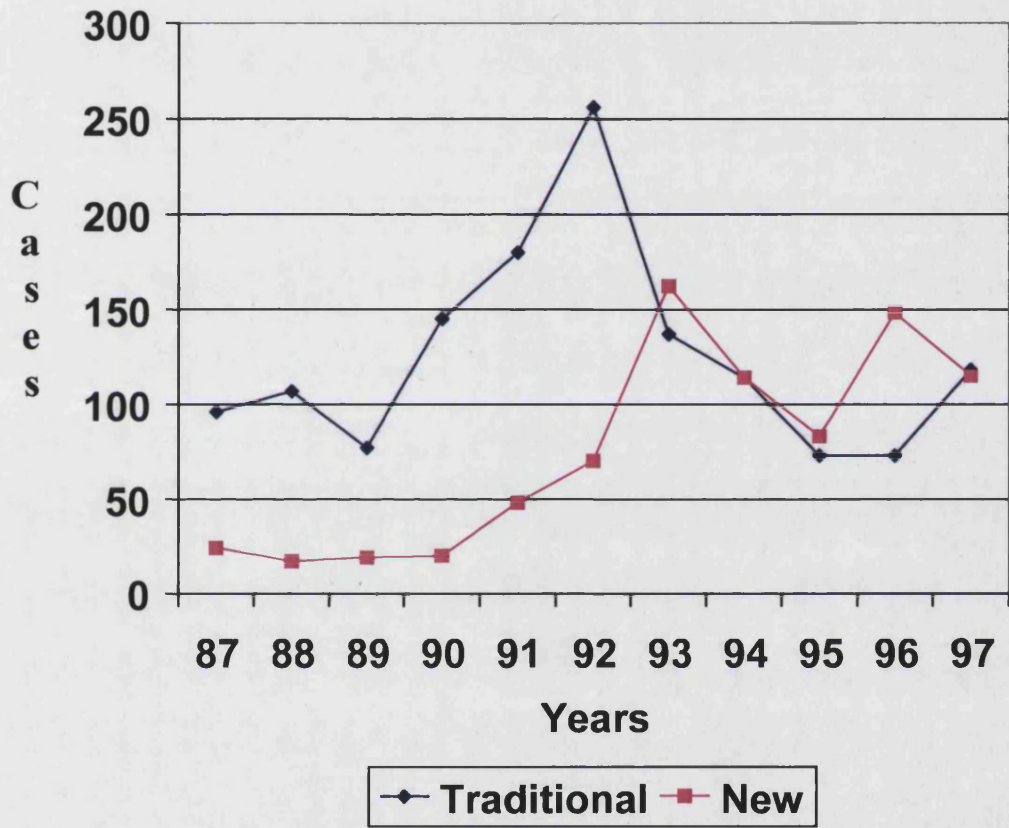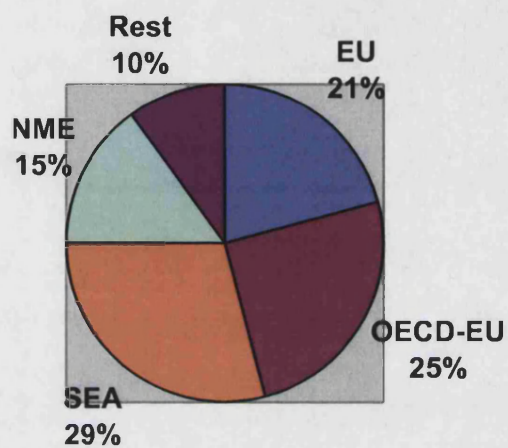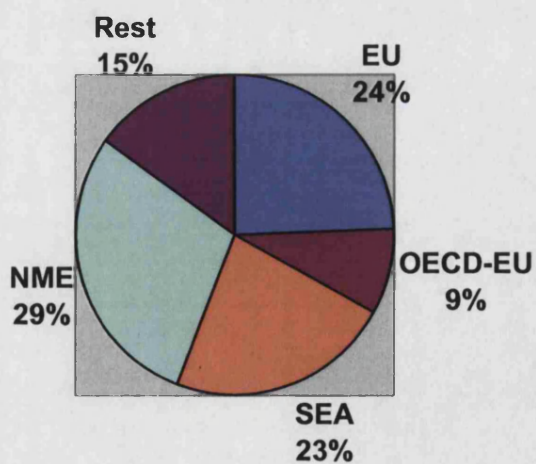
Fig. 3

Figure 3.3: Affected Countries in 1987 and 1997
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Figure 3.4: Antidumping Investigations in the US, 1987-1997
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

AD investigation in the US

Reporting countries in 1987

Rest
15%

NME
0%

SEA
1%

EU
23%

OECD-EU
61%
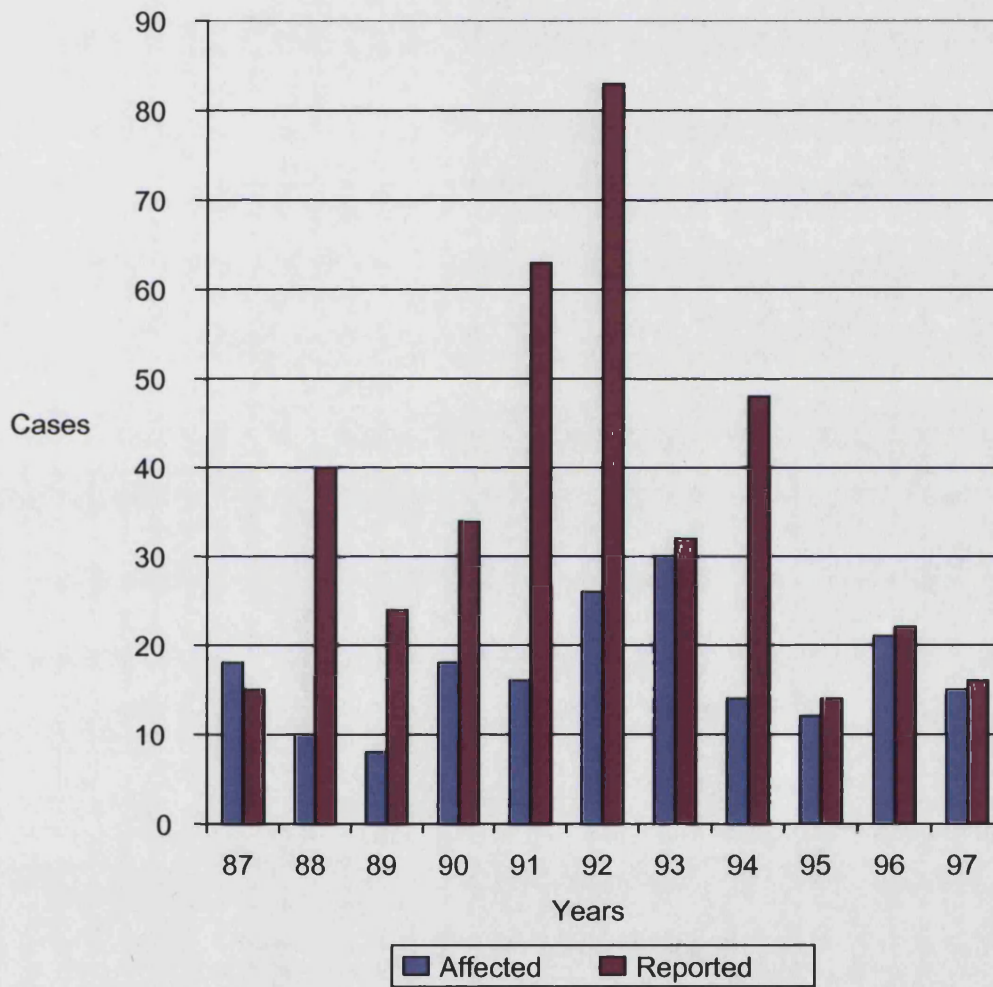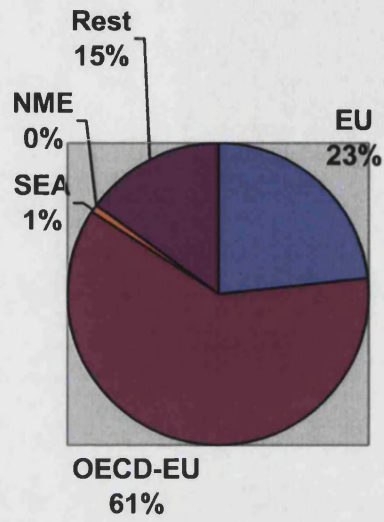
Reporting countries in 1997

EU
18%

Rest
34%

NME
0%

OECD-EU
35%

SEA
13%
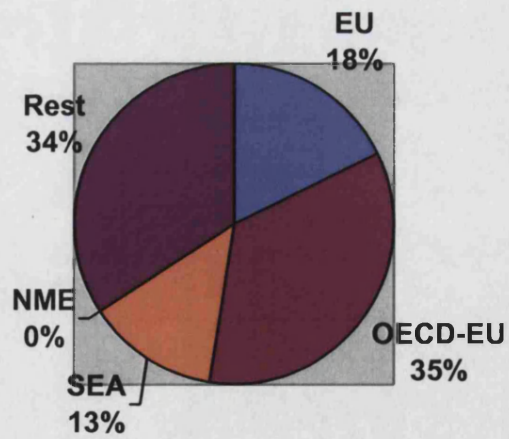
Fig. 5

Figure 3.5: Reporting Countries in 1987 and 1997

Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Reporting and Affected countries: 1987-97
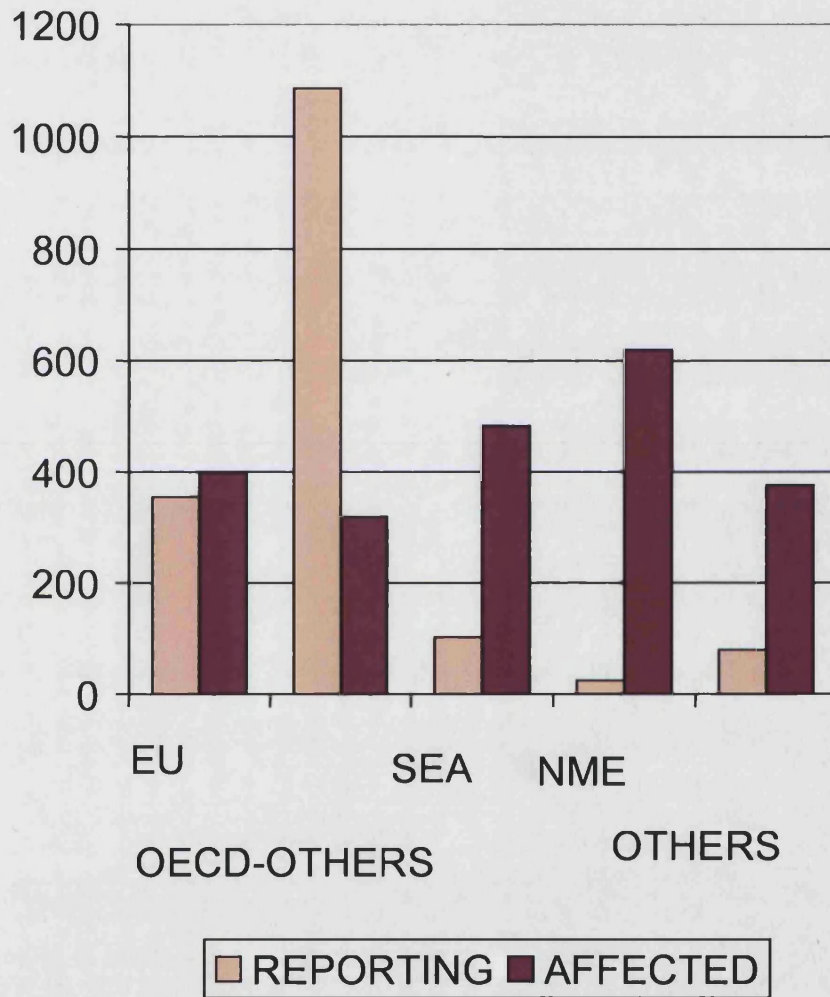
Figure 3.7: Antidumping Investigations (legal cases) in Europe, 1985-1997
Source: European Commission, Official Journal, C and L

AD cases in Europe
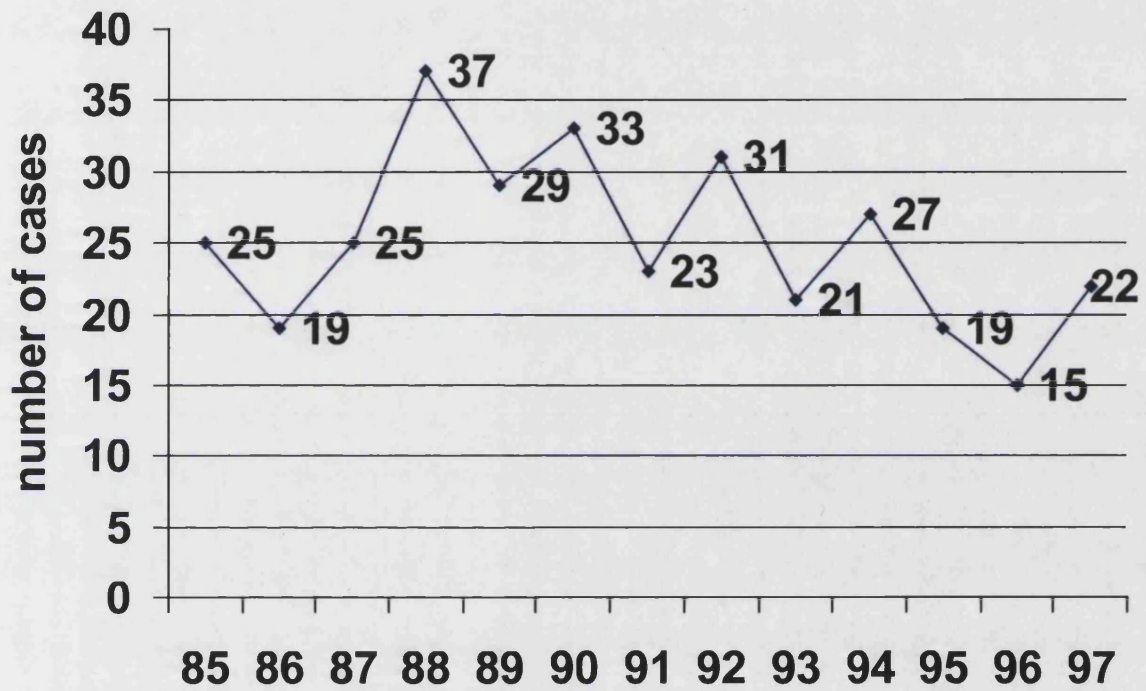
Figure 3.8: Antidumping Investigations in Europe, 1987-1997
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Investigations in Europe

97

European Anti-dumping

Others   OECD
15%   12%

SEA
33%

NME
40%
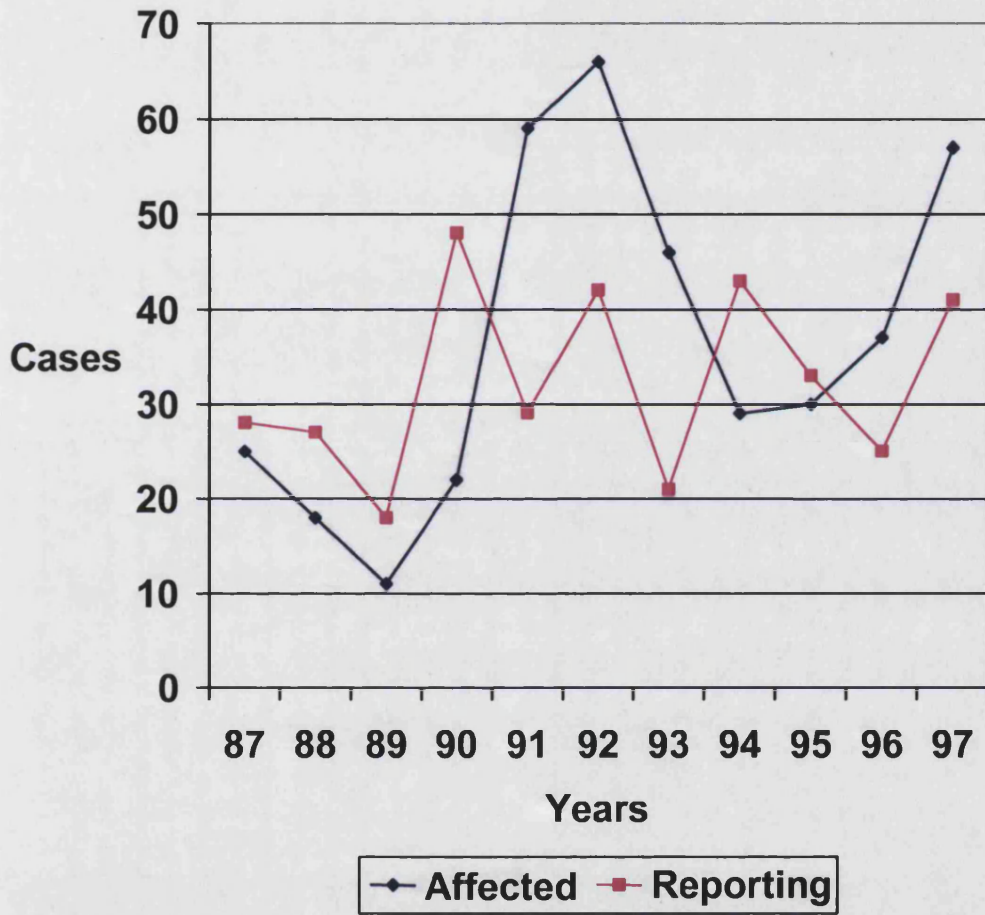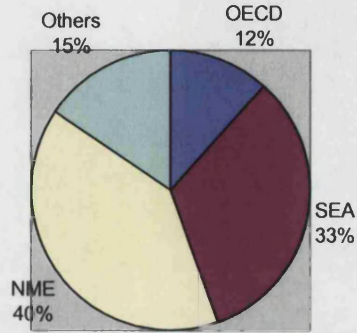
Fig. 9

European AD cases: main affected countries

Brazil	8
Romania	9
US	9
Hong Kong	10
Yugoslavia	10
Poland	11
Malaysia	11
Indonesia	11
Russia	13
Turkey	14
Thailand	17
India	18
Korea	31
Japan	31
China	55
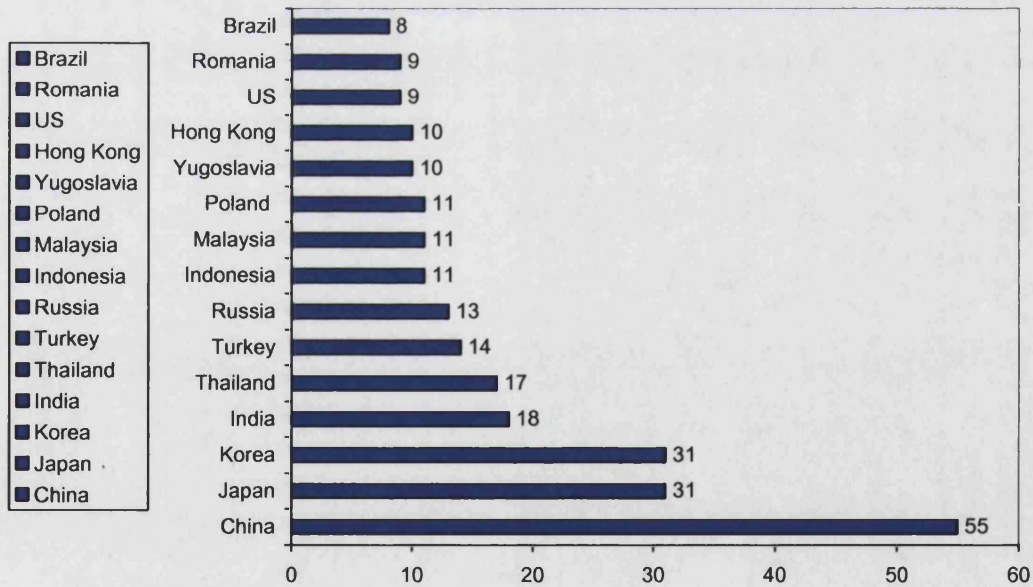
Figure 3.9: European AD Investigations, Main Affected Countries, 1987-1997
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Who files AD against Europe
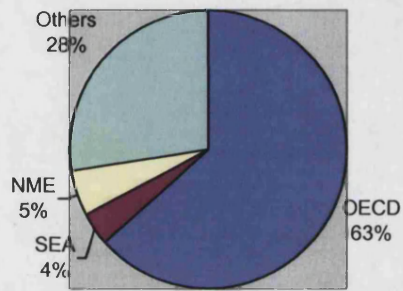
Fig. 10

Who files AD against Europe?
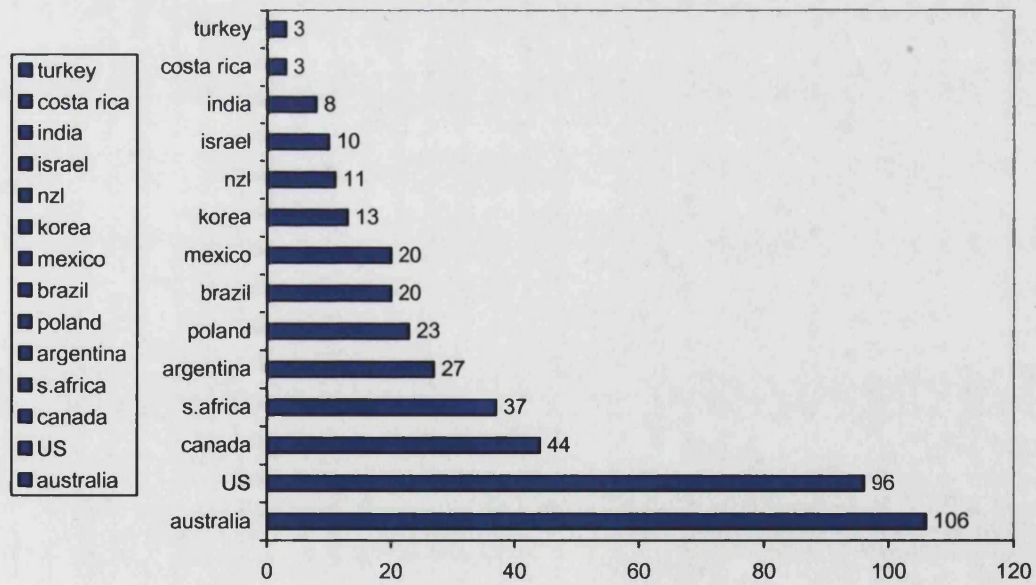
Figure 3.10: European AD Cases; Who files against Europe? 1987-1997

Who files against Europe and
who gets hurt?
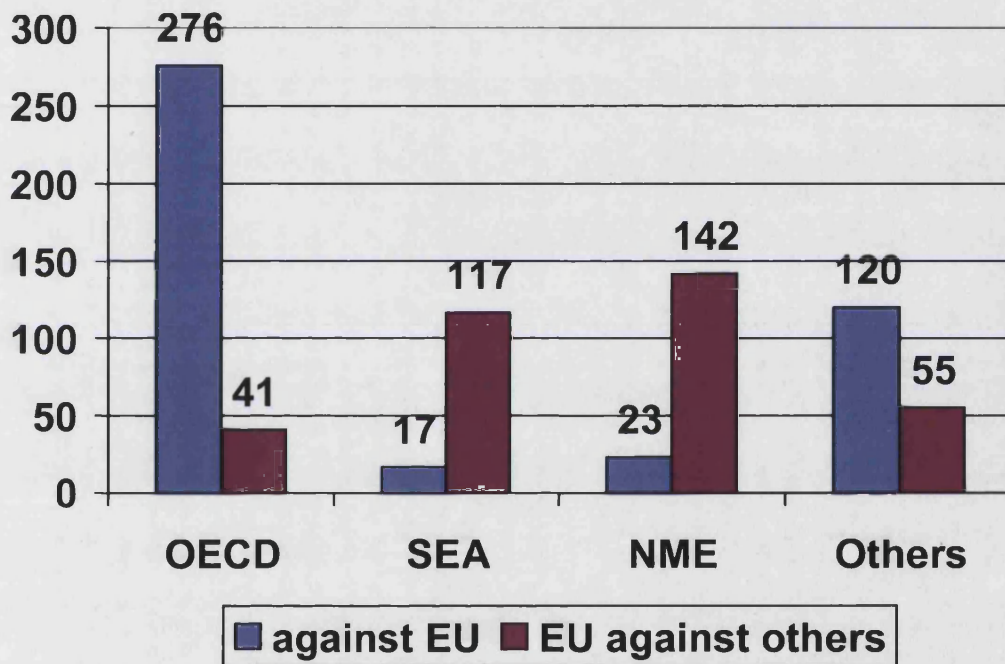
Figure 3.12: Investigations in Europe (%): 1987-1997, by Sector of Economic Activity
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Investigations: Europe

Chemicals   Iron and Steel   Others

Machinery & Elec.Equip.   Textiles
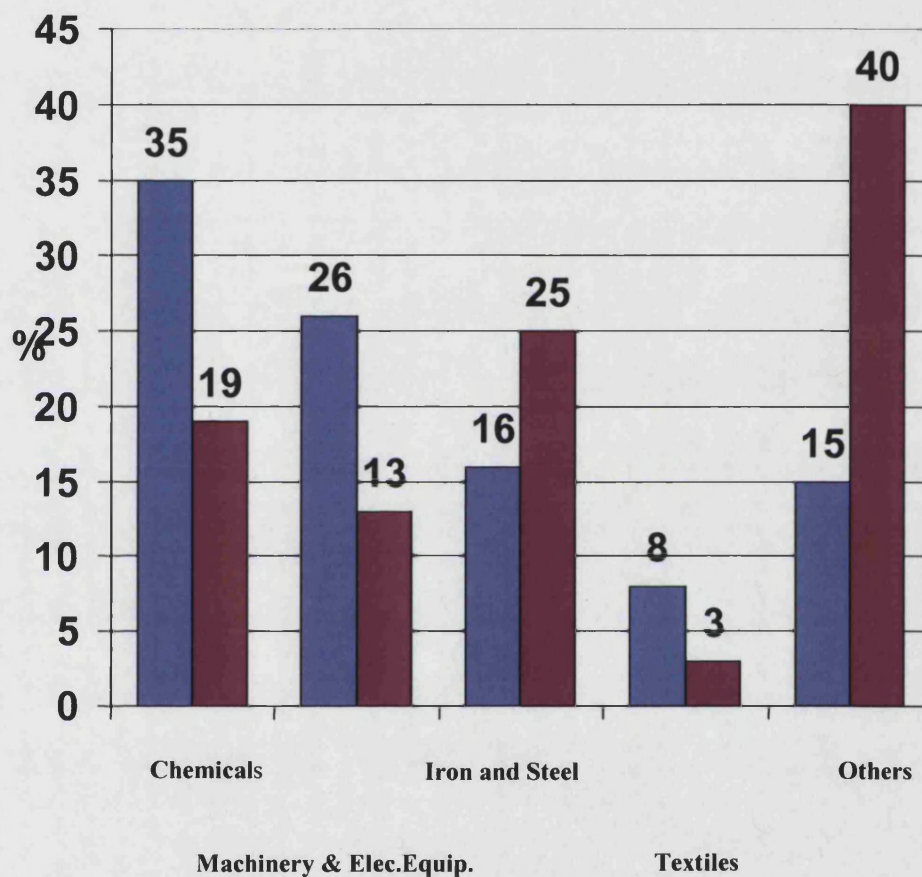
▣ EU against others ■ Others against EU

Figure 3.13: Investigations Against Europe (number of cases), 1987-97, by Sector of Economic Activity
Source: WTO Secretariat, Rules Division Antidumping Measures Database, based on Miranda et al. (1998)

Investigations against Europe
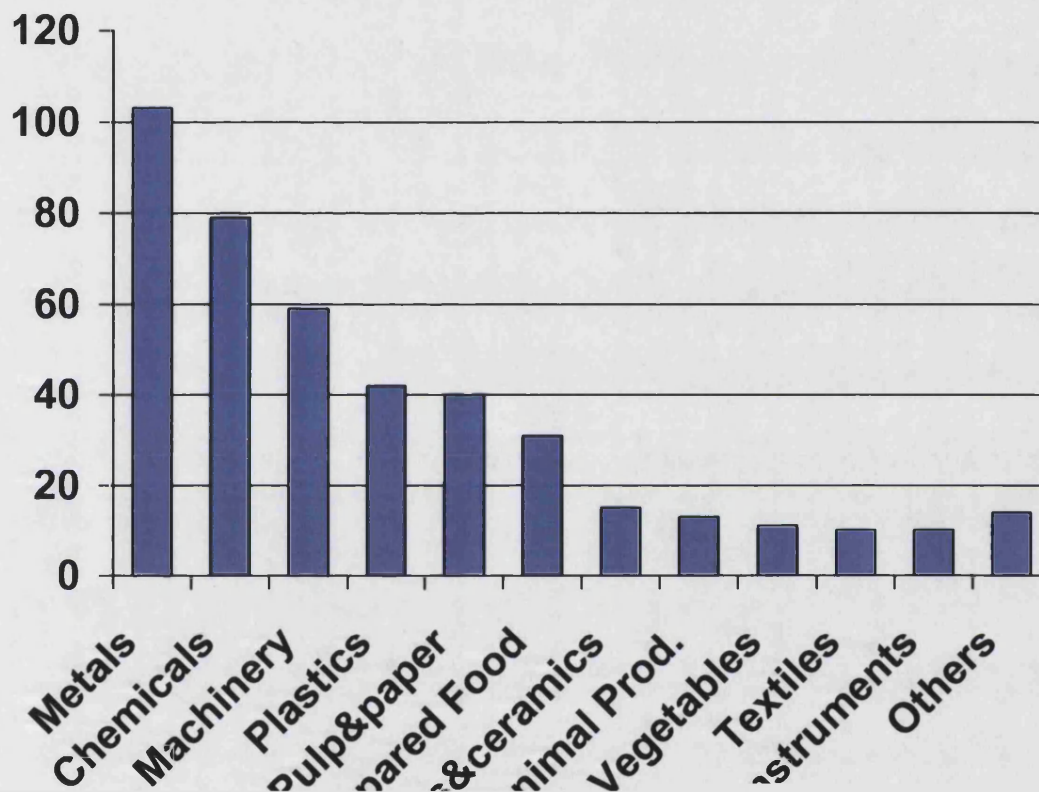
**Figure 3.14: Number of European AD Investigations (sub-cases, yearly)
by industry (1985-2003)**

Chemicals

Iron steel

Textiles
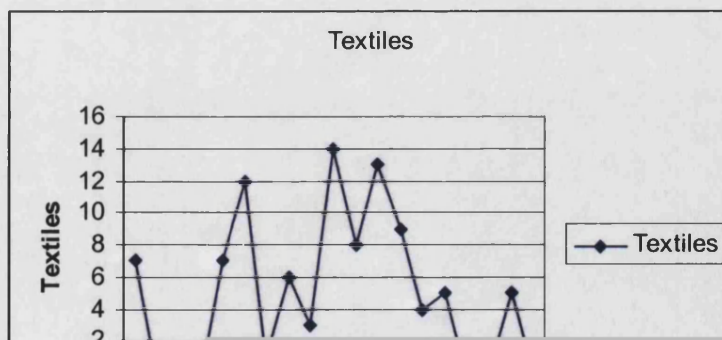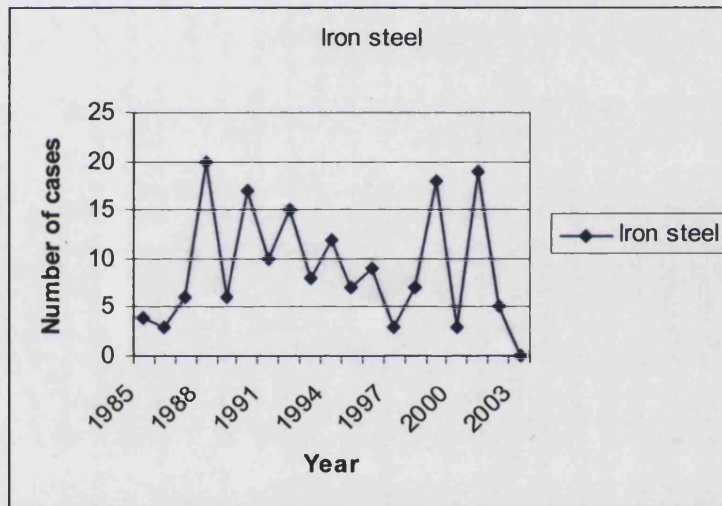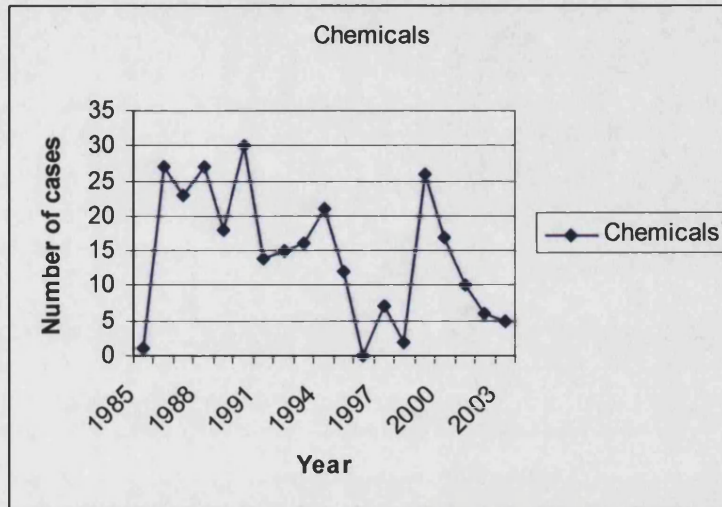
Figure 3.14: Number of European AD Investigations (sub-cases, yearly) by industry (1985-2003), continuation

Electronics/Electrical Machinery

Other

Total
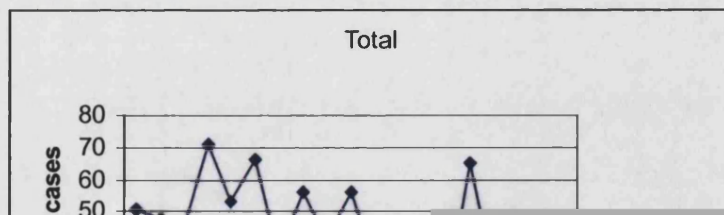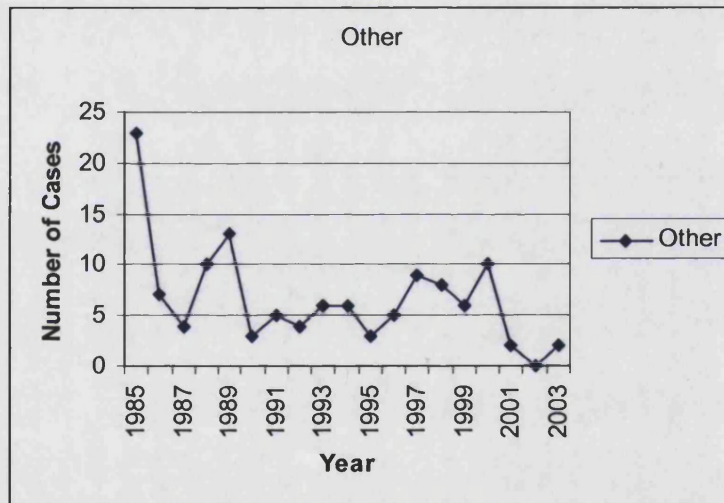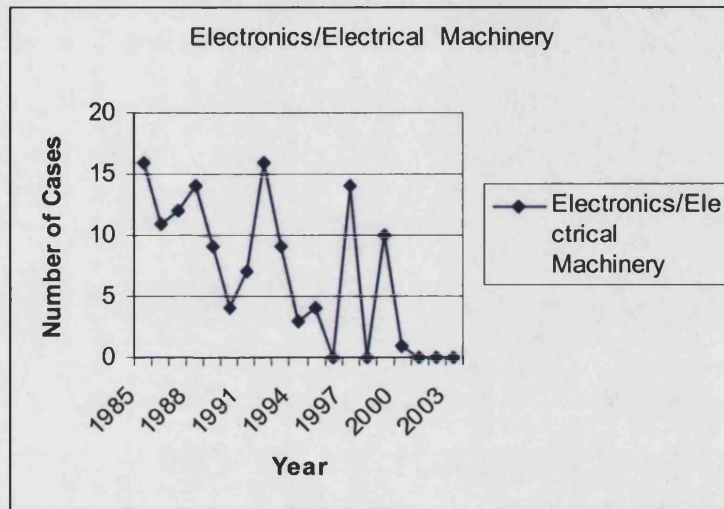
Chapter 4   The Political Economy of Antidumping in Europe

1   Introduction

After several trade talks at the World Trade Organisation (WTO) level there has been a general reduction of tariffs and a fall in traditional trade policy tools has taken place. At the same time, a rise in new forms of protection has occurred. Especially, a rise in the use of antidumping (AD) and countervailing duty (CVD) measures suggests that at least in part they may have replaced the tariffs and vertical export restraints (VER). The use of antidumping measures can lead to selective protection. Legal experts have pointed out the vagueness of the antidumping code (Vermulst, 1990). This has allowed countries to implement unilateral interpretation in law or practice and claim consistency with the AD/CVD code. This is particularly important in the definition of dumping, the determination of 'normal value' and, more significantly, in the determination of injury. The AD implementation of the law contains loopholes that could let influences other than technical criteria in the determination of dumping and injury. This vagueness makes a positive finding more likely and also broadens the scope for its use. Political economy reasons for 'administered protection' may be underlying the recent increase in antidumping actions.

The purpose of this chapter is to test empirically the incidence of these aspects in the European antidumping decisions. The analysis focuses on the AD cases decided in the European Union (EU) in the period 1985-2003. The chapter analyses the separate decisions on dumping and injury made by the independent administrative units of the European Commission. It distinguishes between political and economic determinants of the antidumping decisions. Although the nature of the antidumping mechanism is quite complex, the legal and institutional information presented in the previous chapter provides the necessary background for the empirical analysis that follows. The analysis follows the Finger-Hall-Nelson's (1982) model, which distinguishes between technical (economic) and political aspects in the determination of dumping and injury. This model can be used to

compare biases in the way in which different countries implement the antidumping code. It is also related to the work on injury decisions by the ITC by Moore (1992) and Hansen and Prusa (1997). Finger et al. (1982) empirically analyse the antidumping, countervailing duties and escape clause mechanism in the US in the period 1975-79. Tharakan and Waelbroeck (1994) have tested empirically this model for the European Union (EU) for the period 1980-87. However, the statistical analysis conducted in these studies does not control for macroeconomic factors and industry characteristics that may influence the decisions. This chapter improves on previous studies in three respects. First, it controls for macroeconomic factors and sector heterogeneity. In this way, a decision on dumping and injury being positive is explained by the general features of the double track model of administered protection as captured by the regressors. Second, it assesses the importance of multiple-country filing in the decisions on dumping and injury. The number of countries involved in an investigation is analysed as well as the importance of the cumulation rule by which the European Commission can cumulate imports when an AD investigation involves several countries. Finally, the economic significance of the results is discussed.

The empirical analysis is conducted using a combination of primary and secondary data sources. A data set is constructed with information originating in legal documents containing information about 805 antidumping investigations initiated in Europe over the 19-year period between 1985 and 2003 and associated trade and industrial statistics. The hypotheses, related literature and the econometric results are presented and discussed in the subsequent sections. Two main hypotheses are formulated. The empirical findings confirm these hypotheses.

The remainder of this chapter is organized as follows. The related literature on the political economy of trade policy and AD is presented in Section 2. Section 3 describes the hypotheses and the variable definitions. Section 4 contains the econometric specifications used. Section 5 is dedicated to the discussion of the empirical findings. Section 6 contains a discussion of the robustness and sensitivity analysis of the model. Section 7 includes a discussion of the determinants of positive findings of dumping. Section 8 presents the analysis of the economic significance of the findings. Section 9 compares the results of the AD decision for Europe with those for the US. Section 10 offers some conclusive comments.

2 The Political Economy of Antidumping: Related Literature

In this section we present a review of the literature on the political economy of trade policy, in general, and antidumping, in particular. A summary of the main contributions from the theoretical literature and of the main empirical findings is presented.

2. 1   The Political Economy of Trade Policy in General

Research into the political economy of trade policy has been very profuse in recent years. The "endogenous" trade policy determination explicitly takes into account the political circumstances under which policy is set and has been at the centre of the research in this area. The central questions have been why industries receive protection and why certain industries receive more protection than others. Gawande and Krishna (1993) present a comprehensive review of the empirical research in this area. They distinguish a first and second generation of models. The first generation is based on several theoretical conjectures that have been found to be relevant in the empirical literature. The set of models contained in this group could be classified in the following categories (Baldwin 1985). The pressure group model states that the level of protection in an industry should be positively related to variables denoting geographic and seller concentration (Olson, 1965). Olson (1983) also argues that economic groups might be organised in a context of rapid change that threatens income and employment levels. The comparative cost hypothesis suggests that industries in which the export penetration ratio is high and the import penetration ratio is low will receive a lower level of protection. The status quo model states that government officials have a preference for the status quo. For several reasons, governments want to avoid large adjustment costs. So, present protection should depend on past levels of protection and higher tariffs should be observed if there exists high import penetration and in industries intensive in unskilled workers. The voting approach suggests that elected officials tend to favour industries with the largest number of voters, so that protection is related to the number of employees in the industry. The social change model

emphasizes the motives of governments to reduce income inequality by increasing the living standards of low-income groups. Under this model protection will be higher in industries that employ low-income, unskilled workers. Several empirical studies of these first generation models provided evidence of the endogeneity of trade protection. The results indicate that industries with low wages and high level of labour per unit of output tended to be highly protected, giving support to the social change model. Support for the voting model was also found as protection levels were found to be positively related to industry employment levels. Finally, the number of firms in the industry was found to be negatively related to the level of protection as predicted by the pressure group theory. Treffler (1993) finds that comparative advantage factors – measured by import penetration and export ratios - matter immensely in the determination of non-tariff barriers (NTB) and that they are at least five times as important as business interest factors – as measured by concentration and capital measures.

A second group of theoretical models provide specific and empirically testable predictions. They are mainly contained in the direct democracy (median-voter) approach and the interest group theories. Empirical studies do not find support for the former but find support for the latter. Political organisation is found to influence the inter-industry difference in trade protection in the manner predicted by the theory, namely that tariffs are higher in industries represented by organised lobbies. The most popular model of interest groups is the model by Grossman and Helpman (1994). This model derives closed form expressions for the cross-sectional pattern of tariffs that are directly empirically testable. The model considers a specific factors' economy in which individuals have quasi-linear preferences. Some sectors are politically organised and try to influence politicians through political campaign contributions. Politicians maximise a linear objective function in which they give positive weight to both political contributions and aggregate social welfare. Protection across sectors is measured as a vector of import and export taxes. This model predicts that if an industry is import competing and is organised it is able to buy protection and obtains a protective tax. If it is not organised, it receives a penalising import subsidy. The protection the industry receives depends negatively on the degree of import-to-output ratio and depends inversely on the elasticity of import demand. The predictions of this model have been empirically tested for the US (Goldberg and Maggi, 1999). The paper finds support for the theory and confirms that political organisation influences the inter-industry difference in trade protection in the way predicted by the theory. *Ceteris paribus,*

tariffs are higher, on average, in industries represented by organised lobbies. One of the primary contributions of the Grossman-Helpman model is that it provides a theory of interactions between government and lobbies with strong micro-foundations. This model presents several challenges for empirical studies on lobbying activity, especially in relation to using data on campaign contributions. This data is mostly available on corporate campaign contributions that are not specifically targeted at influencing just trade policy. Empirical research on voting behaviour and political influences through campaign contributions refers mainly to the US, due in part to the availability of data. Research on the influence of lobbying in Europe is very scant partly because of the lack of suitable data and partly because of its political organisation. The channels of influence exerted are not directly through direct monetary contributions to politicians[23].

In the political science literature some theoretical research has focused on the impact of the power structure within government and the degree of conflict between different institutions on trade policy. Lohman and O'Halloran (1994) find that aggregate tariffs are linked to political economy variables in the US. In particular, they find US trade policy to be more protectionist in the presence of a divided Congress than under a unified Congress.

2. 2   The Political Economy of Administered Protection and Antidumping

What makes antidumping different from tariffs, quotas, voluntary export restraints, etc. is its unique combination of political and economic manipulability and the set of specific incentives it generates at the micro level. In spite of the proliferation of political economy models of endogenous protection, very few theoretical models have addressed the specificities of the antidumping legislation. One of the problems in analysing the political economy of antidumping is that the specificities of the "supply" of protection are more complex. The institutions involved in the implementation of antidumping proceedings and

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[23] This does not mean that lobbing activity is small or negligible. In 1993, as many as 525 interest groups were officially recognised and regularly consulted by the Commission (Mazey and Richardson, 1993). An

the decision making process in which it is based are quiet different from those required in the setting of tariff and non-tariffs barriers in which the units of decision making within government are the executive and the legislature. The institutional set up of antidumping raises several political economy issues that range from legislative delegation, to bureaucratic oversight and discretion, to logrolling and favouritism. Most of the issues of oversight, discretion and logrolling have been dealt with in the political economy literature. Some models of delegation refer specifically to administered protection but they do not have very strong micro foundations and have, therefore, few testable implications.

Legislative delegation is at the core of AD legislation. All countries that use AD delegate the decision making (investigations) to special bureaucratic units. The extent to which these units are isolated from political pressure and are independent of the executive authority varies across member states. In the European Union, for example, the investigations are carried out by two independent administrative units of the European Commission. Its members are appointed, so there is no direct political accountability. However, the Council of Ministers (body integrated by all member states) is the institution that has to agree on the final outcome of each investigation. Whether delegation allows pressure groups to lobby at the agency and the executive level or whether the agency is more insulated from any kind of political pressure remains a controversial issue in the literature. In principle, there is a potential for political pressure to be exerted at the agency and at the executive level. But, the delegation of decision making to an agency could also mean a lower level of lobbying as suggested by Hall and Nelson (1992). In a related paper, Moore and Suranovic (1992) show that a policy reform that lowers the likelihood of a protectionist outcome improves expected welfare when an industry has only one channel to seek protection. However, if there is more than one profitable source of protection, expected welfare may be lower because the protection seeking industry chooses the alternative path.

Another important feature of the implementation of AD is that the legislature confers a great deal of discretion to the agencies. The decisions on antidumping are usually delegated to the domain of independent agencies. The term "administered protection" usually refers to protection resulting as a *statutory* response to specified market circumstances or events and is determined by administrative agencies. These statutes are

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estimate of the number of people involved in interest representation in Brussels was close to 13,000 in 1998 (The Economist, 18th August 1998, The Brussels' lobbyist and the struggle for ear-time).

allowed by the GATT/WTO, the most common ones being AD and countervailing duties (CVD). Therefore, discretion is conferred by the WTO consistent rules, on the one hand, and by politicians (principals) who delegate decision-making powers to the agencies, on the other. However, the narrowly defined objectives of the Commission and the Council limit discretion.

The scope for judicial review is closely related to agency discretion. In 1921, the US shifted the enforcement of antidumping law from a legal process to an administrative one. From then onwards AD is a legal remedy and is not subject to criminal law or to the strict rules of meaning and proof that apply to the law. The courts have also a limited role in Europe. The European Courts of Justice, and later the Court of First Instance have had a limited mandate over antidumping decisions and the European Parliament has no say at all. This implies that the role of the courts' decision-making is very insignificant[24]. Agencies and the Council instead are the key players in the administration of AD.

Several issues related to informational asymmetries are important in antidumping. This is relevant because of the nature of the investigation procedure. All cases are initiated by a domestic firm or group of firms and the information provided by these firms constitutes an important source to determine whether there is "unfair" trade and injury. Although agencies also gather information from other interested parties, a common feature in all countries is that confidential business information is collected by the agencies involved. In the EU, in particular, only the investigating authority (the Commission) has access to all pertinent information and the interested parties only get a summary description. Several theoretical papers have modelled lobbying activity as the provision of policy relevant information. These are models of information transmission or models based on the principal agent theory. Among the first group are the contributions by Austen-Smith and Wright (1992), Austen-Smith (1993) and Potters and Van Winden (1991) that analyse the role of lobbies in providing policy relevant information. In these papers a lobby transmits valuable information to a policy maker who is relatively less informed than the lobby about the relevant policy. They show that an influential lobby can coexist at the agenda setting stage and at the voting stage. Although these models capture some of the features most relevant to antidumping, they have the disadvantage that they have no

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[24] Some theoretical research has concentrated on the role of the courts (judges) in interpreting the law (Daughety and Reinganum, 2000) and the judge's concern for reputation in decision-making (Miceli and Cosgel, 1994).

testable implications and their validity could, therefore, not be assessed empirically. Due to its relatively small size the Commission has limited information gathering capabilities and it can adopt the role of intermediation between conflicting interests. In this way, organised pressure groups can improve the transmission of information about their collective needs (Gorges, 1996).

Within the group of models based on the principal agent theory, several papers have analysed the role of delegation in government bureaucracies. Aspects of delegation of administrative procedures have been investigated by Epstein and O'Halloran (1994). Their paper studies the role of discretion of government agencies when legislators and an agency have different preferences. When deciding how much discretion to delegate, legislators trade off informational gains from agency expertise and distributive losses from bureaucratic drift when policy consequences are uncertain. They show that delegation leads to an informational gain. The trade-off between technical competence and political control is captured in a model of legislative decision about agency procedures by Bawn (1995). Hall and Nelson (1992) analyse the role of institutions in administered protection. They argue that administered protection treats protection as a public good in that the returns from increased protection necessarily cut across industries. In a model of perfect delegation, they show that administered protection induces a lower level of lobbying and lower protection.

Issues of oversight are also important in AD. The Council of Ministers (COM) plays an important role in the oversight of the agency's work. Epstein and O'Halloran (1994) show that if politicians have an ex-post veto power there is a discretionary floor, a minimum level of discretion that is always optimally granted. The effects and the degree of delegation by the executive or legislature to an agency are relevant in the context of antidumping. For example, the European Commission has discretion for setting the agenda (decides which cases to open, which proposals to make, etc.) and may have preferences that are different from those of the member states represented in the Council. But, discretion is limited by the control that the COM imposes at the final stage of approval. Unfortunately, the voting within the COM is kept confidential making it impossible to conduct empirical research on voting and to elucidate the preferences of its members and the existence of logrolling or "principle of non-interference". The research on the voting decisions on AD cases in the US has been plentiful. Moore (1992) finds that ITC Commissioners significantly differ in their voting behaviour. He analyses whether decisions of the ITC are immune to outside influence. More specifically, he analyses whether factors outside the

reasonable interpretation of the law enter commissioners' decisions. The results indicate that getting the "right" person on the Commission affects outcomes. The study finds evidence that petitions involving constituencies of the Senate trade sub-committees are favoured. Those represented by Congressmen with direct influence over the administrating bureaucracy are more likely to be successful in obtaining a positive injury decision. Hansen and Prusa (1997) analyse the decision-making process of the ITC in determining injury. They find evidence that the political pressure stems from oversight committees. Although Congress has delegated decision making powers to the ITC it retains strong influence over actual policy decision-making.

Issues of geographical location and political support may also be relevant in Europe. One could expect that those countries representing filing firms would be the only ones giving the final approval on the decisions. If members of the Council only care about the interests of the firms located within their territories, given that each member state has one representative in the COM, the only cases that would be approved would be those where the firms involved are located in eight or more countries. Kempton (2001) suggests that it is not only having an industry located in its territory what makes a country support a case and approve final measures. There may be other dimensions that shape member states' preferences. Using a sample of 55 antidumping cases initiated between 1995 and 2000 he shows that, on average, producers filing a complaint are located in three or four member states. Producers filing AD investigations located in only one country represented 10 out of 55 cases (one fifth). Producers located in less than eight countries represented 96% of the total. Considering that there were 15 member countries in Europe and that decisions in the Council have to be taken by simple majority, a minimum of 8 votes are required to obtain the approval of definitive measures. This suggests that members of the Council do not only vote for measures if the firms are located within their national boundaries. Having an industry located in its territory is not the only reason for making a country member support an antidumping case and approve final measures. Kempton also suggests that the level of country's approval about the use of antidumping could be taken as an indicator of the Council's preferences. There are countries in Europe that vote more often against the imposition of measures (i.e. the UK, Denmark, the Netherlands, Ireland, Sweden) and others who are more prone to vote for them (i.e. France, Spain, Italy, Greece, Portugal). The preferences of the Council may be the same as those of the Commission but there may be some logrolling or principle of non-interference. The situation is very different in the US

where information about voting is available. Several studies have analysed antidumping decision-making using data on Political Action Committee (PAC) contributions and voting behaviour of commissioners at the ITC (Hansen and Prusa, 1997). Moore (1992) also examines the role of the control over the ITC by congressional oversight sub committees. However, the lack of information on voting behaviour in the Council of Ministers means that empirical studies have to rely on indirect measures of political control.

The review of the research on the political economy of antidumping presented highlights that there are issues related to oversight, geographical location of industry, and voting that although relevant cannot be investigated in European Antidumping. Indirect measures have to be used instead. The analysis presented in this Chapter is in line with the work by Finger, Hall and Nelson (1982), Moore (1992), Tharakan and Waelbroeck (1994) and Hansen and Prusa (1997) who have investigated how the antidumping decisions can be captured by political pressure. Even though the decision making process is supposed to be purely statutory – that is, reflecting market circumstances - I hypothesise that political influences are important determinants of the dumping and injury decisions. The hypotheses and variable definitions are presented in the next section.   .

3   The Hypotheses and Variable Definitions

The hypotheses
The model described in this section makes a distinction between economic and political variables that influence the antidumping decisions. The model distinguishes high and low tracks in the administrative regulation of imports[25]. The low or technical track is the "rules" track. The decision-making is delegated to government agencies by the legislature. In the technical track decisions are not subject to political accountability. Cases in the low track are determined instead of decided, according to criteria established by law, administrative regulations and precedent. However, higher-track decisions are less circumscribed by rules and regulations. The government officials are subject to political accountability. Examples

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[25] This model is empirically tested in relation to antidumping and countervailing duties and escape clause mechanism for the US (Finger, Hall and Nelson, 1982). The distinction was introduced by Richard Cooper (1972), *Trade Policy is Foreign Policy*, Foreign Policy, No. 9, 1972-73, 18-36.

of the political track are the escape clause cases and they have been used in the US. However, similar provisions in European legislations have been rarely used. In Europe, the "special instrument" - similar to section 301 of the 1974 US Trade Act - allows the Commission to react to "illegal" practices of trading partners but has rarely been used in practice. Similarly, the safeguards provisions (article XIX of GATT) have very rarely been used.

Decisions such as AD determinations are made administratively and can, therefore, be considered low track. In principle, AD decisions have to be done according to certain rules and procedures. However, it has also been argued that the implementation of the AD laws contains loopholes that could lead in influences other than technical criteria mainly in the determination of injury. Several questions will be evaluated in this Chapter. The statistical aim of the analysis is to determine the influence of both political and economic variables on the likelihood of an affirmative dumping and injury decision. We test two hypotheses:

Hypothesis 1 - The political variables are not significant in the determination of dumping

Hypothesis 2 - The technical variables (comparative costs) are not significant in the determination of injury

In the regressions, economics and political variables are included. However, it is expected that mainly economic variables will be significant in the dumping decisions whilst mainly political variables are expected to be significant in the injury decisions. Law specialists have well documented that the European implementation of the WTO Antidumping Agreement seems to be biased against countries with no market economies as discussed in Chapter 3. Accordingly, a dummy variable is introduced to capture this in the econometric specifications.

In what follows, I present a description of the variables used and the theoretical justification for its inclusion in each regression as well as a comment on the hypothesised sign of each of them. In the dumping equation, the dependent variable is a binary variable that takes the value one if dumping is found to exist and zero, otherwise. Similarly, a binary

variable is constructed for the injury regression. Finally, I describe the data. A list of data sources is presented in Appendix 4C.

The variable definitions

The political variables can be divided into international and domestic. Among the former is the share of European exports that are exported to country j (the country of the defendant) as a proportion of total European exports (X). The variable is defined as the ratio $X_j = \dfrac{X_{EU}^j}{X_{EU}}$, where X_{EU}^j is the total exports from the EU to country j and X_{EU} is the total exports of the EU in the year of the investigation. This variable represents the dependence of EU exports markets on the country of the defendant. I hypothesise that there could be a threat of retaliation in the AD decisions. The main channel through which retaliation can affect the decisions made may operate at the level of the government agency involved, namely the Commission. The decision to grant protection may be influenced by the possibility that an affirmative AD finding leads to retaliation by the foreign countries through the use of AD by the country of the defendant or by the GATT/WTO trade dispute settlement mechanism[26]. Since agencies have considerable discretion, the agencies' decisions may not be completely determined by the facts of the case. It is expected that the higher the proportion of European exports to the country of the defendant on the volume of total exports, the less likely it is that there would be a positive finding of dumping. Therefore, we expect the estimated parameter to be negative[27].

Another variable included as an international influence is an indicator one, which takes value one if the country of the defendant is a less developed country (LDC) and zero, otherwise (see Appendix 4C for classification of countries). In principle, there is no presumption about whether in cases brought against a LDC dumping is more or less likely to be found. Article 15 of the Agreement on Implementation of Article VI of the GATT states:

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[26] Bown (2002) presents a theoretical model with misuse of AD procedures under a situation where the recourse is available to the foreign country under the GATT/WTO dispute settlement process.

[27] Blonigen and Bown (2001) investigate the effects of the threat of foreign retaliation on US antidumping case filing behaviour and find that the threat of foreign reciprocal AD duties can reduce the likelihood of US AD cases being filed against certain countries. Bown (2004) finds evidence that countries tend to implement various forms of "GATT-illegal" protection against trading partners that are unable to credibly threaten substantial retaliation.

"...special regard must be given by developed country Members to the special situation of developing country Members when considering the application of antidumping measures..."

and,

"...possibilities of constructive remedies provided by this Agreement shall be explored before applying antidumping duties..."

However, it should not necessarily be the case that this aspect is taken into account in practice. Bown et al. (2003) analyse the pattern of US antidumping against developing countries. They show that lower income developing countries are more likely to be targeted, less likely to settle cases, more likely to confront high antidumping duties and less likely to bring cases to the WTO. They argue that some of the factors that may explain the observed bias facing developing countries could be the differences in administrative and institutional "capacity" as well as limited retaliatory ability. The sign of this variable is left unspecified.

Among the domestic political variables several measures of political influence are used. A measure of concentration (CON) is included in order to capture the potential for lobbying in the industry that initiates the case. It is the market share of the five biggest firms in an industry in the European Union. The sign of this variable is expected to be positive, reflecting the presumption that the more concentrated the industry the more likely it is to overcome free rider problems and the more likely to lobby for the case. This is consistent with the theory of collective decision-making (Olson 1971). Although the channel through which lobbying occurs is left unspecified here, several theoretical studies have emphasized that the likelihood of lobbying activity is understood to be greater if the number of firms in an industry is relatively small.

Another domestic political variable is the size of the case (SIZE). Two proxies for case size (SIZE) were used. The first one (SIZE1) is the total value of EU imports of product k under investigation from country j (the country of the defendant) at constant prices, $SIZE1 = M_{EU}^{kj}$. Imports are measured in the year in which the investigation was initiated. The second proxy of case size (SIZE2) is the percentage of EU imports of the product k under investigation from country j, M_{EU}^{kj}, in the total imports of the EU for that year M_{EU}: $SIZE2 = \dfrac{M_{EU}^{kj}}{M_{EU}} * 100$. The higher the imports the more likely it is that the final

decision on dumping will be positive. The results reported in this Chapter refer to (SIZE1) but qualitatively similar results are obtained when including (SIZE2).

One of the measures of an industry's political influence is its size. The larger the industry filing a complaint the greater the electoral impact it could have. The presumption is that larger industries can exert greater political pressure either directly on the Commission or on country members' representatives. Two variables that capture the size of the industry were defined. The first one is the number of people employed in the industry (LAB) defined as the number of people employed. The second one is the industry's value added (VA). Employment and output are two alternative measures of industry size. Considerations about employment could be very relevant in the investigation since they could reflect positive findings justified by adjustment costs. Since these variables are highly correlated and the estimation results using either one of them are similar, the results reported are those using employment. To analyse the robustness of the model, two alternative proxies of industry size are used. The first one is a relative measure of value added (RVA). It is defined as the share of value added for European industry i over the value added for the total European manufacturing sector: $RVA = \left(\dfrac{VA^i}{VA_{EU}} \right)$. Similarly, (RLAB) is the share of the number of people employed in European industry i over the total number of people employed in European manufacturing: $RLAB = \left(\dfrac{LAB^i}{LAB_{EU}} \right)$.

The technical track variables should reflect comparative costs. They attempt to capture any bias in favour of producers with a comparative disadvantage in international trade. They refer to relative factor endowments, factor prices and costs. The first variable in this group is the capital-labour ratio (K/L). On Hecksher-Ohlin basis, a highly developed country (EU) is expected to have a comparative advantage in capital-intensive industries. Therefore, the sign of the capital-labour ratio is expected to be negative. Series of capital-labour ratio were calculated for all the European industries according to the perpetual inventory model. The series and the methodology used are presented in Appendix 4B.

A second proxy of costs is the labour share (LS). This is the share of labour costs in value added. It is defined as the ratio of European wages in industry i over the European value added in industry i: $LS = \left(\dfrac{WAGE^i}{VA^i} \right)$. The third variable in this group is the average

wages and salaries per worker employed in the industry concerned (AVWAGE) at constant prices. This intends to capture the extent of the use of human capital. The sign of this variable could be expected to be negative on neo-factor proportions grounds but positive on strategic trade policy grounds, meaning that Europe tends to protect industries with high human capital content. The fourth variable, measures the relative importance of the labour costs in European industry j as a proportion of labour costs in European manufacturing. It is the share of the wage bill in European industry i over the wage bill in the total European manufacturing sector: $RWAGE = \left(\dfrac{WAGE^i}{WAGE_{EU}} \right)$, where $WAGE^i$ is labour compensation in industry i.

A dummy variable (NME) is included to capture the potential bias in the dumping determination and comparison with 'normal value' for non-market economies, as mentioned above. To investigate whether there are also biases in determining material injury this dummy is also included in the injury regressions. The dummy takes value one if the country involved in the case has a non-market economy and zero, otherwise. A non-market economy is broadly defined (see Appendix 4C for classification of countries). The sign is expected to be positive.

A variable measures the number of different products covered by the case (TECH)[28]. The presumption is that this variable will have a negative sign. The reasoning behind its inclusion is that dumping involves a pricing decision and, therefore, it applies better to specific products than to larger aggregations. The more narrowly defined the industry affected by the imports, the easier it becomes for domestic producers to demonstrate dumping and injury. This point seems to be important in the actual investigations of both dumping and injury as is documented in the several publications in the Official Journal where the cases are presented. Therefore, a bigger number of products would mean that the technical criteria for a decision are less clearly met, making it less likely that dumping is found.

Finally, a variable that represents the cost of gathering information in the case is defined. It is represented by the number of countries (NOC) involved in a case. The firm or group of firms initiating a petition have to provide information documenting unfair trade. This and additional information will be used as evidence in the case. This information is

costly and assumed to increase with the number of countries involved in the case. The possibility that this could have an impact on the AD decisions is explored. Since the information provided by the petitioning firms constitutes the basis on which the Commission investigates, one can suspect that it may have an impact in the decisions made. The possibility of non-linear effects is explored. Table 4.1 contains a list of the variables used in the econometric analysis and the sign expected for each one of them.

Table 4.1: Variables and Expected Signs: Dumping and Injury Decisions

	Name	Sign
Political Track variables		
1) % of EU exports imported by the country of the defendant	X	-
2) Dummy for Less Developed Country	LDC	?
3) Market share of 5 biggest firms in the industry	CON	+
4) Imports of the product from defendant's country	SIZE	+
5) Number of people employed in the industry	LAB	+
6) Value added in the industry	VA	+
Technical Track variables		
7) Capital-labour ratio	K/L	-
8) Average wages and salaries per worker	AVWAGE	?
9) Dummy for non-market economy	NME	+
10) Number of products covered by the case	TECH	-
11) Number of countries named in the case	NOC	?

The data

The data set was built from primary and secondary data sources. Two periods are analysed. The first one consists of all European AD investigations initiated between 1985 and 1994, resulting in 261 legal cases that involve 58 countries[29]. The second one includes investigations initiated between 1995 and 2003, totalising 118 legal cases referring to 46 countries. Each legal case involves only one product but it could involve more than one country. Therefore, counting each legal case against each individual country separately, there are 805 "sub-cases" in the sample. The average number of countries in each year varies between 1.7 and 2.5 as described in Table 4.9 (appendix 4A). In this period, 365 investigations ended with the imposition of AD duties (45%), 152 in price undertakings (19%) and 288 cases were terminated by the Commission (36%). Between 1985 and 1994, 80% of antidumping cases are against low cost countries (developing countries and non-market economies) as described in Table 3.13.

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[28] Products are defined by an 8-digit code in the Combined Nomenclature (CN) classification of goods from 1988. Before this date, they were defined by a 6-digit code in the NIMEXE classification.

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Several pieces of information can be obtained from the legal documents initiating an AD case and were used to construct the data set: the date of initiation and termination of the case, the product name and code, the countries named[30]. Each legal case initiated has a number in the C and L series of the Official Journal of the European Commission[31]. A preliminary investigation follows and a decision on preliminary measures is made and published. Finally, a decision about the impositions of definitive measures is made and published. The period of investigation following the initiation of a case lasts on average twelve months.

The information on a legal case decision is used to build dichotomous dependent variables for dumping and injury and was obtained from the Commission of the European Communities, Official Journals (C and L series) available on CD-Rom. The variables are constructed with the information about definitive measures only. All withdrawals are classified as terminated by the Commission and are categorised as missing values since no decision on dumping or injury is reached in these cases.

For each product investigated, annual import trade data of the EU by source were collected from EUROSTAT trade statistics and from the United Nations COMTRADE database. Before 1988 EUROSTAT reports data using the NIMEXE 6-digit product codes. After that date the 8-digit Combined Nomenclature (CN) codes are used to identify products. For the period 1985-94, import values for each product by country of origin were collected for the year in which the case was initiated. The import values are translated into US dollars using the exchange rate ECU-US dollars (International Monetary Fund, International Financial Statistics) and expressed in constant prices of 1990 using the US implicit value added deflator for the manufacturing sector from the OECD STAN database. The Commission has changed the country codes for several countries. For some countries a new country code has exactly replaced an old one. A correction was applied to Easter European countries that were split into separate countries like Czechoslovakia, Yugoslavia and the Soviet Union or have ceased to exist, like the German Democratic Republic. For the period 1995-2003, import trade data of the EU by source were collected from United Nations COMTRADE trade statistics. The data available in Euros is deflated by the GDP (Gross Domestic Product) implicit deflator for 15 European countries.

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[29] After dropping cases for which no trade or industrial data could be constructed there were 379 cases left. A detailed account of data sources and methodologies is presented in Appendix 4C.
[30] A list of European Antidumping cases was provided by Hylke Vandenbussche.
[31] The European AD decisions are a matter of public record and can be found in the Official Journal.

For each investigated country, annual export trade from the EU was collected from EUROSTAT COMEXT in the period 1985-94. For the subsequent period the data was collected from COMTRADE. This data is used to define the share of European exports to the country named over total European exports.

The econometric analysis refers to industries in the manufacturing sector[32]. For the period 1985-94, each product is associated with an industry (3-digit International Standard Industrial Classification – ISIC - Revision 2 and the Nomenclature des Activités dans la Communauté Européenne – NACE - Revision 3). The industry associated with each product was obtained by using the International Concordance published jointly by the Department of Commerce, EUROSTAT and Statistics Canada and several correspondence tables provided by EUROSTAT. Several industrial series are constructed using the OECD STAN and Structural Business Statistics databases for the relevant years. They are industry employment, value added, average wages and salaries per worker and, investment. Nominal variables are measured in constant prices of local currencies using industry and country specific deflators and transformed into US dollars using the exchange rate (OECD STAN) for the relevant countries and years. Industrial investment data was used to calculate capital stock series based on the perpetual inventory model. Investment in local currencies was deflated by the value added implicit deflator for each industry and country, and converted into US dollars using the exchange rate. The capital stock series are measured in dollars at constant 1990 prices. Appendix 4B contains the capital stock series for the period 1970-94 and describes the methodology used to calculate them.

A series of industrial concentration was constructed using the market share of the 5 biggest firms in an industry in 1989. The data was obtained from Lyons and Davies (1996) for most industries at the 3-digit level of the (NACE) 1970 Classification. For the textile and chemical industries the information was obtained from the European Commission (1989) "Horizontal mergers and competition policy".

A series of the growth rate of GDP for Europe was constructed using GDP at constant prices from the World Economic Outlook (GEO) database for the period 1985-94 and EUROSTAT for the period 1994-03. The composition of Europe has changed in 1985, 1995 and 2004. A correction was applied to reflect this.

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[32] Only nine investigations occurred in industries other than manufacturing and referred to products such as salmon and trout.

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4   Econometric Specification

The aim of the statistical analysis is to determine the influence of political and economic variables on the likelihood of an affirmative determination in an AD investigation. The unit of analysis is the sub-case. There are a total of 379 legal cases initiated between 1985 and 2003, but each legal case (petition) could involve several countries. Since decisions are made for each of the countries involved independently, we define a "sub-case" as an investigation initiated against one single country named in the legal proceedings. Defined in this way, there are 525 sub-cases in the sample. Since we are interested in the analysis of the determinants of the Commission's definitive decisions, I exclude those cases that are withdrawn and those in which the investigation period expired. Two sub-cases that are terminated in view of the community interest provision are also excluded [33].

Not all investigations filed (initiated) reach the final decision stage. This can occur for three reasons. First, some investigations are withdrawn by the petitioning firms at different stages of the procedure. Second, the investigation period may reach the maximum length allowed in the regulations. This usually occurs when the European firms do not provide the necessary information requested by the Commission in time. Third, the timeline of an investigation on dumping and injury implies that a decision on dumping may be reached before the investigation on injury has been carried out and vice versa. Overall, 182 sub-cases are not investigated for dumping and 153 sub-cases for injury. A description of the number of sub-cases investigated and their respective final outcomes are summarised in Table 4.2.

Table 4.2: Number of Cases Initiated and Investigated: Dumping and Injury Decisions (1985-2003)

	Dumping	Injury
Number of sub-cases, affirmative (Y=1)	566	524
Number of sub-cases, negative(Y=0)	57	128
Number of sub-cases investigated	623	652
Number of sub-cases initiated	805	805

Note: The unit of observation is the sub-case.
Source: Series C and L Official Journal of the European Commission

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[33] In these cases a provisional decision on dumping and injury was made, the investigation period has been much longer than average and measures were suspended for certain periods. These suspensions vary in length for each investigation but they introduce considerable noise. The products involved are electronic micro-circuits (DRAMS from Korea, Regulation L324, September 1992 and EPROMS from Japan, Regulation L065, March 1991).

Although there are decisions reached at different stages in the investigation procedure, we only consider the definitive decisions on each legal case. Provisional decisions – those made after an investigation has been initiated but before a definitive decision is reached - are not analysed.

Using a probit model, I estimate the probability of an affirmative decision on dumping and injury. Two equations are estimated. In the dumping equation, the dependent variable, y_i, is binary and takes the value one if a decision on dumping is positive and zero otherwise, where $i = 1, 2 ... N = 623$ sub-cases.

The underlying model is

$$y_i = \beta' x_i + u_i$$

where x_i is a vector of k regressors and a constant α; β is a vector of k coefficients and controls and u_i is an error term. The residuals, u_i, follow a normal distribution and the probability that a decision on dumping is affirmative in a case is given by

$$P(y_i = 1 / x) = \int_{-\infty}^{x'\beta} \phi(t)dt$$

The estimates of the coefficients β are obtained by maximum likelihood estimation (MLE). More specifically, the following form for the underlying model for dumping and injury is given in

$$P(y_i = 1) = f(\alpha, X, LDC, CON1, SIZE1, LAB, VA, K/L, AVWAGE, NME, TECH, z_i) \quad (1)$$

where α is a constant; z_i is a vector of controls and all variables are as defined in Section 3[34]. In estimating equation (1) I take into account the effect of aggregate macroeconomic shocks and therefore include year dummies, the rate of growth of GDP and the trade deficit to control for these effects. Some of the effects of the exchange rate is captured by certain variables that are measured in nominal terms such as case size, value added, capital labour ratio and average wage per worker (originally measured in different currencies and converted by using the exchange rate). Knetter and Prusa (2003) find evidence that

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[34] No variable for economies of scale was included, due to lack of good quality indicators at the plant-level. The existence of scale economies can equivalently be captured by industry dummies.

exchange rates and domestic real GDP growth have statistically significant impacts on filing activity for Australia, Canada, the EU and the US. We suspect that they may also have an impact on the decisions made by the European Commission (EC). Furthermore, I control for unobserved fixed effects by including industry dummies. These dummy variables are defined at the 2-digit and 3-digit ISIC/NACE-sector to control for sector heterogeneity. These dummies could capture a possible selection bias to some extent, in the sense that there may be sector characteristics that trigger AD investigations more than others. Therefore, controlling for narrowly defined sector dummies one can control for unobserved fixed characteristics[35]. The same specification is used to analyse the injury decisions. The dependent variable, y_i, is binary and takes the value one if a decision on injury is positive and zero otherwise, where $i = 1, 2 \ldots N = 652$.

A descriptive analysis is presented in Appendix 4A (Table 4.9 to 4.16). The highest dispersion in the data referring to the dumping decisions, as captured by the coefficient of variation, is displayed by the variable case size (SIZE1 and SIZE2) and the lowest by the labour share (LS) and the average wage per worker (AVWAGE). In general, the data on injury decisions shows more dispersion than the one referring to dumping decisions. Fourteen out of eighteen variables used have highest dispersion in the sample used for the injury regressions than in the one used for the dumping regressions. The sample is characterized by a high and significant correlation between employment (LAB) and value added (VA). This means that industries that are big in terms of value added are also big in terms of employment. Including either value added or employment gives the same results. The results reported consider only employment. Some other characteristics of our sample are that the average wage per worker and industrial concentration are positively and significantly correlated. Besides, the dummy variable for less developed countries and the share of EU exports to the country of the defendant, employment and capital-labour ratios are negatively and significantly correlated. The partial correlation coefficients are presented in Tables 4.12.1 to 4.14 in Appendix 4A.

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[35] Case dummies were also included, in addition to year and industry dummies, to explore whether there are fixed effects in a legal case, for example, some common features to all countries named in each investigation. This is a "country group" or "case" effect dummy. The dummy takes the value one for all countries included in a legal proceeding and zero otherwise. For the period 1985-94, 261 case dummies were used. This method imposes high multi collinearity, many of the case dummies are dropped since they either perfectly predicted success or failure and the sample size is significantly reduced. However, the results are consistent with those reported in Table 4.3.

5 Empirical Results

Probit estimations of the model are presented in Table 4.3.1 and 4.3.2 with robust standard errors corrected for heteroscedasticity. The White's robust "sandwich" estimator of the covariance matrix is used. Observations within a case may not be independent whereas observations across cases are. Therefore, the observations (sub-cases) in each legal case are considered as one cluster when estimating the standard errors. The results present the estimated coefficients and the slope (marginal effects) of the probability of a dumping and injury decision being positive, conditional on the firm having filed an investigation[36].

The models differ from the specifications in Finger et al. (1982) and Tharakan and Waelbroeck (1994), in that they control for macroeconomic effects and unobserved industry characteristics. Columns (1), (2) and (3) report the estimates for 8 political and technical determinants of the dumping decisions including industry and year dummies[37]. The statistical results suggest that Europe operates a double track AD mechanism. Mainly technical variables are significant in the determination of dumping. Columns (4), (5) and (6) report the estimates for the same determinants of the injury decisions. The statistical results are consistent with hypothesis 2. The comparative cost variables are not significant in the determination of injury. A closer look at the results, in terms of individual variables, helps to elucidate the determinants of each type of decision.

5.1 Dumping Decisions

Mainly technical track variables are important in the determination of dumping, partly confirming Hypothesis 1. The results in Table 4.3.1 are presented in what follows and correspond to the period 1985-94.

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[36] The model was also estimated assuming a logistic distribution of the errors. The results are qualitatively the same.

[37] Twenty industry categories were included (3-digit ISIC). A specification that uses more aggregated industry dummies is analysed in section 6.

The political track

Dumping is more likely to be found in cases that are big in terms of imports, where the average wage per worker is high, in labour intensive industries and if the countries named are from a non-market economy.

Among the international political influences, the proportion of EU exports to the country of the defendant (X) is not a significant variable ($z = -1.63, p < 0.11$, for a two-tailed test) although it has the expected sign. The results suggest that there is a negative association between the proportion of EU exports to the country involved in the investigation and the probability that a decision on dumping is positive. Moreover, the estimated coefficient is negative in all specifications (see also Table 4.17 in Appendix 4A). The dummy for less developed countries (LDC) is not significant. Nevertheless, it enters all specifications with a negative sign indicating that Europe tends to favour less developed countries in the dumping decisions.

Among the domestic political variable, case size (SIZE) measured by the value of imports involved in the case, is significant at the 5% level of confidence. The estimated coefficient is positive suggesting that cases that are big in terms of imports are associated with a positive determination of dumping. The estimated coefficient of the industrial concentration (CON) variable, measured by the market share of the 5 biggest firms in an industry in the European Union, is not significant and has a negative sign. This result suggests that a lower concentration in the filing industry is associated with a positive finding about dumping.

The technical track

The non-market economies variable (NME) is found to be significant at the 5% level of confidence (see column 2). Cases against a non-market economy have an 8.1% higher probability of a positive decision on dumping at the means of the regressors, everything else being equal. This is a moderate effect given that the sample average dumping decision probability is 83.5%. The econometric tests verify what could be anticipated from the descriptive analysis. Furthermore, this variable is significant and has a positive sign in all specifications. The investigations of AD in Europe seem to be targeted at non-market economies. As was mentioned in previous sections, this is not a surprising result since there seems to be a bias in the implementation of the AD law in Europe against non-market

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economies. The present regulations favour those firms filing petitions against these countries, which results in a higher probability of an affirmative decision on dumping being made.

The average wage per worker (AVWAGE) is significant only at the 10% level of confidence in the dumping regression. Although we have left the expected sign of the average wage per worker unspecified, the econometric results show that this variable has a positive sign. This is in accordance with the hypothesis of strategic trade policy. After controlling for macroeconomic and industry effects the results indicate that European decisions on dumping are more likely to be positive when the average wage per worker is high.

The hypothesis that more affirmative dumping findings occur in relatively labour intensive (low capital-labour ratio) industries is weakly confirmed by the data for the European decisions on dumping after controlling for macroeconomic effects and industry heterogeneity. The estimated coefficient of the capital-labour variable (K/L) presents a negative sign. The estimated coefficient for the technical precision (TECH) variable measured by the number of products in the case has the expected sign but is not significant. The results suggest that a big number of products involved in an investigation is associated with a negative decision on dumping, as hypothesised[38].

A considerable number of observations are not used in this estimation because for certain years and certain industries the results are deterministic. A decision on dumping is always positive or always negative in certain years and industrial sectors. In the specification in Table 4.3.1 where both year and industry dummies are included, a total of 78 observations are excluded because for two years – 1987 and 1994 – all investigations on dumping have been positive. Furthermore, 88 observations are excluded from the regression because in ten industries a decision on dumping has always been positive and in one industry it was always negative. Those industries that always succeed in obtaining a positive finding on dumping are: the manufactures of footwear (ISIC 324, 2 observations), wood products (ISIC 331, 5 observations), paper and paper products (ISIC 341, 12 observations), chemicals other than industrial (ISIC 352, 13 observations), rubber products (ISIC 355, 2 observations), other non-metallic mineral products (ISIC 369, 5 observations),

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[38] The results in Table 4.3 have been obtained using three alternative econometric methods. In the first method, all variables and controls are included. The second procedure included all variables and controls eliminating the less significant variable from each regression, one at the time, until a specification with only significant variables was reached. The third method included only significant variables.

Table 4.3.1: Probit Estimates (marginal effects) of Dumping and Injury Decisions by the European Union (1985-1994): Main Specification

Hypothesis and Variables	Expected Sign	Dumping			Injury		
		(1) Coefficient	(2) Slope	(3) z-values	(4) Coefficient	(5) Slope	(6) z-values
* Political Track							
International Political Influences							
Share of EU exports	-	-7.16	-0.937	*-1.63*	-3.83	-0.823	*-1.28*
		(4.39)	(0.553)		(2.99)	(0.602)	
Less Developed Country	?	-0.616	-0.060	*-1.17*	0.109	0.024	*0.31*
		(0.525)	(0.041)		(0.359)	(0.083)	
Domestic Political Influences							
Concentration	+	-0.013	-0.002	*-0.82*	0.0005	0.0001	*0.03*
		(0.016)	(0.002)		(0.015)	(0.003)	
Case size (value imports)	+	2.46**	0.322**	*2.46*	0.848**	0.182**	*2.49*
		(1.000)	(0.088)		(0.340)	(0.057)	
Industry size: employment	+	2.26	0.296	*0.83*	-0.502	-0.108	*-0.56*
		(2.72)	(0.369)		(0.894)	(0.193)	
* Technical Track							
Comparative costs							
Capital intensity	-	-0.936*	-0.122*	*-1.67*	-0.176	-0.038	*-0.80*
		(0.561)	(0.084)		(0.221)	(0.048)	
Average wage	?	0.325*	0.043*	*1.86*	0.053	0.011	*0.57*
		(0.174)	(0.027)		(0.093)	(0.020)	
Non-market economy	+	0.623**	0.081**	*2.03*	0.170	0.036	*0.86*
		(0.307)	(0.046)		(0.199)	(0.042)	
Technical Precision (Number of products)	-	-0.062	-0.008	*-1.51*	-0.004	-0.0008	*-0.12*
		(0.041)	(0.005)		(0.032)	(0.007)	
Constant		-0.566	-	*-0.13*	2.42*		*0.94*
		(4.290)			(1.471)		
GDP growth rate		0.422	0.055		0.567	0.122**	
		(0.264)	(0.039)		(0.226)	(0.051)	
Trade Deficit		0.003	0.0004		0.002	0.0003	
		(0.002)	(0.0003)		(0.002)	(0.0003)	
Year Dummies			*Yes*			*Yes*	
Industry Dummies			*Yes*			*Yes*	
No. observations			253			422	
Wald χ^2			36.4**			61.9***	
(df)			(23)			(30)	
Log. Likelihood			-90.0			-169.1	
Pseudo R^2			0.19			0.26	

Notes: z-values presented in italics. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. In the sample period, there are an average of 2 sub-cases per case with a maximum of 8 and a minimum of 1. Each regression also includes a constant. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for "less developed country" and "non-market economy" are for discrete changes in the variables from 0 to 1. In column (1) 166 observations, corresponding to two years and ten industries, are eliminated because decisions are deterministic. Either an affirmative or negative decision is always made. In column (4) 18 observations, corresponding to five industries, are similarly eliminated.

electric machinery (ISIC 383. 41 observations), transport equipment (ISIC 384, 22 observations) and other industries (ISIC 390, 7 observations)[39]. The industrial sector for which a decision on dumping is negative is plastic products (ISIC 356, 1 observation). Only the year dummy for 1992 and two industry dummies (metal products and non electrical machinery) are significant at the 10% level. The t-statistics suggests that investigations initiated in 1992 and those relating to metal products (ISIC 381) and non-electrical machinery (ISIC 382) are less likely to have a positive decision on dumping. We can reject the hypothesis that all coefficients in the dumping regression except the intercept are zero at the 0.05 level ($Wald\,\chi^2 = 36.4$, $df = 23$, $p < 0.05$). The pseudo-R^2 statistic is 0.19. Technical variables were found to be jointly significant as indicated by the likelihood ratio test (χ^2 (4) = 13.15, P-value = 0.01). A similar test was conducted for the political economy variables and they were found to be jointly significant (χ^2 (5) = 13.15, P-value = 0.01) as well. Similarly, yearly dummies were found to be jointly significant (χ^2 (7) = 17.38, P-value = 0.02) but industry dummies were found jointly insignificant (χ^2 (7) = 8.22, P-value = 0.31).

Period 1995-2003

The analysis of the recent period (1995-03) is presented in columns (1) to (3) in Table 4.3.2. The results confirm that Europe is operating a double track AD mechanism. The results are consistent with both Hypothesis 1 and Hypothesis 2. We can reject the hypothesis that all coefficients in the dumping regression except the intercept are zero at the 0.05 level ($Wald\,\chi^2 = 83.9$, $df = 17$, $p < 0.01$). The pseudo-R^2 statistic is 0.27. Technical variables were found to be jointly significant as indicated by the likelihood ratio test (χ^2 (4) = 11.64, P-value = 0.02). However, the test for the political economy variables shows that they are jointly insignificant (χ^2 (4) = 9.04, P-value = 0.06). Similarly, yearly dummies were found to be jointly insignificant (χ^2 (4) = 7.65, P-value = 0.11) and industry dummies were found jointly insignificant (χ^2 (4) = 4.62, P-value = 0.33) as well.

The results for this period are similar to the previous one in several respects. Variables such as case size, the labour share in value added and the average wage per worker are significant at conventional level and the estimated coefficients have the

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[39] The products involved are: clogs, Kraft liner paper and board, fibreboard and hardboard, photo albums, thermal paper, Portland cement, tubes for bicycles and bicycles, electric motors, microwaves, TV, radio, video, CD-players, mobile phones and fax machines.

expected sign. Affirmative findings are associated with relatively labour intensive industries and with high wages, as before. The results are in accordance with other studies (Rodrik, 1996 and Tharakan and Waelbroeck 1994).

One of the main differences with the results for the previous period is that the non-market economy dummy is insignificant in the decisions on dumping. This could be explained by the transition towards market economies that most of the Eastern European countries have experienced. Some of these countries have become part of the European Union from May 2004 (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia and Slovenia). As emerges from the legal documents, in some investigations the European Commission would considered countries such as Bulgaria, Croatia, Estonia, Lithuania, Poland and Romania as market economies towards 2001. Therefore, the protectionist built-in mechanism to calculate dumping margins is less applicable to these countries and the subsequent bias less severe.

5. 2   **Injury Decisions**

Political track variables are important in the determination of injury confirming Hypothesis 2. The case size is a significant determinant of the injury decisions. Injury is more likely to be found if the case is big in terms of imports.

The political track

After controlling for industry heterogeneity and macroeconomic effects, the domestic political variable case size (SIZE) is statistically significant in the decisions on injury as can be seen in Columns (4), (5) and (6) in Table 4.3.1. Among the domestic political determinants, having big imports in the case (SIZE) has a significant effect on the probability of injury ($z = 2.49, p < 0.05$ for a two-tailed test). This means that higher imports of the product are associated with a positive finding of injury occurs. This variable has a positive sign in all specifications and is significant at conventional levels.

The proportion of EU exports to the country of the defendant (X) is not significant ($z = -1.28, p < 0.20$ for a two-tailed test). The sign of this variable is negative suggesting that the higher the proportion of EU exports to the country involved in the case (X) the less

likely it is that a positive decision on injury is made. Blonigen and Bown (2003) find similar results when they investigate the effects of the threat of foreign retaliation on US antidumping case filing behaviour. Their results indicate that retaliation exposure and, in particular, the threat of foreign reciprocal AD duties can reduce the likelihood of US AD cases being filed against certain countries[40]. Although this variable is not significant in this specification it becomes significant when the cost of filing against multiple countries is introduced (see Section 6).

The dummy variable for less developed countries (LDC) is not significant and enters positively in the specification with industry and year controls. Unlike in the dumping decisions, Europe does not seem to favour less developed countries in the determination of injury. The industrial concentration (CON) variable is not significant and should not be considered an important determinant of the injury decisions.

The technical track

There are no statistically significant technical track variables in the specification presented in Table 4.3.1. Among the comparative costs measures the capital intensity (K/L) is not significant and enters with the expected sign. The results suggest that affirmative findings are more likely in relatively labour intensive (low capital-labour ratio) industries. The average wage per worker (AVWAGE) is not a significant determinant of the decisions of injury and the estimated coefficient is positive. Having high average wages per worker increases the probability of injury in line with the strategic trade policy theory, in a similar fashion as in the dumping decisions. The non-market economy dummy does not have a significant effect on the probability of injury. No evidence of a bias against non-market economies is present in the decisions on injury. This is a reasonable result since the bias arises mainly from the comparison of the exporters' price and the price sold in the EU, which is embedded in the calculation of the dumping margin, but is not necessarily related to the economic material injury. Finally, the technical precision variable (TECH) is not significant but the sign of the estimated coefficient suggests that the bigger the number of products in the case the less likely it is that injury is found, as hypothesised.

After controlling for macroeconomic effects and industry heterogeneity 18 observations are dropped because injury is either always positive or negative. The

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[40] They find that US agencies are less likely to rule affirmatively against WTO members that have recourse to dispute settlement procedures.

industries for which there is always a positive decision on injury are the manufacture of footwear (ISIC 324, 2 observations), rubber products (ISIC 355, 2 observations), transport equipment (ISIC 384, 5 observations) and other manufactures (ISIC 390, 7 observations)[41]. The industry for which a negative decision is made is plastic products (ISIC 356, 2 observations)[42]. Also, only three yearly dummies for 1988, 1989 and 1992 are statistically significant at the 5% level of confidence. The t-statistics suggests that investigations initiated in those three years are less likely to have a positive decision on injury. Only one industry dummy variable (metal products, ISIC 381) is statistically significant in the decisions on injury at 10% level of confidence and has a negative sign suggesting that investigations in the metal products sector are less likely to obtain a positive decision on injury. We can reject the hypothesis that all coefficients in the injury regression except the intercept are zero at the 0.01 level (*Wald* χ^2 = *61.9, df = 30, p < 0.01*). The pseudo-R^2 is 0.26. Technical variables were found to be jointly insignificant as indicated by the likelihood ratio test (χ^2 *(4) = 1.80, P-value = 0.77*). A similar test was conducted for the political economy variables and they were found to be jointly significant (χ^2 *(5) = 20.96, P-value = 0.00*). Similarly, yearly dummies were found to be jointly significant (χ^2 *(9) = 46.06, P-value = 0.00*) and industry dummies jointly significant as well (χ^2 *(12) = 41.6, P-value = 0.00*).

The results discussed above are robust. They have been obtained using two alternative econometric methods. In the first one, all variables and controls are included as reported. The second one starts by the inclusion of all variables and controls and eliminates the least significant variable, one at the time, until a specification with only significant variables is reached. When using this last method, the proportion of EU export to the country of the defendant becomes significant and has the correct sign suggesting that the "fear of retaliation" hypothesis may be relevant in the injury decisions.

Period 1995-2003

The analysis of the recent period (1995-03) is presented in columns (4) to (6) in Table 4.3.2. The results confirm that Europe is operating a double track AD mechanism. The results are consistent with both Hypothesis 1 and Hypothesis 2. We can reject the hypothesis that all coefficients in the injury regression except the intercept are zero at the

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[41] The products are: clogs, tubes for bicycles, bicycles and other miscellaneous.
[42] The product is polyester film.

Table 4.3.2: Probit Estimates (marginal effects) of Dumping and Injury Decisions by the European Union (1995-2003): Main Specification

		Dumping				Injury	
		(1)	(2)	(3)	(4)	(5)	(6)
Hypothesis and Variables	Sign	Slope	z-values	Slope	z-values	Slope	z-values
* Political Track							
International Political Influences							
Share of EU exports	-	2.228***	2.87	3.877***	3.58	-0.029	-0.02
		(1.187)		(1.675)		(1.769)	
Less Developed Country	?					0.220	1.64
						(0.223)	
Domestic Political Influences							
Concentration	+	-0.002***	-2.90	-0.004***	-2.91	0.004**	2.05
		(0.001)		(0.002)		(0.002)	
Case size (value imports)	+	0.0001**	0.65	0.0001	0.61	0.001**	2.18
		(0.0001)		(0.002)		(0.0003)	
Industry size: employment	+	-0.122**	-2.03	-0.232**	-2.24	0.52***	2.72
		(0.082)		(0.133)		(0.218)	
* Technical Track							
Comparative costs							
Labour share	+	0.383*	1.79	0.564	1.62	0.040	0.14
		(0.208)		(0.314)		(0.305)	
Average wage	?	0.008**	2.17	0.015***	2.58	-0.016*	-1.87
		(0.004)		(0.006)		(0.007)	
Non-market economy	+	0.023	1.51			0.019	0.61
		(0.019)				(0.0034)	
Technical Precision (Number of products)	-	0.012**	2.47	0.021***	2.57	-0.01**	-2.19
		(0.005)		(0.009)		(0.008)	
GDP growth rate		0.017	0.71	0.032	0.84	-0.05**	-2.32
		(0.023)		(0.037)		(0.031)	
Trade Deficit		1.57e-14	0.04	2.5e-14	0.04	-1.7e-12 ***	-3.33
		(4.0e-13)		(6.5e-13)		(0.0003)	
Constant		-	2.00	-	-0.13		1.12
Year Dummies		Yes		Yes		Yes	
Sector Dummies		Yes		Yes		Yes	
No. observations		163		155		181	
Wald χ^2		83.9***		59.8***		43.4***	
(df)		(17)		(16)		(18)	
Log. Likelihood		-35.1		-36.2		-51.5	
Pseudo R^2		0.27		0.23		0.25	

Notes: z-values presented in italics. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. Each regression also includes a constant. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for "less developed country" and "non-market economy" are for discrete changes in the variables from 0 to 1. In column (1) 26 observations, corresponding to two years, are eliminated because decisions are deterministic. An affirmative decision is always made. In column (3) 34 observations, corresponding to two years and the "less developed country" dummy are dropped. An affirmative decision is always made. In column (5) 13 observations, corresponding to two years, are similarly eliminated.

0.01 level (*Wald* χ^2 =43.4, *df* =18, *p* < 0.00). The pseudo-R^2 statistic is 0.25. Technical variables were found to be jointly insignificant as indicated by the likelihood ratio test (χ^2 (3) = 6.21, *P-value* = 0.10). However, the test for the political economy variables shows that they are jointly significant (χ^2 (5) =17.65, *P-value* = 0.00). Yearly dummies were found to be jointly significant (χ^2 (4) = 18.00, *P-value* = 0.00) and industry dummies were found jointly insignificant (χ^2 (4) = 8.32, *P-value* = 0.08).

Unlike in the previous period, three of the political economy variables are found to be significant at conventional levels and the estimated coefficients have the expected sign, confirming the importance of domestic political influences in the injury decisions. The industrial concentration variable is significant at the 5% level of confidence, confirming the pressure group hypothesis. Finally, the share of EU exports to the country of the defendant is associated with a positive probability of dumping.

6 Sensitivity Analysis

The aim of this section is to check the robustness of the results presented in Section 5. It focuses on three concerns. First, since different specifications of the model can be constructed and several different proxies used, it is important to ascertain that it is not a particular choice of regressors that drives the results. In fact, different proxies can represent the same effect. For this reason, several other proxies are considered with different variations for the domestic political influences and comparative costs. Tables 4.4 and 4.5 report some of the results of the different specifications used in the dumping and injury regressions, respectively. Table 4.4 below documents alternative specifications of the regressions on dumping using other proxies for domestic political influence and comparative costs. In column (1) the results of column (2) of Table 4.3.1 are reproduced, for ease of comparability. In column (2) two different proxies for domestic political influences are used. A relative measure of the case size (SIZE2) - defined as the percentage of the value of imports of the products mentioned in the case in the total European imports - is introduced instead of the value of imports (SIZE1 in hundred million constant 1990 dollars). The second variable introduced is a relative measure of employment (RLAB) - representing the share of the number of people employed in European industry *i*

Table 4.4: Sensitivity Analysis: Domestic Political Influences and Comparative Costs.
Probit Estimates (marginal effects) of Dumping Decisions by the European Union (1985-1994)

		(1)	(2)	(3)	(4)	(5)
*Political Track						
International Political Influences						
Share of EU exports	-	-0.937	-1.034	-1.004*	-1.068	-1.170**
		-1.63	*-1.61*	*-1.69*	*-1.61*	*-2.10*
Less Developed Country	?	-0.060	-0.070	-0.065	-0.073	-0.062
		-1.17	*-1.21*	*-1.25*	*-1.26*	*-1.33*
Domestic Political Influences						
Concentration	+	-0.002	-0.003	-0.002	-0.002	-0.003
		-0.82	*-1.11*	*-0.76*	*-1.02*	*-1.24*
Case size: imports	+	0.322**		0.322**		0.302**
		2.46		2.41		2.23
Relative Case Size (in %)	+		14.23**		13.95**	
			2.13		2.10	
Industry Size:	+	0.296		0.395		0.386
Employment		*0.83*		*0.86*		*1.03*
Relative Size:	+		-9.67		-10.89	
Employment (share)			*-0.66*		*-0.62*	
*Technical Track						
Comparative costs						
Capital Intensity	-	-0.122*	-0.156*			-0.131*
		-1.67	*-1.91*			*-1.75*
Average Wage p/worker	?	0.043*	0.054**			0.048**
		1.86	*2.18*			*2.04*
Labour Share	+			0.307	1.120	
				0.34	*1.26*	
Non-market Economy	+	0.081**	0.084*	0.086**	0.088**	0.073*
		2.03	1.89	2.12	1.98	1.78
Technical Precision						
(Number of products)	-	-0.008	-0.010*	-0.008	-0.009	-0.010*
		-1.51	*-1.65*	*-1.44*	*-1.63*	*-1.80*
Number of Countries						-0.065*
						-1.77
(Number of Countries)^2						0.007*
						1.76
GDP growth		0.423	0.067*	0.048	0.064	0.065*
		1.60	*1.68*	*1.33*	*1.54*	*1.79*
Trade Deficit		0.003	0.0005*	0.0001	0.0001	0.0005*
		1.43	*1.80*	*0.36*	*0.55*	*1.68*
Year Dummies		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry Dummies		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No. observations		253	253	253	253	253
Wald χ^2 (degrees of freedom)		36.4**(23)	39.7**(23)	33.0(22)***	35.5(22)**	37.1(25)*
Log likelihood		-90.0	-91.1	-91.6	-92.6	-88.2
Pseudo R^2		0.19	0.18	0.17	0.16	0.20

See note in Table 4.3.1. z-values presented in italics. Each regression also includes a constant. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). In all regressions, 166 observations corresponding to two years and ten industries are eliminated because decisions are deterministic. Either a positive or negative decision is always made.

over the total number of people employed in the whole European manufacturing sector.[43] The significant determinants of the dumping decisions remain the same as in the original specification. The relative measure of case size becomes significant and has the expected sign. In Column (3) the use of an alternative measure of comparative costs is investigated. Instead of the capital-labour ratio and the average wage per worker, the labour share (LS) – defined as the ratio of wages as a proportion of value added – is introduced. The results remain the same indicating that labour costs do not significantly contribute to a positive finding of dumping. Column (4) includes both alternative variables for domestic political influence and comparative advantage. The results remain unaltered. Finally, Column (5) investigates the relevance of the number of countries involved in a case, as this can be relevant to the likelihood of a positive decision being made. In general, the belief is that the more countries, the more likely an affirmative decision will be made. But, acting against a bigger number of countries may increase or decrease the effectiveness of filing and this could have an impact that is different in the decisions on dumping and injury. The presumption is that the total cost of filing is probably increasing in the number of countries but there may be economies of scale. Since the information provided by the petitioning firms constitutes the basis on which the Commission investigates, we suspect that it may have an impact in the decisions made. In Europe, unlike in the US, the information on which the decisions are made is kept confidential. The variables used are the number of countries named in each case and the square of the number of countries involved to explore if non-linearity exists. Both variables are significant at the 10% level of confidence. The results show that the probability of a positive decision on dumping and injury initially decreases but it later increases with the number of foreign countries named in the investigation. Furthermore, when introducing this variable the share of EU exports to the country of the defendant (X) becomes significant at the 5% level of confidence, whilst the qualitative results of the other variables are unchanged. In all specifications, the hypothesis that all coefficients in the dumping regression except the intercept are zero is rejected.

In a similar fashion, the same robustness exercise is carried out for the injury decisions using different alternative proxies of domestic political influences and comparative costs. The results are reported in Table 4.5 and remained qualitatively

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[43] Other proxies of size like value added (VA) and relative value added (RVA) are highly correlated with measures of employment and are, therefore, not included in the regressions reported. The relative wage bill (RWAGE) was found to be highly correlated with employment (LAB) and value added (VA) and is excluded in the results reported as well.

Table 4.5: Sensitivity Analysis: Domestic Political Influences and Comparative Costs
Probit Estimates (marginal effects) of Injury Decisions by the European Union (1985-1994)

		(1)	(2)	(3)	(4)	(5)
***Political Track**						
International Political Influences						
Share of EU exports	-	-0.823	-0.859	-0.857	-0.880	-1.131**
		-1.28	*-1.36*	*-1.41*	*-1.44*	*-1.99*
Less Developed Country	?	0.024	0.019	0.019	0.015	0.033
		0.31	*0.24*	*0.25*	*0.21*	*0.42*
Domestic Political Influences						
Concentration	+	0.0001	0.0001	-0.0002	-0.00007	-0.0002
		0.03	*0.04*	*-0.06*	*-0.02*	*-0.05*
Case size: value imports	+	0.182**		0.199***		0.177***
		2.49		*2.56*		*2.58*
Relative Case Size (in %)	+		8.21***		9.06**	
			2.63		*2.53*	
Industry Size: Employment	+	-0.107		0.096		-0.133
		-0.56		*0.81*		*-0.79*
Relative Size: Employment	+		-18.9		-9.38	
			-1.07		*-0.60*	
***Technical Track**						
Comparative costs						
Capital Intensity	-	-0.038	-0.053			-0.056
		-0.80	*-1.10*			*-1.30*
Average Wage	?	0.011	0.015			0.019
		0.57	*0.73*			*1.08*
Labour Share	+			-1.74*	-1.54*	
				-1.95	*-1.84*	
Non-market Economy	+	0.036	0.035	0.039	0.038	0.028
		0.86	*0.86*	*1.01*	*0.99*	*0.68*
Technical Precision (Number of products)	-	-0.0009	-0.0002	0.0003	0.0004	-0.003
		-0.12	*-0.03*	*0.05*	*0.06*	*-0.41*
Number of Countries						*-0.141****
						2.93
(Number of Countries)2						*0.017****
						2.63
GDP growth	.	0.121**	0.124***	0.092**	0.094**	0.134***
		2.51	2.57	*2.10*	*2.17*	*2.83*
Trade Deficit		0.0003	0.0004	*0.0002*	*0.0002*	*0.0004*
		1.03	1.42	0.70	0.75	1.38
Year Dummies		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry Dummies		*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
No. observations		422	422	422	422	422
Wald χ^2 (df)		61.9***(28)	64.0***(30)	72.7(29)***	74.8(29)***	75.2(32)***
Log likelihood		-169.1	-168.4	-166.9	-167.1	-162.6
Pseudo R^2		0.26	0.26	0.27	0.27	0.29

See note in Table 4.3.1. z-values presented in italics. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. Each regression also includes a constant. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for dummy variables are calculated as discrete changes from 0 to 1. In all regressions, 18 observations corresponding to five industries are eliminated decisions are deterministic. Either a positive or negative decision is always made.

unaltered. Using a relative measure of case size does not introduce any changes. Using the labour share in value added instead of the capital labour ratio and the average wage per worker, seems relevant in the injury decisions. The variable is significant at the 10% level of confidence and enters negatively, suggesting that injury is less likely to be found in cases where the share of labour costs in value added is high. The variable number of countries is significant at conventional levels (column 5). The bigger the number of countries named in the case the lower the probability of injury initially, but this probability increases when the number of foreign countries named in the investigation is larger than four. When the number of countries is introduced, the proportion of European exports to the country of the defendant (X) becomes significant.

Second, so far we have ignored the cumulation rule by which the Commission can cumulate imports when an AD investigation involves imports from multiple sources. Without cumulation, imports are evaluated on a country-by-country basis. When cumulation is applied the Commission aggregates all "like" imports from all countries under the investigation and assesses the combined impact on the European industry. Without cumulation, the imports originating in a single country are less likely to represent a significant share of the domestic market and is, therefore, less likely to cause injury. When imports from different competitors are aggregated they are more likely to impact on the domestic industry. Hansen and Prusa (1996) find that cumulated cases are 20-40 per cent more likely to result in duties than non-cumulated cases for the US. So, one would expect that this is also relevant in the European investigations. In this section, we add a new variable (SIZE_OTHERS) that represents the cumulated imports from all other countries except the one considered in the sub-case whereas in section 5 the variable represented only the imports originating in the country investigated in the sub-case. I proceed in this manner, so that I do not restrict the coefficients of both these two variables to be the same. One would expect that the market share contributed by the *other* named countries to be important in the injury decision, since the cumulation provision is more relevant for the determination of material injury. The econometric results for the period 1985-94 are summarised in Table 4.6.1 Both the imports from the country in the sub-case and the cumulated imports from the other countries named in the legal case are highly significant.

Table 4.6.1: Probit Estimates (marginal effects) of Dumping and Injury Decisions by the European Union (1985-1994): Cumulation

Hypothesis and Variables	Expected Sign	Dumping		Injury	
		(1) Slope	(2) z-values	(3) Slope	(4) z-values
* Political Track					
International Political Influences					
Share of EU exports	-	-0.827*	*-1.67*	-1.011*	*-1.82*
		(0.475)		(0.540)	
Less Developed Country	?	-0.037	*-0.75*	0.042	*0.55*
		(0.041)		(0.083)	
Domestic Political Influences					
Concentration	+	-0.002	*-0.92*	-0.0001	*-0.44*
		(0.002)		(0.003)	
Case size –own country	+	0.236**	*2.08*	0.141**	*2.38*
		(0.075)		(0.047)	
Case size-other countries in the case	+	0.214**	*2.29*	0.092**	*2.45*
		(0.102)		(0.036)	
Industry size: employment	+	0.430	*1.35*	0.036	*0.20*
		(0.351)		(0.177)	
* Technical Track					
Comparative costs					
Capital intensity	-	-0.110*	*-1.79*	-0.038	*-0.88*
		(0.076)		(0.044)	
Average wage	?	0.038**	*2.00*	0.011	*0.59*
		(0.025)		(0.018)	
Non-market economy	+	0.066*	*1.89*	0.030	*0.74*
		(0.043)		(0.041)	
Technical Precision					
(Number of products)	-	-0.009*	*-1.93*	-0.004	*-0.58*
		(0.005)		(0.006)	
Number of countries		-0.060**	*-1.97*	-0.151***	*-3.34*
		(0.032)		(0.052)	
Number of countries square		0.005	*1.38*	0.017***	*2.83*
		(0.004)		(0.007)	
Year Dummies		*Yes*		*Yes*	
Industry Dummies		*Yes*		*Yes*	
No. observations		253		422	
Wald χ^2(df)		52.1***		89.6***	
		(26)		(30)	
Log. Likelihood		-84.0		-169.1	
Pseudo R^2		0.24		0.31	

See notes in Table 4.3.1: z-values presented in italics. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for "less developed country" and "non-market economy" are for discrete changes in the variables from 0 to 1. In column (1) 166 observations, corresponding to two years and ten industries, are eliminated because decisions are deterministic. Either a positive or negative decision is always made. In column (4) 18 observations, corresponding to five industries, are similarly eliminated.

The econometric results for the period 1995-03 are summarised in Table 4.6.2. The cumulation rule seems more relevant in the dumping than in the injury regressions since the estimated coefficient of the variable (SIZE_OTHERS) - representing the cumulated imports from all other named countries except the one being investigated - is significant at conventional levels only in the dumping regressions. On the contrary, cumulation does not appear to apply to the decisions in this period for the injury regression.

Third, another area of interest is to what extent some industries may be driving the results. Instead of using disaggregated industry dummies, five major industry categories dummies were defined[44]. I proceed by eliminating each industrial sector in turn: chemicals, iron and steel, textiles, and electronics and electrical machinery and others to analyse if there are any significant changes. The sample is reduced successively, excluding each industrial sector at the time. Results for the dumping and injury decisions are reported in Table 4.19 and 4.20 in Appendix 4A, respectively. The results discussed in section 5 remain mostly unchanged with some minor changes that are summarised in what follows. The chemical sector and the electronics and electrical machinery sector deserve special attention since they filed 37% and 19% of all cases respectively. It is worth recalling that, on balance, the European chemical sector is a net exporter of AD investigations. The sector files more cases against other countries than it is the recipient of AD investigations. A total of 192 investigations were initiated by this industry in Europe against other countries and only 78 investigations were initiated in other countries against European firms between 1985 and 1994.

Dumping decisions

When the chemical sector is excluded, the comparative costs variables – with the exception of the dummy for non-market economies – become non significant. Instead two additional political track variables are significant at conventional levels: the dummy for LDC and the concentration variable. They both enter negatively as they do when all sectors are included. This is a significant result because it would indicate that when excluding chemical products the only determinants are political track variables, contradicting Hypothesis 1. When the electronic and electrical machinery sector is excluded, the main determinants remain unchanged but

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[44] The sectors are chemicals, iron and steel, textiles, electronics and electrical machinery, and others (see Table 4.22.1 and 4.22.1 for details).

Table 4.6.2: Probit Estimates (marginal effects) of Dumping and Injury Decisions by the European Union (1995-2003): Cumulation

Hypothesis and Variables	Expected Sign	Dumping		Injury	
		(1)	(2)	(3)	(4)
		Slope	z-values	Slope	z-values
* Political Track					
International Political Influences					
Share of EU exports	-	0.860***	*2.88*	-0.047	*-0.03*
		(0.821)		(1.792)	
Less Developed Country	?			0.221	*1.64*
				(0.224)	
Domestic Political Influences					
Concentration	+	-0.0004	*-1.51*	0.004**	*2.01*
		(0.0005)		(0.002)	
Case size –own country	+	0.00002	*0.55*	0.001**	*2.28*
		(0.00003)		(0.0003)	
Case size-other countries in the case	+	0.0001**	*2.02*	-0.00001	*-0.09*
		(0.00009)		(0.0001)	
Industry size: employment	+	-0.018	*-0.90*	0.521***	*2.70*
		(0.029)	.	(0.224)	
* Technical Track					
Comparative costs					
Labour Share	+	0.095	*1.40*	0.052	*0.18*
		(0.097)		(0.483)	
Average wage	?	0.0007	*0.53*	-0.016*	*-1.82*
		(0.001)		(0.013)	
Non-market economy	+	0.010*	*1.93*	0.019	*0.60*
		(0.013)		(0.034)	
Technical Precision					
(Number of products)	-	0.002	*1.55*	-0.013**	*-2.16*
		(0.003)		(0.008)	
GDP growth		0.002	*0.33*	0.006*	*0.24*
		(0.008)		(0.026)	
Trade Deficit		-5.89e-14	*0.48*	8.76e-13*	*1.72*
		(1.19e-13)		(5.35e-13)	
Year Dummies		*Yes*		*Yes*	
Industry Dummies		*Yes*		*Yes*	
No. observations		163		181	
Wald χ^2(df)		37.2***		45.4***	
		(18)		(19)	
Log. Likelihood		-33.1		-51.5	
Pseudo R^2		0.31		0.25	

Notes: z-values presented in italics. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for "less developed country" and "non-market economy" are for discrete changes in the variables from 0 to 1 In column (1) 26 observations, corresponding to two years, are eliminated because decisions are deterministic. An affirmative decision is always made. In column (3) 13 observations, corresponding to two years, are similarly eliminated.

an additional political track variable is significant. This is the share of EU exports to the country of the defendant. However, the Wald test is not very robust in this regression[45]. Finally, when the observations corresponding to the steel sector are excluded the non-market economy dummy becomes insignificant. This is not a surprising result since the steel industry is the one that most targets these economies. Nearly 56% of investigations in the steel industry are directed towards firms operating in non-market economies.

Injury decisions

When the chemical sector is excluded, an additional comparative costs variable becomes significant: capital intensity. It enters negatively confirming that being labour intensive increases the probability of injury. This result would indicate that when excluding chemical products not only are political track variables important but also one technical track determinant is significant. When the electronic and electrical machinery sector is excluded, the main determinants remain unchanged but an additional political track variable is significant. This is the share of EU exports to the country of the defendant as it was the case in the dumping decisions.

7   The Determinants of Affirmative Findings

In this section, I analyse the political and technical determinants of the affirmative findings of dumping and injury where either duties are imposed or price undertakings accepted. Unlike in Section 5, the cases analysed here are those cases in which dumping an injury were found, the causation of the injury was established and definitive penalties were imposed. The dependent variable takes a value one when both dumping and injury are found and zero, otherwise. This variable is defined over the total number of investigations initiated. The results for the period 1985-1994 are presented in Table 4.7.1

Column (1) and (2) analyse the determinants of affirmative findings including all investigations filed for the main specification. It is expected that the probability of an affirmative finding of dumping increases with the case size – measured as the value of

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[45] The hypothesis that all coefficients in the dumping regression except the intercept are zero is rejected at the 10% level of confidence.

Table 4.7.1: Probit Estimates (marginal effects) of Affirmative Findings by the European Union: 1985-1994

Variables	All cases initiated		Excluding withdrawn, expired and community interest	
	(1)	(2)	(3)	(4)
* Political Track				
International Political Influences				
Share of EU exports (-)	-1.244	-1.546*	-1.282*	-1.509**
	-1.50	*-1.95*	*-1.71*	*-2.12*
Less Developed Country (?)	-0.054	-0.041	-0.042	-0.033
	0.53	*-0.40*	*-0.46*	*-0.36*
Domestic Political Influences				
Concentration (+)	0.0003	-0.001	0.00004	-0.0008
	-0.07	*-0.28*	*0.01*	*-0.22*
Case size (imports) (+)	0.089***	0.097***	0.124***	0.131***
	2.63	*2.57*	*2.65*	*2.71*
Industry size: employment (+)	-0.151	-0.149	-0.116	-0.117
	-0.63	*-0.63*	*-0.45*	*-0.49*
* Technical Track				
Comparative costs				
Capital intensity (-)	-0.041	-0.047	-0.043	-0.048
	-0.62	*-0.71*	*-0.71*	*-0.82*
Average wage (?)	0.023	0.025	0.010	0.013
	0.87	*0.95*	*0.41*	*0.56*
Non-market economy (+)	0.138**	0.129**	0.073	0.065
	2.20	*2.09*	*1.28*	*1.15*
Technical Precision				
(Number of products) (-)	-0.0008	0.0007	-0.0001	-0.0009
	0.14	*0.06*	*-0.01*	*-0.10*
Number of Countries (?)		-0.172**		-0.137**
		-2.51		*-2.25*
Number of Countries Square (?)		0.022**		0.018**
		2.50		*2.23*
Year Dummies	*Yes*	*Yes*	*Yes*	*Yes*
Industry Dummies	*Yes*	*Yes*	*Yes*	*Yes*
No. observations	506	506	464	463
Positive findings (%)	65.4	65.4	71.3	71.3
Wald χ^2(df)	69.6***(31)	81.2***(33)	60.1**(31)	71.8***(33)
Log. Likelihood	-257.1	-251.5	-218.8	-214.5
Pseudo R^2	0.22	0.23	0.22	0.23

See notes in Table 4.3; z-values presented in italics. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). 13 observations corresponding to five industry dummies are eliminated because the outcome for those industries was deterministic. Either a positive or negative decision was always made.

imports in the year the case was initiated – and when the country named is a non-market economy. In Column (2), the specification includes the number of countries named. In this specification, an additional significant determinant is the share of EU exports to the country of the defendant. This indicates that the fear of retaliation increases the probability of an affirmative decision.

Often cases are filed and then withdrawn or terminated because they lead to arrangements between firms or other collusive outcomes. Thus, retaliation threats would be more relevant when withdrawn and expired cases are excluded. The evidence presented in Column (3) and (4) confirms this. When the dependent variable is the probability of an affirmative antidumping decision the fear of retaliation hypothesis is confirmed by the data. Column (1) reports results when all cases initiated are included, whereas Column (3) excludes those cases in which investigations were withdrawn or in which the period of investigation expired. We exclude those observations based on the fact that cases withdrawn were those cases in which dumping either did not exist or firms colluded and reached a settlement of some kind without the intermediation of the Commission.

Similarly, cases in which the period of investigation has expired can be interpreted in a similar fashion to those withdrawn. Generally, the period expires because domestic firms do not provide the necessary evidence in the time stipulated by the regulations. The number of countries enters in a non-linear way (Columns 2 and 4). The probability of an affirmative finding decreases with the number of countries named initially but increases after a critical point. When the cases withdrawn or expired are left out, the results change slightly and only political track determinants are significant. The probability of an affirmative finding increases with the case size as well in this case. However, the non-market economy dummy is no longer significant. Instead, the fear of retaliation hypothesis is confirmed. The probability of an affirmative finding of dumping decreases with the proportion of European exports to the country of the defendant. The technical determinants (comparative costs) are not important.

Period 1995-2003

As can be seen in Table 4.7.2, the results do not change in any significant way from those corresponding to the earlier period.

Table 4.7.2: Probit Estimates (marginal effects) of Affirmative Findings by the European Union: 1995-2003

	All cases initiated		Excluding withdrawn, expired and community interest	
	(1)	(2)	(3)	(4)
Variables				
* Political Track				
International Political Influences				
Share of EU exports (-)	-6.217***	-5.635***	-4.422***	-4.359***
	-3.27	*-3.09*	*-2.80*	*-2.76*
Less Developed Country (?)	-0.302*	-0.286	-0.072	-0.078
	-1.75	*-1.59*	*-0.47*	*-0.52*
Domestic Political Influences				
Concentration (+)	-0.0009	0.0009	0.006	0.011*
	-0.17	*0.15*	*1.12*	*1.71*
Case size (imports) (+)	0.0002	0.0002	0.0003*	0.0003
	0.65	*0.87*	*1.78*	*1.40*
Industry size: employment (+)	1.520	1.763*	1.969**	2.652***
	1.60	*1.78*	*2.14*	*2.72*
* Technical Track				
Comparative costs				
Labour Share (+)	0.993	1.135	1.235	1.104
	0.87	*1.01*	*1.02*	*0.91*
Average wage (?)	0.007	-0.002	-0.002	-0.015
	0.19	*-0.05*	*-0.07*	*-0.44*
Non-market economy (+)	0.089	0.088	0.156*	0.165**
	1.09	*1.10*	*1.85*	*1.96*
Technical Precision				
(Number of products)	-0.044***	-0.048***	-0.050***	0.050***
	-2.96	*-3.20*	*-3.87*	*-3.60*
Number of Countries (?)		-0.029		-0.167**
		-0.38		*-2.18*
Number of Countries Square (?)		0.006		0.017
		0.72		*2.26*
GDP growth	*0.078*	0.066	*0.004*	0.072
	0.55	*0.46*	0.03	*0.48*
Trade Deficit	*4.88e-13*	1.22e-12	*8.43e-13*	2.99e-12
	0.17	*0.41*	0.28	*1.01*
Year Dummies	*Yes*	*Yes*	*Yes*	*Yes*
Industry Dummies	*Yes*	*Yes*	*Yes*	*Yes*
No. observations	261	261	216	216
Positive findings (%)	61.7	61.7	71.3	71.3
Wald χ^2(df)	83.5***(25)	105.9***(25)	80.6***(23)	110.0***(25)
Log. Likelihood	-139.3	-138.0	-98.7	-95.5
Pseudo R^2	0.20	0.20	0.24	0.26

Note: z-values presented in italics. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single named country in and AD legal case.* indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). In column (1) and (2), 10 observations corresponding to two industry dummies and one year dummy are eliminated because the outcome was deterministic. Either a positive or negative decision was always made. Similarly in column (3) and (4), 15 observations corresponding to three industry dummies and one year dummy are eliminated because the outcome was deterministic.

8   Economic Significance

In this section, the economic relevance of the econometric findings presented in Section 5 corresponding to the analysis of the period 1985-94 is discussed. When using probit regression the marginal effects are not straightforward to interpret. The regressors are of a very different nature and are measured in substantially different units. For this reason, it is more appropriate to discussed standardised results. The results of the main specifications are presented in Table 4.8. They show the percentage change in the probability of dumping and injury for a one standard deviation change in each of the relevant independent variables, holding all other variables at their mean values. In this manner, the percentage change in the probability of dumping and injury accounts for how large a given change is with respect to the initial probability. For the number of countries several intervals of change are considered. Dummy variables (LDC and NME) show the discrete change from 0 to 1. For the number of countries named in the investigations changes are measured in four intervals of dimension 2.

Dumping decisions

The results in Table 4.8 show that the capital-labour ratio has the largest effect. A one-standard deviation increase in the capital-labour ratio reduces the probability of a positive finding on dumping by 100%. This is a substantial effect. However, a remark is necessary, because a one-standard deviation in the capital-labour ratio corresponds to nearly 80.000 US dollars at constant 1990 prices. A one-standard deviation in the case size increases the probability of a positive decision on dumping by nearly 7%. The one-standard deviation represents more than 100 million dollars. The impact of employment is similar. A one-standard deviation – representing about 627.000 people – increases the probability of dumping by about 7%. The impact of the average wage per worker is 7% and significant. A one-standard deviation represents about 9,700 US dollars per worker per year. Filing against more than one country decreases the probability of dumping to start with and up to a certain number but exhibits that increasing returns to scale are present and are significant.

Injury decisions

The results for the decisions on injury are very similar to those of the dumping decisions,

Table 4.8: Economic Significance: Percentage Changes in the Probability of Dumping and Injury (1985-94)

		Dumping		Injury
		(1)	(2)	(3)
Hypothesis and Variables	Sign			
* Political Track				
International Political Influences				
Share of EU exports	-	-5.40*	-4.11	-5.17*
Less Developed Country	?	-6.26	-6.09	3.83**
Domestic Political Influences				
Concentration	+	-6.01	-3.23	-0.32
Case size: imports	+	6.80**	7.26***	13.27***
Industry size: employment	+	6.78**	7.07**	-16.70
* Technical Track				
Comparative costs				
Capital intensity	-	-100.00***	-100.00***	-82.02*
Average wage per worker	?	6.80**	7.26***	11.98**
Non-market economy	+	8.13**	9.18**	2.83**
Technical Precision				
Number of products	-	-4.99	-4.03	-1.12
Countries: 1 to 2		-5.15***		-11.77***
2 to 4		-5.73		-11.11**
4 to 6		2.24		10.52**
6 to 8		7.10**		14.66***
Year Dummies		Yes	Yes	Yes
Industry Dummies		Yes	Yes	Yes
No. observations		253	253	422

Notes: * indicates significant at the 10% confidence level; ** 5% level and *** 1% level. Expected sign next to variable name. Robust standard errors are calculated using the delta method.

except for the impact of the share of EU exports to the country of the defendant and the LDC dummy. A one-standard deviation in the share of EU exports to the country of the defendant – representing 3.5 per cent of European total exports - decreases the probability of injury being found by about 5%. The change in the probability of injury increases by more than 3% when the petition is against a less developed country. Filing against more than one country decreases the probability of injury to start with and up to a certain number but exhibits a non-linear form.

Overall, the empirical analysis supports the conclusions anticipated previously and the determinants represent a meaningful economic significance.

9 Comparison of the Results with those for the US

A comparison of the analysis in this study and results from previous ones is summarised in Table 4.21 in Appendix 4A. The results refer to those sub-cases investigated. Previous research (Finger et al. 1982 and Tharakan and Waelbroeck 1994) has found that AD decisions in the US and in the EU are influenced by factors other than technical criteria envisaged by the World Trade Organization (WTO) and its predecessor the General Agreement on Tariffs and Trade (GATT). In previous research the dumping decisions have been found to be mainly dominated by technical criteria, whilst the injury decisions have been found to be more open to political economy considerations. In this study, political economy factors were also found to be relevant in the decisions on dumping.

The econometric analysis discussed in this chapter is based on a sample of 525 legal cases initiated between 1985 and 1994. The specification used in this thesis differs from previous ones in that it introduces several controls that account for macroeconomic effects and industry heterogeneity. The phenomenon of having an affirmative decision on dumping or injury can be explained by the general features of the double track model of administered protection.

Dumping decisions

One of the similarities between the results in this study and previous ones is that mainly technical determinants (comparative costs) are individually and jointly important in the decisions on dumping. The significant technical determinants in this study, as well as in previous ones, are the average wage per worker and the capital-labour ratio. The average wage per worker has a negative sign for the US whilst it is positive for Europe, in accordance with the strategic trade policy theory. The differences in performance of the human capital variable for the US and Europe suggest that the European Commission is receptive of implications of the strategic trade policy theory. This could be viewed as a more interventionist approach or as an indication of the underlying preferences of the decision-makers that emphasises strategic issues in the domain of antidumping. The capital intensity variable was found to be a significant determinant of the dumping decisions in this study as it was for the US and a previous study for the EC. Whereas the results for Europe

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are in accordance with the Heckscher-Ohlin theory of comparative advantage, those for the US are possibly more in line with the Leontief Paradox. Among the technical determinants, the dummy for a non-market economy was found to be significant in this study as it was previously found for European decisions on dumping. This confirms that the built-in technical artifice makes the non-market economies more vulnerable to dumping findings in Europe. A very aggressive response is geared towards non-market economies, for which there is significant effect in the dumping and injury decisions. Whether this strong effect of non-market economies then translates into penalisations such as the imposition of definitive duties or ends up in the acceptance of undertakings as a softer remedy is further analysed in Chapter 5.

When controlling for macroeconomic effects and industrial sector heterogeneity, the only significant political determinants in the dumping decision in Europe in the period 1985-94, is case size. A likelihood ratio test indicates that political economy variables are jointly significant in the dumping decisions. However, variables other than case size are jointly insignificant. Industrial concentration was previously found to be significant for the US but had the wrong sign. The dummy variable for less developed countries was found to be significant in a previous study for the EC, but was found to be insignificant here.

Injury decisions

The similarity between the results in this study and previous ones is that mainly political track variables are significant in the injury decisions. No comparative costs variables were found to be significant. In stark contrast with previous research, the analysis for European injury decisions between 1985 and 1994 shows that only one domestic political determinant – that is, case size - is statistically significant and very robust (at least 5% level of confidence in all specifications). No international political determinants were found to be significant with the exception of the fear of retaliation variable in some specifications.

Two other proxies for industry size were significant for the US; namely, concentration and employment. However, only employment had the expected sign. In a previous study for Europe, industry concentration and value added were found to be significant and had the expected sign. But as pointed out earlier, value added is likely to be highly correlated with employment and either one or the other of these variables should be taken to capture industry size effects. Furthermore, none of these two variables are found to be important determinants after controlling for macroeconomic effects and industry

heterogeneity. The capital intensity variable was found to be significant in a previous study for Europe, but it is not significant here, except in the specification that excludes the chemical industry.

The Commission is obviously more responsive to the firms whose cases are big in terms of imports. This may be cause for concern but it could also have another interpretation. Import values originating from the countries named in an investigation are often high at the time of initiation. Very often these high import values represent new importers entering the European market very aggressively. And, because imports are one of the things contained in the European Commission checklist for injury, it should not be surprising that it is found to be an important determinant of the injury decisions.

A final caveat is that the results for the period 1995-2003 should be interpreted with caution since the sample contains all new AD investigations and only some review cases. In Europe, AD measures are imposed for a period of 5 years and after that, they ceased automatically (provided there is no review of the case). The reviewed cases are, therefore, like new cases. Data limitations resulted in most review cases being omitted in the recent period (only 15 are included in the sample). Review cases represented 36% of all investigations (188 out of 525 investigations) in the period 1985-94.

10 Conclusions

This chapter examined the political and technical determinants of AD investigations in Europe in the period 1985-2003. The results presented in the previous sections are consistent with the hypotheses formulated. The findings in this study suggest that Europe is operating a double track AD mechanism. In the period 1985-94, mainly economic variables are significant in the dumping decisions whereas only political determinants are important in the injury decisions. In the most recent period, the results confirm more clearly hypotheses 1 and 2. This pattern is similar to the mechanism in the US. In spite of Europe's less cohesive political structure, the main features are similar.

The present study improves upon previous research in that by using a unique dataset with information collected from the reports published in the Official Journal of the European Commission and other sources, gathers a data set of 805 legal cases covering the

period 1985-2003. First, the econometric analysis improves on previous studies in that it explicitly controls for industry heterogeneity and macroeconomic effects. It is shown that a decision on dumping and injury being positive can be explained by the general features of the double track model of administered protection as captured by the main regressors. Several comparative costs variables are individually significant in the determination of dumping. Moreover, the relevance of the number of countries named in the investigations in the probability of dumping and injury being positive is analysed. The econometric analysis shows that there is a non-linear effect on the probability of a decision on dumping and injury. Filing investigations against a larger number of countries decreases the probability of dumping and injury to start with until it reaches a critical value of four countries. When more than four countries are named in the investigation the probability of dumping and injury increases. The model is robust to the use of different proxies. Second, the results are similar when cumulated imports – by which the European Commission can cumulate imports from all the countries named in the investigation – are analysed. There are no major variations when excluding different sectors of economic activity. Third, the economic significance of some of the determinants is of considerable magnitude.

The analysis in this chapter contributes to the debate that the AD laws are serving different purposes. The fact that the determinants of injury are political rather than technical goes in favour of the presumption that because the criteria for injury are less clear, political economy factors would tend to be more prevalent. The results are consistent with the hypothesis formulated. However, for the earlier period (1985-94) only one or two political variable, namely case size and the share of EU exports were found to be significant in the dumping regression. The finding that imports are significant on injury decisions is in accordance with previous findings. However, the fact that the variable "case size" is a determinant of the dumping and injury decisions could also be interpreted as the fact that new exporters enter the EU market very aggressively with very high levels of imports in the year in which the investigations are filed. This result seems to be in accordance with other studies that find that protection – when considering tariff levels or the change in tariff levels - is higher if the industry has experienced an increase in import penetration (Treffler 1993). There is some evidence of the significance of traditional measures of industry power, such as industry size and concentration.

The empirical evidence of cross-country industry determinants of protection shows that protection is higher when the industry is labour intensive, low-skill and low-wage

(Rodrik, 1996). However, the econometric analysis in this study finds support for a higher probability of dumping when the industry is high skill, high-wage. The analysis of the dumping decisions in the European Union indicates that the probability of a positive decision on dumping increases in industries with high human capital content, as shown by the significant and robust importance of the average wage per worker in the industry filing an investigation. This is an indicator of how much the European Commission is concerned with protecting industries with high levels of human capital.

The results for the recent period (1995-03) suggest that the share of EU export to the country of the defendant is positively and significantly associated with an affirmative decision on dumping. The EU is more likely to find dumping in cases involving those trade partners with a higher proportion of European exports. However, this variable may not be measuring only the threat of retaliation. Instead it could also be a proxy for the stability of trade relations between the EU and its trading partners. If this was the case, affirmative decisions against trade partners may not affect the trade flows with these partners. Another possible interpretation of the results is that the variable used may be capturing the fact that countries with a large share of EU exports are using antidumping against the EU and Europe is likely to retaliate.

In recent years there have been changes in the regulations that are likely to affect the way in which measures are approved by the Council of Ministers. The voting rule changed in 1994. Since then the decisions in the COM have to be approved by simple majority instead of qualified majority. Abstentions were counted against the imposition of AD measures. Since 1995 there have been more disagreements between the EC and member states and among member states. In practice, Austria, Luxemburg and Belgium – which are small countries – are swing voters and decide whether a simple majority for definitive measures is achieved. The ascension of Austria, Sweden and Finland has added two countries to the anti-duties block.

Two additional changes occurred in 2004. First, a change in the voting rules occurred in March 2004. Since then abstentions in the COM count in favour of the imposition of measures (Evenett and Vermulst 2005). Second, ten countries have acceded to the European Union in May 2004. They are small countries that do not use AD measures heavily and are likely to abstain. So with the new rules introduced in March 2004 their abstentions will count in favour of measures. It will be more difficult to obtain a simple

majority against measures. It is possible that these new developments could affect the outcome of antidumping activity.

A final caveat to be kept in mind is that all the econometric analysis discussed in this chapter is conditional on the European firms filing a petition. The determinants of a decision on dumping and injury are analysed once firms have filed their investigations. Further research is needed to explain the determinants of a decision to file an investigation by European firms and is beyond the scope of this study. In the econometric analysis presented in this chapter there is a potential problem of self-selection in the petitions filed. It could be that only cases that have a good chance of being won are actually initiated and are then part of the sample. Acknowledging this possibility implies that the interpretation of the results must be clearly associated with the investigations actually initiated by the European Commission. The inclusion of sector dummies that control for sector heterogeneity can capture to some extent a possible selection bias.

The next chapter will extend the analysis further. After dumping and injury have been found, legal provisions allow the investigating authorities to settle antidumping cases either by levying duties or by demanding price undertakings from the foreign exporting firms. Price undertakings are price agreements between firms that allow the dispute to be settled, as long as the injury is eliminated. They have been used in Europe, although less frequently in the period 1985-2003 than before. The rules for its acceptance are no clear-cut, so the chapter empirically assesses several hypotheses regarding these decisions.

Appendix 4A

Table 4.9: Number of AD Investigations (cases) and Sub-cases in Europe (1985-2003), by Year

Years	Number of legal cases	Number of sub-cases	Average number of countries in each legal case
1985	24	51	2.1
1986	19	48	2.5
1987	23	45	2.0
1988	37	71	1.9
1989	28	53	1.9
1990	31	66	2.2
1991	22	37	1.7
1992	30	56	1.9
1993	21	42	2.0
1994	26	56	2.2
Sub-total	261	525	
1995	16	34	2.1
1996	10	28	2.8
1997	17	42	2.5
1998	9	21	2.3
1999	26	65	2.5
2000	11	31	2.8
2001	13	31	2.4
2002	13	21	1.6
2003	4	7	1.8
2004	17	29	1.7
Sub-total	136	309	
Total	397	834	

Source: European Commission, Official Journal, series C and L
Note: A sub-case is a subdivision of a petition (legal case) in which each country named is considered as an individual unit

Table 4.10.1: Descriptive Statistics of Variables Used in the Dumping Regressions (1985-94)

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient Variation
Dependent Variable					
DUMPING	0.889614	0.3136673	0	1	2.836353
Regressors					
X	0.022504	0.0341157	0	0.218096	1.515985
SIZE1	50.156	167.414	0	1,456.577	3.337932
SIZE2	0.01032	0.03593	0	0.33431	3.481309
VA	0.6561708	0.341904	0.0981229	1.527312	0.521059
RVA	0.0505337	0.0271799	0.0073249	0.1078681	0.536795
LAB	1.245057	0.8191313	0.261018	3.19632	0.657379
RLAB	0.0431728	0.028658	0.009888	0.1058202	0.663797
AVWAGE	35.87628	10.0847	14.14347	61.15977	0.281097
RWAGE	0.0514861	0.0318809	0.0077365	0.1284103	0.619213
LS	0.6419541	0.0751564	0.5132412	0.7992101	0.117074
LDC	0.8075117	0.394718	0	1	0.488808
NME	0.4295775	0.4955979	0	1	1.115369
K/L	15.12007	7.703729	2.336526	30.9690	0.509504
CON1	35.391	16.35426	5	73	0.462102
CON2	0.7701422	0.4212406	0	1	0.546965
TECH	2.788732	3.657381	1	26	1.311149
NOC	3.136792	2.018863	1	8	0.643607

Note: It refers to 426 observations. The unit of observation is the sub-case. Statistics are calculated for each sub-case. A sub- case is defined as the investigation against each single country named in an AD legal case. See Appendix 4C for more details on data construction and sources.

Table 4.10.2: Descriptive Statistics of Variables Used in the Dumping Regressions (1995-03)

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient Variation
Dependent Variable					
DUMPING	0.921182	0.270120	0	1	0.293232
Regressors					
X	0.015720	0.019255	0.00277	0.207874	1.224882
SIZE1	6.54e+07	1.96e+08	0	1,85e+09	2.996108
SIZE2	0.008350	0.026139	0	0.248979	3.130260
VA	15.04811	12.54616	0.051718	36.96233	0.833737
LAB	0.024530	0.164168	0.001546	0.788804	0.669247
AVWAGE	24.11379	6.694185	9.624306	33.65210	0.277608
LS	0.447883	0.080087	0.297706	0.592907	0.178813
LDC	0.940887	0.236420	0	1	0.251273
NME	0.403941	0491899	0	1	1.217750
CON1	32.71357	15.8407	3	65	0.484224
TECH	3.024752	2.790243	1	12	0.922470
NOC	4.103448	2.440203	1	10	0.594671

Note: It refers to 203 observations. The unit of observation is the sub-case. Statistics are calculated for each sub-case. A sub- case is defined as the investigation against each single country named in an AD legal case. See Appendix 4C for more details on data construction and sources.

Table 4.11.1: Descriptive Statistics of Variables Used in the Injury Regressions (1985-94)

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient Variation
Dependent Variable					
INJURY	0.7616927	0.4265233	0	1	1.785817
Regressors					
X	0.0234294	0.0349984	0	0.2499166	1.493781
SIZE1	48.916	163.3341	0	1,456.577	3.339055
SIZE2	0.0100432	0.035045	0	0.33431	3.489426
VA	0.6593378	0.3531017	0.0981229	1.527312	0.535540
RVA	0.0507651	0.0279397	0.0073249	0.1078681	0.550374
LAB	1.26704	0.8436427	0.261018	3.19632	0.665837
RLAB	0.0438096	0.0293697	0.009888	0.1058202	0.670395
AVWAGE	35.46483	10.24339	14.14347	61.15977	0.288323
RWAGE	0.0518981	0.0329712	0.0077365	0.1284103	0.635306
LS	0.6430946	0.0756168	0.5132412	0.7992101	0.117583
LDC	0.7928731	0.4056993	0	1	0.511683
NME	0.4432071	0.4973182	0	1	1.122090
K/L	14.68912	7.814726	2.336526	30.969	0.532008
CON1	34.54628	16.66646	5	73	0.482439
CON2	0.7404706	0.4389073	0	1	0.592793
TECH	2.63029	3.422166	1	26	1.301061
NOC	3.12975	2.018121	1	8	0.644718

Note: It refers to 449 observations. The unit of observation is the sub-case. Statistics are calculated for each sub-case. A sub- case is defined as the investigation against each single country named in an AD legal case. See Appendix 4C for more details on data construction and sources.

Table 4.11.2: Descriptive Statistics of Variables Used in the Injury Regressions (1995-03)

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient Variation
Dependent Variable					
INJURY	0.879227	0.326653	0	1	0.371523
Regressors					
X	0.015699	0.0192829	0.000187	0.207974	1.228265
SIZE1	6.50e+07	1.95e+08	0	1.85e+09	2.992298
SIZE2	0.008311	0.025941	0	0.248979	3.121170
VA	14.56344	12.41765	0.051718	36.96233	0.852659
LAB	0.237274	0.161739	0.001546	0.788040	0.681654
AVWAGE	24.19649	6.557643	9.624306	33.65210	0.288323
LS	0.450613	0.080411	0.297706	0.592907	0.271843
LDC	0.932367	0.251724	0	1	0.269983
NME	0.410628	0.493140	0	1	1.200942
CON1	32.34236	15.81326	3	65	0.488933
TECH	3.131068	2.924631	1	12	0.934068
NOC	4.236715	2.426993	1	10	0.572848

Note: It refers to 207 observations. The unit of observation is the sub-case. Statistics are calculated for each sub-case. A sub- case is defined as the investigation against each single country named in an AD legal case. See Appendix 4C for more details on data construction and sources.

Table 4.12.1: Correlation Matrix (1985-1994)

	LAB	VA	AVWAGE	K/L	CON1	SIZE2	LDC	X	NME
LAB	1								
VA	0.87*	1							
AVWAGE	-	0.25*	1						
K/L	-0.46*	-	0.59*	1					
CON1	-0.13*	0.14*	0.61*	0.42*	1				
SIZE2	0.09*	-	-0.16*	-0.14*	-	1			
LDC	0.17*	0.10*	-	0.19*	-	0.27*	1		
X	-	-	-	-	-	0.10*	-0.63*	1	
NME	-0.23*	-0.18*	0.13*	-	-	-0.12*	0.40*	-	1

Note: The above tables report pair wise correlations using all 525 observations;(*) indicates partial correlation coefficients significant at the 5% level of confidence.

Table 4.12.2: Correlation Matrix (1995-2003)

	LAB	VA	AVWAGE	LAB.SH	CON1	SIZE2	LDC	X	NME
LAB	1								
VA	0.70*	1							
AVWAGE	-	0.64*	1						
LAB. SHARE	0.26*	-0.80*	-0.62*	1					
CON1	-0.23*	0.22*	0.70*	-0.29*	1				
SIZE2	-	-	-	-	-	1			
LDC	-	-	-	-	-	0.50*	1		
X	-	-	-	-	-	0.57*	-0.57*	1	
NME	-	-	-	-	-	-	0.20*	-	1

Note: The above tables report pair wise correlations using all 280 observations;(*) indicates partial correlation coefficients significant at the 5% level of confidence

Table 4.13: Correlation Matrix, Sensitivity Analysis (1985-1994)

	RLAB	RVA	LS	RWAGE	CON1	SIZE2	LDC	X	NME
RLAB	1								
RVA	0.89*	1							
LS	0.40*	0.11*	1						
RWAGE	0.93*	0.97*	0.45*	1					
CON1	-0.18*	0.16*	-	-	1				
SIZE2	0.12*	-	-	-	-	1			
LDC	-0.14*	-0.14*	-0.16*	-0.17*	-	0.27*	1		
X	-	-	-	-	-	0.10*	-0.63*	1	
NME	-0.23*	-0.14*	-0.16*	-0.17*	-	-0.12*	0.40*	-	1

See note in Table 4.12.1

Table 4.14: Correlation Matrix: Sensitivity Analysis (1985-1994) (continuation)

	LDC	RLAB	SIZE2	CON1	LS	NME	TECH
LDC	1						
RLAB	-0.17*	1					
SIZE2	0.27*	0.12*	1				
CON1	-	-0.18*	-	1			
LS	-0.16*	0.40*	-	-	1		
NME	0.40*	-0.23*	-0.12*	-	0.16*	1	
TECH	-	-	-	-	-	-0.11*	1

See note in Table 4.12.1

Table 4.15.1: Number of Cases (1985-1994), by Sector of Economic Activity

	85	86	87	88	89	90	91	92	93	94	Total	Percentage
Chemicals	1	27	23	27	18	30	14	15	16	21	192	**36.6**
Iron steel	4	3	6	20	6	17	10	15	8	12	101	**19.2**
Textiles	7	0	0	0	7	12	1	6	3	14	50	**9.6**
Electronics/Electrical Machinery	16	11	12	14	9	4	7	16	9	3	101	**19.2**
Other	23	7	4	10	13	3	5	4	6	6	81	**15.4**
Total	51	48	45	71	53	66	37	56	42	56	525	**100.0**
Percentage	**9.7**	**9.1**	**8.6**	**13.5**	**10.1**	**12.6**	**7.0**	**10.7**	**8.0**	**10.7**	**100**	

Source: European Commission, Official Journal, C and L series

Table 4.15.2: Number of Cases (1994-2003), by Sector of Economic Activity

	95	96	97	98	99	00	01	02	03	Total	Percentage
Chemicals	12	0	7	2	26	17	10	6	5	85	**30.4**
Iron steel	7	9	3	7	18	3	19	5	0	71	**25.4**
Textiles & Footwear	8	13	9	4	5	0	0	5	0	44	**15.7**
Electronics/Electrical Machinery	4	0	14	0	10	1	0	0	0	29	**10.4**
Other	3	5	9	8	6	10	2	0	2	45	**16.1**
Total	34	28	42	21	65	31	31	21	7	280	**100.0**
Percentage	**12.1**	**10.0**	**15.0**	**7.5**	**23.2**	**11.1**	**11.1**	**7.5**	**2.5**	**100**	

Source: European Commission, Official Journal, C and L series

Table 4.16.1: Industrial Indicators (mean), by Sector of Economic Activity (1985-1994)

	K/L	AVWAGE	LAB	VA	Observations
Chemicals	21.37727	43.55046	0.9459345	0.6960006	192
Iron steel	16.06133	35.18207	0.7465987	0.3802396	101
Textiles	7.65459	20.45051	1.5530480	0.5218228	50
Electronics &Elect. Mach.	6.48965	31.60105	2.5450630	1.1027020	103
Other	9.20601	26.68881	0.9303072	0.3982149	79
Total	14.30508	34.87450	1.2774500	0.6541346	525

Source: European Commission and OECD STAN

Note: Five major industry categories are defined using the International Standard Industrial Classification (ISIC) Revision (see Table 4.22.1)

Table 4.16.2: Industrial Indicators (mean), by Sector of Economic Activity (1995-2003)

	LABOUR SHARE	AVWAGE	LAB	VA	Observations
Chemicals	0.38	30.339	0.229870	26.260	85
Iron steel	0.49	25.439	0.123244	6.551	71
Textiles	0.49	14.173	0.180290	5.107	44
Electronics &Elect. Mach.	0.47	23.868	0.253265	12.968	29
Other	0.48	17.291	0.272934	9.701	45
Total	0.45	23.645	0.225543	13.630	280

Source: European Commission and EUROSTAT (Structural Business Statistics)

Note: as in table 4.16.1

Table 4.17: Probit Estimates (marginal effects) of Dumping Decisions by the European Union (1985-1994), Main Specification (with and without controls)

Hypothesis and Variables	Expected Sign	(1)	(2)	(3)	(4)
* Political Track					
International Political Influences					
Share of EU exports	, -	-0.197	-0432*	-0.544	-0.937
		-1.07	*-1.67*	*-1.50*	*-1.63*
Less Developed Country	?	-0.014	-0.028	-0.037	-0.060
		-0.72	*-0.83*	*-1.24*	*-1.17*
Domestic Political Influences					
Concentration	+	-0.00003	-0.0003	-0.0004	-0.002
		-0.01	*-0.24*	*-0.42*	*-0.82*
Case size: imports	+	0.099*	0.222**	0.121	0.322**
		1.7	*2.28*	*1.61*	*2.46*
Industry size: employment	+	0.005	0.005	0.003	0.296
		0.46	*0.04*	*0.14*	*0.83*
* Technical Track					
Comparative costs					
Capital intensity	-	-0.0009	0.005	-0.003	-0.122*
		-0.61	*0.26*	*-1.00*	*-1.67*
Average wage	?	0.0004	-0.002	0.0008	0.043*
		0.39	*-0.28*	*0.30*	*1.86*
Non-market economy	+	0.025*	0.044**	0.046*	0.081**
		1.90	*2.06*	*1.94*	*2.03*
Technical Precision					
(Number of products)	-	-0.003	-0.003	-0.005*	-0.008
		-1.29	*-1.00*	*-1.92*	*-1.51*
Year Dummies		*No*	*No*	*Yes*	*Yes*
Industry Dummies		*No*	*Yes*	*No*	*Yes*
No. observations		419	315	341	253
Wald χ^2(df)		9.7(9)	21.3(16)	33.0***(16)	36.4**(23)
Log. Likelihood		-121.7	-110.1	-102.1	-90.0
Pseudo R^2		0.09	0.08	0.18	0.19

Notes: z-values presented in italics. Dependent variable: y=1 if a dumping decision is positive; y=0 otherwise. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. In the sample period, there are an average of 2 sub-cases per case with a maximum of 8 and a minimum of 1. Each regression also includes a constant. Robust standard errors are corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for dummy variables are calculated as discrete changes from 0 to 1. In column (2), (3) and (4) two year and ten industry dummies –and the corresponding observations - are eliminated because a decision has always been positive or negative for those years and industries.

Table 4.18: Probit Estimates (marginal effects) of Injury Decisions by the European Union (1985-1994), Main Specification (with and without controls)

Hypothesis and Variables	Expected Sign	(1)	(2)	(3)	(4)
* Political Track					
International Political Influences					
Share of EU exports	-	-0.813	-1.057*	-0.814	-0.823
		-1.35	*-1.71*	*-1.9*	*-1.28*
Less Developed Country	?	0.050	-0.023	0.056	0.024
		0.73	*-0.31*	*0.76*	*0.31*
Domestic Political Influences					
Concentration	+	0.002	0.0006	0.001	0.0001
		0.98	*0.19*	*0.65*	*0.03*
Case size: imports	+	0.182**	0.161**	0.187***	0.181**
		2.54	*2.09*	*2.66*	*2.49*
Industry size: employment	+	-0.022	-0.646*	-0.021	-0.108
		-0.57	*-1.75*	*-0.63*	*-0.56*
* Technical Track					
Comparative costs					
Capital intensity	-	-0.006	-0.073*	-0.004	-0.038
		-0.90	*-1.85*	*-0.64*	*-0.80*
Average wage	?	0.005	0.021	0.003	0.011
		1.02	*1.33*	*0.46*	*0.57*
Non-market economy	+	0.024	0.033	0.032	0.036
		0.53	*0.75*	*0.81*	*0.86*
Technical Precision (Number of products)	-	-0.003	0.003	-0.006	-0.0008
		-0.44	*0.40*	*-1.19*	*-0.12*
Year Dummies		*No*	*No*	*Yes*	*Yes*
Industry Dummies		*No*	*Yes*	*Yes*	*Yes*
No. observations		440	422	440	422
Wald χ^2(df)		20.2**(9)	40.0***(21)	38.4***(18)	61.9***(30)
Log. Likelihood		-218.7	-192.2	-197.6	-169.1
Pseudo R^2		0.07	0.16	0.16	0.26

Notes: z-values presented in italics. Dependent variable: y=1 if an injury decision is positive; y=0 otherwise. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. In the sample period, there are an average of 2 sub-cases per case with a maximum of 8 and a minimum of 1. Each regression also includes a constant. Robust standard errors are corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for dummy variables are calculated as discrete changes from 0 to 1. In column (2) and (4) five industry dummies - and the corresponding observations - are eliminated because a decision has always been positive or negative for certain industries.

Table 4.19: Industrial Sectors, Probit Estimates (marginal effects) of Dumping Decisions by the European Union (1985-1994)

		All sectors	Chemical excluded	Iron and Steel excluded	Textiles excluded	Electronic & Elec. Machinery Excl.	Others excluded
		(1)	(2)	(3)	(4)	(5)	(6)
*Political Influences							
International							
Share of EU exports	-	-0.937	0.094	-0.211	-0.200	-1.195**	-0.414
		-1.63	*0.09*	*-0.86*	*-1.34*	*-1.98*	*-1.53*
Less Developed Country	?	-0.060	-0.058**	-0.0007	-0.013	-0.073	-0.027
		-1.17	*-2.40*	*-0.02*	*-1.22*	*-1.52*	*-1.12*
Domestic							
Concentration	+	-0.002	-0.003**	-0.0004	-0.0001	-0.0012	0.0004
		-0.82	*2.52*	*0.49*	*-0.24*	*-0.61*	*0.05*
Case Size: Imports	+	0.322**	0.084**	0.107**	0.081**	0.360***	0.122**
		2.46	*2.11*	*2.29*	*2.46*	*2.61*	*2.01*
Industry Size:	+	0.296	0.107	0.013	0.016	-0.008	0.037
Employment		*0.83*	*0.67*	*0.52*	*1.31*	*-0.17*	*1.42*
*Technical Track							
Comparative costs							
Capital Intensity	-	-0.122*	-0.002	-0.002	-0.0005	-0.004	-0.006**
		-1.67	*-0.36*	*-0.73*	*-0.36*	*-0.69*	*-2.14*
Average Wage	?	0.043*	0.005	0.00004	-0.002	0.0006	0.005
		1.86	*1.07*	*0.02*	*-1.09*	*0.10*	*1.29*
Non-market Economy	+	0.081**	0.053**	0.014	0.025**	0.064*	0.047**
		2.03	*2.46*	*0.75*	*2.43*	*1.70*	*2.43*
Number of products	-	-0.008	-0.003	-0.009**	-0.003*	-0.01*	-0.005
		-1.51	*-0.95*	*-2.03*	*-1.83*	*-1.94*	*-2.04*
No. observations		253	172	271	307	279	297
Wald χ^2 (df)		36.4**(23)	41.8***(17)	34.0**(19)	41.1(19)***	29.6*(19)	38.5(19)***
Log likelihood		-90.0	-48.9	-77.1	-83.8	-91.4	-89.2
Pseudo R^2		0.19	0.26	0.18	0.24	0.18	0.21

Marginal effects; z-values presented in italics. All regressions contain a constant and industry and yearly dummies. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for "less developed countries" and "non-market economies" are calculated as discrete changes from 0 to 1. In Column (2), 74 observations corresponding to four years (1986, 1987, 1991 and 1994) are eliminated because dumping decisions are always positive. In Columns (3), (4), (5) and (6), 60, 77, 66 and 73 observations are excluded respectively, because dumping decisions are always positive in two years (1987 and 1994).

Table 4.20: Industrial Sectors, Probit Estimates (marginal effects) of Injury Decisions by the European Union (1985-1994)

		All sectors	Chemical excluded	Iron and Steel excluded	Textiles excluded	Electronic & Elec. Machinery Excl.	Others excluded
		(1)	(2)	(3)	(4)	(5)	(6)
*Political Influences							
International							
Share of EU exports	-	-0.823	-1.600	-0.844	-0.721	-1.550*	-0.342
		-1.28	*-1.58*	*-1.25*	*-1.16*	*-1.73*	*-0.61*
Less Developed Country	?	0.024	0.028	0.046	0.068	-0.047	0.145*
		0.31	*0.36*	0.54	*0.87*	*-0.53*	*1.72*
Domestic							
Concentration	+	0.0001	0.003	0.003	0.0007	0.001	-0.0003
		0.03	*1.12*	*0.87*	*0.27*	*0.31*	*-0.14*
Case Size: Imports	+	0.182**	0.139**	0.158**	0.166**	0.486***	0.176**
		2.49	*2.10*	2.36	*2.49*	*2.91*	*2.49*
Industry Size:	+	-0.108	-0.094	0.005	-0.032	-0.107	-0.030
Employment		-0.56	*-1.63*	*0.09*	*-0.59*	*-1.25*	*-0.53*
*Technical Track							
Comparative costs							
Capital Intensity	-	-0.038	-0.056**	-0.0001	-0.006	-0.0003	-0.007
		-0.80	*-2.87*	*-0.01*	*-0.82*	*-0.03*	*-1.18*
Average Wage	?	0.011	0.021	-0.0003	0.002	-0.005	0.008
		0.57	*1.45*	*-0.40*	*0.34*	*-0.44*	*1.14*
Non-market Economy	+	0.036	0.025	0.006	0.017	0.050⁻	0.034
		0.86	*0.47*	*0.12*	*0.41*	*1.00*	*0.98*
Number of products	-	-0.0008	-0.003	0.016	-0.011*	-0.015**	-0.009*
		-0.12	*-0.49*	*-1.02*	*-1.83*	*-2.03*	*-1.87*
No. observations		422	242	356	406	355	380
Wald χ^2 (df)		61.9***(30)	47.9***(20)	42.4***(21)	45.2***(18)	47.7***(21)	41.9(21)***
Log likelihood		-169.1	-102.9	-153.7	-175.1	156.9	-153.5
Pseudo R^2		0.26	0.26	0.21	0.18	0.20	0.19

Marginal effects; z-values presented in italics. All regressions contain a constant, industry and year dummies. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for "less developed countries" and non-market economies" are calculated as discrete changes from 0 to 1. In Column (2), 21 observations corresponding to year 1991 are eliminated because injury decisions are always positive.

Table 4.21: Comparison of Results for US (1975-1979), the EC (1980-1987)
and the EU (1985-1994)

Hypothesis and Variables	Dumping			Injury		
	US	EC	EU	US	EC	EU
	(1)	(2)	(3)	(4)	(5)	(6)
* Political Track						
International Political Influences						
Share of EU exports	-	+	-	-	-	-
Less Developed Country	-	-*	-	-	-	-
Domestic Political Influences						
Concentration	-	+	-	-	+*	-
Case Size: Imports	-	-	+*	+	-	+*
Industry Size: Employment	+	-	+	+*	-	+
Industry Size: Value Added	-	+	n/a	-	+*	n/a
*Technical Track						
Comparative costs						
Capital Intensity	+*	-*	-*	+	-*	-
Average Wage per Worker	-*	+*	+*	+	-	+
Scale Economies	-*	+	n/a	-	-	n/a
Non-market Economy	n/a	+*	+*	n/a	-	+
Technical Precision						
Number of Products	-	-	-	-	+*	-
Constant	+*	-	-	-	+*	+*
Number of countries						
Year Dummies	No	No	Yes	No	No	Yes
Industry Dummies	No	No	Yes	No	No	Yes
No. Observations	183	280	253	57	296	422
Successfully predicted (%)	69%	88%		84%	87%	
Correctly classified (%)						
Pseudo R^2			0.19			0.26

Sources: Finger et al. (1982), Tharakan and Waelbroeck (1994) and Table 4.3.1 in this chapter.

Columns (3) and (6) are the same as in Table 4.3.1. Different aspects of industry heterogeneity and macroeconomic effects are captured by industry and year dummies. A proxy for scale economies is omitted. The industry size variable, value added, is omitted because is highly correlated with employment. * indicates significant at the 10% level of confidence or less and not contradicting the hypothesised sign. In columns (1) and (4) the null hypothesis is that the sign is not the expected one (one-tail test) whereas in the rest of the table the null hypothesis is that the individual coefficient is different from zero (two-tailed test).

Table 4.22.1: Major Sectors of Economic Activity (1985-94)

Sector of Economic Activity	ISIC 3-digits Revision 2	Sector's Name
1) Chemicals	351	Manufacture of industrial chemicals
	352	Manufacture of other chemical products
	355	Rubber products
	356	Plastic products N.E.C.
2) Iron and Steel	371	Iron and Steel basic industries
	372	Non-ferrous metal basic industries
3) Textiles and Footwear	321	Manufacture of textiles
	322	Manufacture of wearing apparel except footwear
	323	Manufactures prods. Leather except footwear and apparel
	324	Manufacture footwear except rubber or plastic
4) Electronic and Electrical Machinery	382	Manufacture of machinery except electrical
	383	Electrical machinery, apparatus, appliances and supplies
	385	Prof., scientific, measuring and control equipment
5) Others	331	Manufacture wood, wood and cork products, except furniture
	341	Manufacture of paper and paper products
	362	Glass and glass products
	369	Other non-metallic mineral products, N.E.C
	381	Fabricated metal products, except machinery and equipment
	384	Transport equipment
	390	Other manufacturing industries

Source: International Standard Industrial Classifications (ISIC), Revision 2, Major Division 3 (Manufactured goods).

Table 4.22.2: Major Sectors of Economic Activity (1995-03)

Sector of Economic Activity	NACE 3-digits Revision 3.1	Sector's Name
1) Chemicals	241	Manufacture of basic chemicals
	244	Manuf. of pharmaceuticals, medical chems. and botanical pts.
	246	Manufacture of other chemical products
	247	Manufacture of man-made fibres
	252	Manuf. of plastic plates, sheets tubes and profiles
2) Iron and Steel	271	Manufacture of basic metals
	272	Manufacture of cast iron tubes
	273	Other first processing of iron and steel
	274	Manufacture of basic precious and non-ferrous metals
3) Textiles and Footwear	171	Manufacture of textiles
	172	Textile weaving
	174	Manufactures of made-up textile articles, except apparel
	175	Manufacture of carpets and rugs
	192	Manufacture of luggage, handbags and the like
	193	Manufacture of footwear
	366	Miscellaneous manufacturing n.e.c.
4) Electronic and Electrical Machinery	291	Manufacture of machinery mechanical power
	292	Manufacture of other general purpose machinery
	295	Manufacture of other special purpose machinery
	321	Manufacture of electronic valves, tubes & other components
	322	Manufacture of television and radio transmitters
	323	Manufacture of television and radio receivers
5) Others	202	Manufacture veneer sheets, plywood, etc.
	204	Manufacture of wooden containers
	231	Manufacture of coke oven products
	267	Cutting, shaping and finishing of stone
	268	Manufacture of other non metallic mineral products
	287	Manufacture of other fabricated metal products
	315	Manufacture of lighting equipment and electric lamps
	316	Manufacture of electrical equipment n.e.c.
	354	Manufacture of motorcycles and bicycles

Source: Nomenclature des Activités dans la Communauté Européenne (NACE) Revision 1, Manufactured goods.

Appendix 4B

Estimation of Capital-labour Ratios for European Industries

Capital Stocks were calculated from investment figures based on the perpetual inventory model setting the steady state estimates of the initial capital stock, using data from the OECD STAN database for the period 1970-94, where $K_t = (1-\delta)K_{t-1} + I_{t-1}$ and δ is the depreciation or obsolescence rate which is assumed to be 5 percent. The benchmark for K was calculated following the procedure used by Coe and Helpman suggested by Griliches (1980), as $K_0 = \dfrac{I_0}{(g+\delta)}$ where g is the average annual growth of investments over the period for which the investment data were available, I_0 is the first year for which data were available and K_0 is the benchmark for the beginning of the year. Investment in local currencies was deflated by the value added implicit deflator for each industry and country and converted into U.S. dollars using the exchange rates from OECD-STAN. Capital stocks are calculated for the whole of Europe. Capital stocks are measured in US dollars at constant 1990 prices using the exchange rate for the relevant countries and years from OECD STAN[46]. The calculated benchmarks are reported in Table 4.23 and the capital stock series in Table 4.24 and 4.25.

King and Levine (1994) present an excellent and critical review on the methods to compute capital stocks. There are four main methods to calculate capital stocks. The first is the steady state estimates used by Summers and Heston's (1991) $\dfrac{K_t}{Y_t} = \dfrac{i_j}{(\gamma_j + \delta_j)}$, where i_j is the Investment-output ratio $\dfrac{I}{Y}$, γ_j is the marginal increase in output $\dfrac{dY}{Y}$ and δ_j is the depreciation rate. It assumes that each country is at a steady

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[46] Investment data for each industry for Denmark, Greece and the Netherlands was available up to 1991, 1992 and 193 respectively. For Denmark and Greece, the series of investment were estimated using the share of investment of each industry in the total investment in the manufacturing and extrapolating. For The Netherlands data for 1994 total investment was kept constant at the same level as in 1993, as most European countries' investment remained constant.

state continually and capital-output ratios are constant[47]. The second method is the standard perpetual inventory model using an initial capital stock of zero. The third one, in the perpetual inventory model setting the steady state estimates of the initial capital stock. King and Levine (1994) prefer the third method in spite of the assumption that capital-output ratios are constant. A fourth method for estimating capital stocks was considered, the permanent inventory method, where $K_{t+1} = \sum (1-\delta)^j I_{t-j}$. Series of the capital stock per industry for the whole of Europe were estimated using the second, third and fourth methods. The series with better explanatory power was the one estimated by the third method - the perpetual inventory model setting the steady state estimates of the initial capital stock – and it is the one reported in this section and in the econometric analysis.

Table 4.23: Capital Stocks Benchmarks [a]

Industries-Europe	Capital Stocks Available	Average growth rate	Capital Benchmark
321 (g)	1970-91	0.017784	99,535,642,624
322 (c)	1970-91	0.014672	20,371,879,936
323	1970-91	-0.019468	28,717,897,728
324 (c)	1970-91	0.024638	8,416,914,432
331 (d)	1970-91	0.030185	25,835,520,000
341	1970-91	0.044963	50,297,630,720
351	1970-91	0.023444	189,115,138,048
352 (e)	1970-91	0.051092	29,161,676,800
355	1970-91	0.024411	32,035,850,240
356 (b) (c)	1970-91	0.067977	14,656,048,128
362 (b) (f)	1970-91	0.050665	10,999,067,648
369 (b) (f)	1970-91	0.020363	83,893,067,776
371 (d)	1970-91	0.011871	198,525,599,744
372	1970-91	0.035886	32,764,968,960
381 (d)	1970-91	0.024287	131,125,190,656
382 (d)	1970-91	0.009904	207,250,964,480
383 (d)	1970-91	0.060184	53,633,257,472
384 (d)	1970-91	0.041017	166,162,268,160
385 (d)	1970-91	0.035229	34,695,577,600
390 (c)	1970-91	0.000047	33,376,942,080

(a) Denmark: Estimated investment series from 1992.
Greece: Estimated investment series from 1993.
The Netherlands: Estimated investment series from 1994.
(b) Belgium: Investment data not available for the whole period 1970-1994.
(c) France: Investment data not available for these industries for the whole period 1970-1994.
(d) Spain: Investment data not available in 1970-1977. Capital series starts in 1978.
(e) Italy: Investment data not available.
(f) Italy: Investment data not available in 1970-1974. Capital series starts in 1975.
(g) Belgium: Investment data not available in 1970-1973. Capital series starts in 1974.

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[47] Manuelli (1994) highlights the shortcoming of this method. He points out that the necessary assumptions to validate the steady state calculations are clearly violated in the data since they also find that the capital-output ratio is increasing in the level of income and not constant, as assumed.

Table 4.24: Capital Stocks (millions US dollars constant 1990 prices), per Industry (a)

Industries	321 (g)	322 (c)	323	324 (c)	331 (d)	341	351	352 (e)	355	356 (b) (c)
Year										
1970	99536	20372	28718	8417	25836	50298	189115	29162	32036	14656
1971	101306	20671	28159	8624	26615	52559	193549	30652	32818	15652
1972	102464	20766	27672	8642	27288	53731	196902	31794	34030	16445
1973	103789	20912	27415	8764	28123	54476	196927	32669	34898	17413
1974	106590	21215	27099	8930	29148	55322	196697	33755	35278	18629
1975	109631	21683	26575	9177	30089	56208	196708	35213	35369	19661
1976	110570	21816	25887	9312	30653	56482	198430	36070	34987	20301
1977	111777	22060	25411	7434	31449	57036	201226	37133	34776	21362
1978	111927	22320	24913	9664	32337	57984	204463	38340	34808	22784
1979	112195	22502	24397	9914	33191	58768	206900	39952	34822	24340
1980	113124	22861	24058	10180	34213	60554	208136	41921	35151	26388
1981	114633	23212	23645	10372	35682	62666	209361	43822	35463	28542
1982	115194	23303	23281	10500	36603	63649	209110	45481	35430	29621
1983	115378	23375	22952	10619	36965	63977	208522	47076	35358	30616
1984	115561	23479	22496	10758	37353	64387	207780	48784	35213	31885
1985	116362	23733	22121	10848	38235	65068	207294	50791	35245	33740
1986	116981	23870	21762	10780	38544	66513	207894	53542	35639	35861
1987	118084	24059	21365	10935	39188	69307	209215	56498	36162	38057
1988	119994	24404	20912	11002	40042	73250	212608	59361	37043	40777
1989	122926	24802	20589	10982	41269	77831	215328	62898	38337	43917
1990	126124	25191	20167	10985	42637	82690	220527	67471	39951	47386
1991	129178	25781	19726	11036	43953	88059	228969	71338	41723	50796
1992	131373	26079	19207	11261	45103	93511	237421	75440	42885	53998
1993	132102	26316	18735	11347	46142	97240	243716	79738	43404	56207
1994	131221	26200	18245	11374	46388	99685	245323	82938	43509	57616

(a)	Denmark: Estimated investment series from 1992.
	Greece: Estimated investment series from 1993.
	The Netherlands: Estimated investment series from 1994.
(b)	Belgium: Investment data not available for the whole period 1970-1994.
(c)	France: Investment data not available for these industries for the whole period 1970-1994.
(d)	Spain: Investment data not available in 1970-1977. Capital series starts in 1978.
(e)	Italy: Investment data not available.
(f)	Italy: Investment data not available in 1970-1974. Capital series starts in 1975.
(g)	Belgium: Investment data not available in 1970-1973. Capital series starts in 1974.

Table 4.24: Capital Stocks (in millions U.S. dollars constant 1990 prices), per Industry [a]
(continuation)

Industries	362 (b) (f)	369 (b) (f)	371 (d)	372	381 (d)	382 (d)	383 (d)	384 (d)	385 (d)	390 (c)
Year										
1970	10999	83893	198526	32765	131125	207251	53633	166162	34696	33377
1971	11556	85601	200882	33941	134310	209304	56861	172987	35918	33379
1972	12122	87459	207994	35049	137426	209953	59347	179262	36845	33554
1973	12461	89352	214712	35766	140063	209698	61592	182091	37589	32888
1974	12963	91650	216960	36551	143671	211185	64973	186174	38414	32529
1975	13619	93457	215988	37103	146865	213047	69277	192268	39764	32227
1976	14282	93816	215887	37377	148527	212166	72377	194872	40612	31633
1977	14785	95072	215994	38183	150870	211498	75330	196294	41317	31030
1978	15721	96779	214170	39542	152905	211802	78951	199639	42089	30563
1979	16665	98516	210214	40844	155005	212835	83157	204803	42979	31135
1980	17661	100618	206402	42167	159118	214305	88524	212043	44601	29814
1981	18703	102640	204587	43289	163100	216368	94134	221267	46250	29482
1982	19262	104009	202531	44404	165297	216664	99225	229007	47699	28897
1983	19989	103989	198970	45192	166428	215515	103528	237919	48664	28409
1984	20708	103872	195487	45593	167365	214093	108058	244441	49590	27722
1985	21498	104162	192523	46042	168658	213136	114144	249078	50955	27074
1986	22054	104232	191976	46310	170183	213412	122240	254462	53487	26437
1987	22751	104399	190871	47533	172016	215117	131011	261468	55759	26042
1988	23778	105272	188976	49059	174593	215981	139542	269749	57634	25699
1989	25083	107184	186484	50450	178491	217591	147789	278129	59624	25347
1990	26772	110094	184275	52129	184589	220790	157685	288586	61943	25250
1991	28404	112689	185198	54571	190661	224555	168357	301600	64362	25188
1992	29574	115108	186759	56910	196029	227028	178295	317004	66566	25094
1993	30447	117071	186949	58980	199597	226676	186694	330199	67851	24922
1994	30841	118186	183244	60661	200266	224662	192306	335060	67842	24607

Table 4.25: Capital Stocks (1985=1), per Industry (a)

Industries Year	321 (g)	322 (c)	323	324 (c)	331 (d)	341	351	352 (e)	355	356 (b) (c)
1970	0.855	0.858	1.298	0.776	0.676	0.773	0.912	0.574	0.909	0.434
1971	0.871	0.871	1.273	0.795	0.696	0.808	0.934	0.603	0.931	0.464
1972	0.881	0.875	1.251	0.797	0.714	0.826	0.950	0.626	0.966	0.487
1973	0.892	0.881	1.239	0.808	0.736	0.837	0.950	0.643	0.990	0516
1974	0.916	0.894	1.225	0.823	0.762	0850	0.949	0.665	1.001	0.552
1975	0.942	0.914	1.201	0.846	0.787	0.864	0.949	0.693	1.004	0.583
1976	0.950	0.919	1.170	0.858	0.802	0.868	0.957	0.710	0.993	0.602
1977	0.961	0.929	1.149	0.870	0.823	0.877	0.971	0.731	0.987	0.633
1978	0.962	0.940	1.126	0.891	0.846	0.891	0.986	0.755	0.988	0.675
1979	0.964	0.948	1.103	0.914	0.868	0.903	0.998	0.787	0.988	0.721
1980	0.972	0.963	1.088	0.938	0.895	0.931	1.004	0.825	0.997	0.782
1981	0.985	0.978	1.069	0.956	0.933	0.963	1.010	0.863	1.006	0.846
1982	0.990	0.982	1.052	0.968	0.957	0.978	1.009	0.895	1.005	0.878
1983	0.992	0.985	1.038	0.979	0.967	0.983	1.006	0.927	1.003	0.907
1984	0.993	0.989	1.017	0.992	0.997	0.990	1.002	0.960	0.999	0.945
1985	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986	1.005	1.006	0.984	0.994	1.008	1.022	1.003	1.054	1.011	1.063
1987	1.015	1.014	0.966	1.008	1.025	1.065	1.009	1.112	1.026	1.128
1988	1.031	1.028	0.945	1.014	1.047	1.126	1.026	1.169	1.051	1.209
1989	1.056	1.045	0.931	1.012	1.049	1.196	1.039	1.238	1.088	1.302
1990	1.084	1.061	0.912	1.013	1.115	1.271	1.064	1.328	1.134	1.404
1991	1.110	1.086	0.892	1.017	1.150	1.353	1.105	1.405	1.184	1.506
1992	1.129	1.099	0.868	1.038	1.180	1.437	1.145	1.485	1.217	1.600
1993	1.135	1.109	0.847	1.046	1.207	1.494	1.176	1.570	1.231	1.666
1994	1.128	1.104	0.825	1.048	1.213	1.532	1.183	1.633	1.234	1.708

(a) Denmark: Estimated investment series from 1992.
Greece: Estimated investment series from 1993.
The Netherlands: Estimated investment series from 1994.

(b) Belgium: Investment data not available for the whole period 1970-1994.

(c) France: Investment data not available for these industries for the whole period 1970-1994.

(d) Spain: Investment data not available in 1970-1977. Capital series starts in 1978.

(e) Italy: Investment data not available.

(f) Italy: Investment data not available in 1970-1974. Capital series starts in 1975.

(g) Belgium: Investment data not available in 1970-1973. Capital series starts in 1974.

Table 4.25: Capital Stocks (1985=1), per Industry [a] (continuation)

Industries	362 (b) (f)	369 (b) (f)	371 (d)	372	381 (d)	382 (d)	383 (d)	384 (d)	385 (d)	390 (c)
Year										
1970	0.512	0.805	1.031	0.712	0.777	0.972	0.470	0.667	0.681	1.233
1971	0.538	0.822	1.043	0.737	0.796	0.982	0.498	0.694	0.705	1.233
1972	0.564	0.840	1.080	0.761	0.815	0.985	0.520	0.720	0.723	1.239
1973	0.580	0.858	1.115	0.777	0.830	0.984	0.540	0.731	0.738	1.215
1974	0.603	0.880	1.127	0.794	0.852	0.991	0.569	0.747	0.754	1.201
1975	0.633	0.897	1.122	0.806	0.871	1.000	0.607	0.772	0.780	1.190
1976	0.664	0.901	1.121	0.812	0.881	0.995	0.634	0.782	0.797	1.168
1977	0.688	0.913	1.122	0.829	0.895	0.992	0.660	0.788	0.811	1.146
1978	0.731	0.929	1.112	0.859	0.907	0.994	0.692	0.802	0.826	1.129
1979	0.775	0.946	1.092	0.887	0.919	0.999	0.729	0.822	0.843	1.113
1980	0.822	0.966	1.072	0.916	0.943	1.005	0.776	0.851	0.875	1.101
1981	0.870	0.985	1.063	0.940	0.967	1.015	0.826	0.888	0.908	1.089
1982	0.896	0.999	1.052	0.964	0.980	1.017	0.869	0.919	0.936	1.067
1983	0.930	0.998	1.033	0.982	0.987	1.011	0.907	0.955	0.955	1.049
1984	0.963	0.997	1.015	0.990	0.992	1.004	0.947	0.981	0.973	1.024
1985	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986	1.026	1.001	0.997	1.006	1.009	1.001	1.071	1.022	1.050	0.976
1987	1.058	1.002	0.991	1.032	1.020	1.009	1.148	1.050	1.094	0.962
1988	1.106	1.011	0.982	1.066	1.035	1.013	1.223	1.083	1.131	0.949
1989	1.167	1.029	0.969	1.096	1.058	1.021	1.295	1.117	1.170	0.936
1990	1.245	1.057	0.957	1.132	1.094	1.036	1.381	1.159	1.216	0.933
1991	1.321	1.082	0.962	1.185	1.130	1.54	1.475	1.211	1.263	0.930
1992	1.376	1.105	0.970	1.236	1.162	1.065	1.562	1.273	1.306	0.927
1993	1.416	1.124	0.971	1.281	1.183	1.064	1.636	1.326	1.332	0.921
1994	1.435	1.135	0.952	1.318	1.187	1.054	1.685	1.345	1.331	0.909

Appendix 4C

The Data

(Basic legal cases information): The information on a legal case (petition) decision to build dichotomous dependent variable for dumping and injury was obtained from the Commission of the European Communities, Official Journals (C and L series) available on CD-Rom. The estimations were based on the compilation of a data set built on a case-by-case basis where several pieces of information were obtained for each legal document: the investigation (legal case) number, date in which the investigation was initiated, product under investigation, countries named in the investigation (country of the defendant), the final decisions reached (injury or no injury, dumping or no dumping) and the year in which the investigation ended. Up to 1988 EUROSTAT reports data using the NIMEXE 6-digit product codes, whereas after 1988 the 8-digit Combined Nomenclature (CN) codes[48] are used to identify products. The products involved in each case are identified at the NIMEXE 6-digit level and CN 8-digit level. Different series of related industry level data were used to match the case information. The industry associated with each trade NIMEXE-CN product was obtained by using the International Concordance published jointly by U.S. Department of Commerce, EUROSTAT and Statistics of Canada. The econometric analysis refers to industries in the manufacturing sector. This is not at all restrictive since in the whole period only two investigations occurred in industries other than manufacturing. For the period 1995-2003, the information was obtained from the Global Antidumping Database Version 2.0 available in http://people.brandeis.edu/~cbown/global_ad/ .The data collection project was lead by Chad Bown, Brandeis University (Bown, 2006).

There are two methods of counting investigations. The first one considers a petition initiated as a case, including all countries named in the legal document that initiates the legal proceedings. Firms located in more than one country could be named in an investigation. If all countries are included as a case (observation), the size of an AD case would include aggregate imports of the product involved from all the countries named in the investigation. The second and better method consists of considering each country named in an investigation as one separate sub-case. This is a preferred approach since the dumping and injury final decisions and margins are calculated separately for

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[48] The Combined Nomenclature is also referred to as the Harmonised System.

each country of origin. When more than one country is named in the investigation, each country is considered as one sub-case and therefore, as one observation in the econometric analysis. As a result, a larger dataset is obtained and technical and political variables, e.g. imports, will refer just to the country of the defendant and product included in that sub-case. According to the second method, there are 525 sub-cases during the period analysed[49]. A detail of the number of cases, sub-cases and average number of countries per case in each year is described in Table 1 in Appendix 4A. They involve 58 countries and 20 different industries (3-digit ISIC Rev. 3).

(X): For each investigated country, annual export trade from the EU was collected from EUROSTAT-COMEXT, External Trade figures NIMEXE-CN exports and imports and from the United Nations COMTRADE database.[50] It is measured as the share of the value of European exports to the country of the defendant in the value of total European exports.

(LDC): A dummy variable that takes the value one when the country named in the investigation is a developing country. Less developed countries are defined in a broad sense including Albania, Algeria, Argentina, Belarus, Bosnia Herzegovina, Brazil, Bulgaria, China, Croatia, Czech Republic, Czechoslovakia, Egypt, German Democratic Republic, Georgia, Hong-Kong, Hungary, India, Indonesia, Kazakhstan, Kuwait, Libya, Lithuania, Macao, Macedonia, Malaysia, Mexico, North Korea, Pakistan, Philippines, Poland, Romania, Russia, USSR, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Taiwan, Thailand, Trinidad and Tobago, Turkey, Turkmenistan, Ukraine, Venezuela, Vietnam, Yugoslavia and Zimbabwe

(SIZE1) and (SIZE2): For each investigated product, annual import trade was collected from EUROSTAT: COMEXT, NIMEXE-CN and EUROSTAT: Intra AND Extra EU Trade (annual data, combined nomenclature) for the relevant years. The number of NIMEXE 6-digit and CN 8-digit codes that define a product involved in each one of the sub-cases was identified from the relevant issues of the EC Official Journal. For the period 1985-94, the import values are measures in hundred million (10^8) US dollars.

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[49] They represent 269 investigations initiated (legal cases) according to the first method. Each case involves one product. After dropping observations for which no complete series could be constructed we were left with 519 products.

[50] Adjustments were made to those countries that were separated into separate countries or regions (Soviet Union, Yugoslavia and Czechoslovakia) and to those countries that ceased to exist (German Democratic Republic, in 1990).

Originally in ECU they are translated into US dollars using the exchange rate ECU-US dollars (International Monetary Fund) and in constant prices of 1990 using the US implicit value added deflator for the manufacturing sector from OECD STAN database. For the period 1995-2003, import trade data of the EU at the product CN (Harmonised System) at 6-digit level by source were collected from United Nations COMTRADE trade statistics. It is measured in US dollars and expressed in constant 1996 prices using the US GDP deflator.

(CON): Two different proxies for industry concentration were used. The first one is the market share of the 5 biggest firms in an industry in the European Union, *CON1*. The data used is reported in B. R. Lyons and S. W. Davies (1996) for most industries at 3-digit NACE Rev. 1, available for 1989. For some textile and chemical industries, the information was obtained from the European Commission (1989) "Horizontal merges and competition policy". The second proxy, *CON2*, is a dummy variable which takes the value one if the market share of the industry is bigger than 25%, and zero otherwise. The proxy *CON1* proved to be more significant and it is, therefore, included in the regressions reported[51].

(LAB, VA, AVWAGE, LS): OECD STAN database for the relevant years in the period 1985-94. *LAB* is the number engaged (total employment) in the industry and it is measured in millions. *VA* is the value added in the industry measured in hundred billion (10^{11}) dollars. *AVWAGE* is the average wages and salaries per worker measured in thousands of dollars. *VA* and *AVWAGE* are measured in constant 1990 prices of local currencies and transformed into millions of US dollars using the exchange rate (IMF, International Financial Statistics). The NIMEXE 6-digit and CN 8-digit product codes were correlated with the industry codes using correspondence tables. For the period 1995-03, the data was collected from EUROSTAT Structural Business Statistics (SBS). It corresponds to industries define at the 3-digit level in classification NACE Revision 1.1. VA is measured in hundred billion (10^{11}) Euros. AVWAGE is measured in thousands of Euros. Value added is measured in 100 billion Euros and transformed into constant prices of 1995 using the GDP deflator for 15 countries in Europe (EU-15).

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[51] Although information contained in the reports could ensure that the various economic factors related to the decisions of the commissioners coincide with the particular tariff-line items covered by the investigations, its relevance depends on the nature of the variable used. Pressure groups are not organised at the level of the most detailed tariff line item but at the industry level, with the correspondent higher level of aggregation.

Average wage per worker is measured in thousands of Euros at 1995 prices. The data was extrapolated for certain industries, countries and years.

(RVA, RLAB, RWAGE, LS): OECD STAN database for the relevant years.

(K/L): Capital Stocks series were calculated from investment (gross fixed capital formation) figures based on the perpetual inventory model, OECD STAN database for the relevant years (see Appendix 4B). They are measured in tens of thousands (10^4) dollars constant 1990 prices. They are calculated in local currencies and translated into US dollar using the exchange rate.

(NME): Dummy variable that takes value one if the affected country is a non-market economy and zero otherwise. This group is broadly defined and it includes: Albania, Belarus, Bosnia Herzegovina, Bulgaria, China, Croatia, Czech Republic, Czechoslovakia, German Democratic Republic, Georgia, Hungary, Kazaquistan, Lithuania, Macedonia, North Korea, Poland, Romania, Russia, USSR, Slovakia, Slovenia, Turkmenistan, Ukraine, Vietnam and Yugoslavia.

(TECH): Represents the number of products covered by the case and was obtained from the relevant issues of the Official Journal. Up to 1988, NIMEXE 6-digit product code were used in the investigations and EUROSTAT reports data using this classification, while after 1988 the 8-digit Combined Nomenclature (CN) is used to identify products. However, the variable for number of products (TECH) is built using the CN 8-digit code. The NIMEXE 6-digit codes were correlated with the CN 8-digit codes using correspondence tables.

(NOC): Represents the number of countries named in an antidumping investigation and was obtained from the relevant issues of the Official Journal.

(GDP) A series of GDP growth rate for Europe was constructed using GDP at constant prices from the World Economic Outlook (GEO) database for the period 1985-94 and Eurostat for the period 1994-03. The composition of Europe has changed in 1985 and 1995. A correction was applied to reflect this change (EU-10, EU-12 and EU-15).

Chapter 5   The determinants of price undertakings in Europe

1   Introduction

The previous chapter analysed the determinants of the European decisions on dumping and injury. The purpose of this chapter is to empirically assess several hypotheses about what factors are associated with the European Commission's choice of the acceptance of price undertakings as opposed to imposing definitive antidumping duties in those cases in which both dumping and material injury have been found. A dataset of European antidumping decisions initiated in the period 1985-2003 is used to analyse the hypothesised determinants of the acceptance of undertakings. Using a probit model, I analyse the importance of certain variables on the probability that the AD authority in Europe would accept price undertakings.

The final outcome of an AD investigation could be: a rejection of the claim because no dumping or injury is found or it is in the community's interest not to impose penalties; the imposition of an antidumping duty; and, the acceptance of undertakings[52].

In the WTO 1994 AD agreement there is a provision for firms to offer and accept price undertakings once the Member country has made at least a preliminary affirmative determination of dumping and injury caused by the dumping. A price undertaking is an agreement by the foreign exporter to eliminate injury by increasing its price. Article 8 of the World Trade Organisation's (WTO) AD Agreement establishes that:

> "...Proceedings may be suspended or terminated without the imposition of provisional or antidumping duties upon receipt of voluntary undertakings from any exporter to revise its price or to cease exports to the country in question at dumped prices so that the authorities are satisfied that the injurious effect of dumping is eliminated...".[53]

Price undertakings are common in Europe and Australia, but less frequent in the US and Canada. In the US antidumping law a similar provision is made, the Suspension

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[52] Other reasons for the termination of a case are firms' withdrawals or expiry of the time required for the investigation to be completed.
[53] Article 8 of the Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade (GATT), 1994.

Agreements. These agreements can remove dumping or the injury or they may require a temporary withdrawal from the market, but they are very rare in practice. While these agreements are very seldom used, private price arrangements could occur and lead to the withdrawal of petitions, as shown in Prusa (1992). So, the fact that Suspension Agreements are not the most commonly used channel towards price agreements, does not mean that price agreements do not exist or are unimportant. Moreover, the US government has intervened with other market arrangements, like VER, for high profile industries such as steel and semiconductors.

There are two main differences between price undertakings (PU) and vertical export restraints (VER). The first difference is that while a PU usually restricts trade through a price agreement, a VER restricts trade through volumes. The second and more important difference is that the former is an agreement between the exporters and the government of the importing country whereas the latter is an agreement between governments.

A clause in the European antidumping law allows the EU administration to settle antidumping actions either by levying duties or by demanding price undertakings from the foreign exporting firms in accordance with the GATT/WTO regulations[54]. The undertaking could take the form of a price increase by the exporter (or importer) or of a restraint of the volume of exports. Undertakings shall be accepted after the European Commission (EC) has made at least a preliminary affirmative determination of dumping, injury and causality. Until December 1995, undertakings could be accepted even when an investigation on injury had not yet finished. But, even when undertakings had been accepted the Commission would complete the injury investigation if it so decided, if exporters representing a significant percentage of the trade involved or the country of export requested it. However, if no injury were found the undertakings would automatically lapse. The most frequent situation is that in which the Commission would only accept undertakings once dumping and injury had been found. From December 1995, the regulation states that undertakings shall not be sought or accepted unless a provisional affirmative decision of dumping and injury caused by such dumping has been made.

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[54] The European regulations are contained in Article 10 of Council Regulation (EEC) 2176/84, Article 10 of Council Regulation (EEC) 2423/88 and Article 8 of Council Regulation (EC) 384/96 of 22 December 1996. In this last regulation the EU has also agreed to grant a preferential treatment of price undertakings in disputes with its future member states from 1994. The Essen Summit in 1994 sets this principle against Central and Eastern European countries. This, however, does not affect the analysis discussed since it falls outside the period of study.

Once the undertaking is accepted, it would be closely monitored by the Commission and in a case of violation would be heavily penalised. The Commission would then request from the parties involved to provide periodically information relevant to the fulfilment of the undertaking and to allow the verification of data.

Price undertakings may be suggested by the exporter(s) or by the EC. When price undertakings are suggested by the Commission, it remains unclear what the motivation and the criteria for suggesting them are. Furthermore, very little information is available in the legal documents as to the motives for this suggestion.

It is important to compare the welfare effects of price undertakings with those of imposing AD duties. Although the level of price undertakings is not mentioned in the legal documents, it should be equivalent to the level of the AD duty that would have been imposed and that is necessary to eliminate the injurious effect of dumping. In Europe there exists a "lesser duty rule" by which the level of any antidumping duty is limited to the amount required to eliminate the injury to the Community industry where this is less than the margin of dumping. This should also apply to price undertakings.

The optimal tariff argument states that under perfect competition the distortions of consumption and production decisions created by the imposition of a tariff may be offset by the terms of trade gain, provided the tariff is small enough to keep the volume of trade (imports and exports) at the level most favourable to the country imposing the tariff but big enough to improve its terms of trade. In a similar fashion one can think that imposing an AD duty could be beneficial for a large trading block like the EU. Regarding the elimination of the injury, AD duties are equivalent to price undertakings. However, for the country imposing AD measures, duties are more attractive since the increase in revenue (duties) accrues to the country imposing measures whereas if a price increase for exporters is accepted this revenue is captured by the country of the defendant. Imposing AD duties would lead to larger welfare gains for a large country than price undertakings. The acceptance of price undertakings generates rents for the foreign firms that could be captured by the importing country if duties are imposed instead.

The welfare effects of undertakings could also be negative in the presence of imperfect competition and when market structure is not exogenous. Veugelers and Vandenbussche (1999) analyse the effect of AD on market structure when initially there exists a European cartel and no foreign entry. The authors analyse how AD regulations provide incentives for domestic and foreign firms to engage in a full cartel after entry occurs. They find that the use of AD measures can both have a pro-competitive or an

anticompetitive effect, depending on the government objective function, cost asymmetries and product heterogeneity. Their welfare analysis shows that the imposition of duties in the equilibrium market structure increases domestic welfare. The rent shifting from foreign producers more than compensates consumer losses. This scope for rent shifting is larger with larger cost asymmetries. If AD cases end with the imposition of price undertakings, the welfare effects tend to be negative. The benefits to domestic producers are smaller than the loss in consumer welfare and the losses due to an anti-competitive effect of antidumping.

The only one written guideline for the rejection of undertakings is contained in the GATT/WTO AD Agreement that states that:

> "...undertakings offered need not be accepted if their acceptance is considered impractical, if such as where the number of actual or potential exporters is too great, or for other reasons, including reasons of general policy..."[55]

However, there are no written guidelines in the regulations of European AD. The EU administration has considerable discretion in allowing price undertakings. The absence of clear-cut rules for the possible acceptance or rejection of price undertakings and the enormous discretion held by the Commission and the Council of Ministers, makes it plausible that a number of political economy considerations could play a role in the decisions. In a previous study, factors such as the prevalence of bilateral trade deficits, the country of origin of certain defendants - more specifically, Japan - and the lobbying potential of the domestic industry were found to be correlated with the decision to refuse the offer of undertakings (Tharakan, 1991b). However, this study analyses the decisions made in the period 1980-87 in which more than two thirds of affirmative decisions ended with the acceptance of undertakings. The intensity in its use has changed dramatically in the years that followed and there is no reason to believe that the hypothesised determinants might be the same.

With all these ideas as motivation, this chapter analyses these and other determinants of the undertaking decisions. A legal data set of all European AD investigations initiated between 1985 and 2003 is compiled, together with other associated trade and industrial statistics, and used to empirically test several hypotheses.

The rest of the chapter is organised as follows. Section 2 presents a brief overview of the related literature. Section 3 contains a descriptive analysis of price

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[55] *Idem*, footnote No. 56.

undertakings in Europe in the period 1985-2003. Section 4 contains a description of the main hypotheses formulated. Section 5 presents the econometric specification and the variables used. The results are discussed in Section 6. Finally, the conclusions are presented in Section 7.

2   Related Literature

A number of papers, including Belderbos et al. (2004) and Vandenbussche and Wauthy (2001), have analysed the effects of price undertakings in Europe. Belderbos et al. (2004) analyse the effects of undertakings on foreign direct investment (FDI). They show that the decision to accept an undertaking will depend on the objective function of the EU administration that may range from protecting only industry interests to including the interest of consumers and other users. When considering the possibility of FDI, if the EU values producers' surplus only, it is more likely to negotiate price undertakings rather than impose duties. FDI increases price competition in the EU market due to the cost advantage of foreign producers and the option of undertakings acts to persuade the foreign firm not to engage in FDI. Furthermore, they show that undertakings are less likely to occur if the EU also values the positive effect of inward foreign investment on employment and wages. Vandenbussche and Wauthy (2001) analyse the effects of price undertakings on the choice of product quality in vertically differentiated industries. They show that price undertakings lead to lower product quality in the protected industries. Although price undertakings loosen price competition when the quality of products is given, in the presence of vertically differentiated products, quality choices are affected in a detrimental way to European firms compared to free trade. When quality is endogenous, price undertakings make the foreign firm compete more aggressively in quality terms.

In a related fashion, some other papers (Prusa, 1992 and Zanardi, 2004a) have analysed the possibility of AD being used as a collusive device. In the US, from the number of petitions initiated, nearly one third of antidumping cases are withdrawn or are voluntarily terminated and only one third of them actually result in dumping duties. Prusa (1992) argues that the mere existence of AD law can affect trade flows even in periods in which no petition is actually filed. He shows that, in the presence of imperfect competition, cases withdrawn can have as big an effect as the cases that resulted in duties.

Petitions are used by domestic industries to threaten and induce foreign industries into a collusive agreement. He presents a model of the bargaining process leading to an agreement. Even when the agreement must be in the public interest, the ability to avoid dumping duties and cooperate on pricing decisions makes it strictly preferred to the expected International Trade Commission (ITC) decision. Antidumping petitions serve as a vehicle for achieving cooperative levels of profits.

Zanardi (2004a) argues that according to the model developed by Prusa, all antidumping investigations should be withdrawn. However, he points out that in practice we do not observe that all investigations are withdrawn. He develops a theoretical model in which only some petitions are withdrawn in equilibrium. The decision to withdraw a petition depends on the coordination costs and the bargaining power of domestic and foreign firms. The empirical results for the US verified the theory, suggesting that antidumping law is used as a collusive device.

Other research has focused on the effects of European AD policy on market structure. More specifically, Veugelers and Vandenbussche (1999) show that AD protection can result in collusive outcomes. The initial situation is one in which there exists a domestic European cartel and there is no foreign entry. They then proceed to analyse how AD regulations provide incentives for foreign and domestic firms to engage in a full cartel after foreign entry occurs. AD measures can have a pro-competitive or an anticompetitive effect depending on the objective function of the European government, on the costs asymmetries and on the degree of product heterogeneity between domestic and foreign firms. European welfare could increase or decrease accordingly. They show that when the government's objective function includes only domestic producers' welfare, undertakings are the only type of measures observed whatever the cost differences and the degree of product heterogeneity. When the government cares additionally about tariff revenue, undertakings will still predominantly be used. The third possibility is that the government additionally cares about consumer welfare. Only then, will the AD measures be predominantly duties, provided that cost differences are not too small.

Everaert (2003) suggests that technology adoption is always delayed in the presence of price undertakings compared to free trade and the result is valid when protection is either temporary or permanent.

Finally, a study by Tharakan (1991b) analyses empirically the determinants of price undertakings in the period 1980-1987. The explanatory hypothesis are formulated based on three sources: the reasons given by the EC in the legal documents which

terminates the case; the arguments provided by the theory of the political economy of protection and antidumping; and, the explanations provided by the practitioners (lawyers and government officials). Factors such as the prevalence of bilateral trade deficits, the country of origin of certain defendants (Japan) and the lobbying potential of the domestic industry are found to be correlated with the decision to refuse the offer of undertakings. European price undertakings were frequently used in the beginning of the 1980s. More than 72% of all affirmative decisions reached between 1980 and 1987 ended with the acceptance of price undertakings. As will be shown in the next section, the use of undertaking has decreased dramatically towards 1990 and has continued to decrease towards 1994 and it is likely that the variables associated with its acceptance may also have changed considerably. The econometric analysis discussed in the next sections builds on this work.

3   Descriptive Analysis of Price Undertakings in Europe, 1985-2003

This section presents a descriptive analysis of price undertakings in Europe. Although the total number of price agreements could also include those investigations that have been withdrawn, in this chapter, the focus will only be on those investigations formally terminated by the acceptance of price undertakings. Withdrawn investigations will be ignored.

In the European Union a very small proportion of investigations are withdrawals as such. Between 1985 and 1994 only 7% of cases were withdrawn after the investigations were formally initiated by the European Commission. However, a considerable number of complaints are made every year in which no investigation is officially opened. Previous to the initiation of an AD investigation, there is a consultative stage where the Commission advises the industry about filing a petition. If the industry does not have a case, an investigation is never opened, even though there is a gathering of information on behalf of the firms in the industry and a consultation with Commission officials takes place. These complaints are never reported but Kempton (2001) estimates that between 30% and 50% of the total number of complaints are rejected at this stage. Information about this consultative stage is not publicly available and it is, therefore, impossible to quantify its full scale. The only available information is contained in the decisions published in the Official Journal for those cases formally

terminated due to the acceptance of price undertakings and this will be the source of the analysis in this chapter.

A summary of the final outcomes of all investigations in each year of the period of study is presented in Table 5.0. In the period 1985-94, decisions were negative in 26% of the total number of cases, 44% ended with definitive duties, 21% with the acceptance of undertakings and 7% of cases were withdrawn. As can be seen in Figure 5.1, there has been an increasing trend in the use of AD duties. More than one third of total cases ended with duties between 1985 and 1989, whereas this amounted to nearly 55% in the 5-year period that followed.

Table 5.0: Final Outcome of AD Investigations in Europe (1985-2003), by year

	Total	No dumping or Injury	AD Duties Sub-total	Price Undertakings Sub-total	Others
1985	51	18	12	21	0
1986	48	8	20	17	3
1987	45	5	31	9	0
1988	71	26	23	22	0
1989	53	30	11	6	6
1990	66	20	27	12	7
1991	37	1	28	7	1
1992	56	14	29	7	6
1993	42	8	26	4	4
1994	56	8	24	7	17
Total	**525**	**138**	**231**	**112**	**44**
Percentage	**100**	**26**	**44**	**21**	
1995	34	7	14	5	n/a
1996	28	11	12	4	n/a
1997	48	12	17	5	n/a
1998	21	4	4	9	n/a
1999	65	10	34	12	n/a
2000	31	9	18	2	n/a
2001	31	7	21	2	n/a
2002	21	6	8	0	n/a
2003	7	0	6	1	n/a
Total	**280**	**66**	**134**	**40**	
Percentage	**100**	**23**	**48**	**14**	

Source: Commission of the European Communities (Official Journal, Series C and L)
Note: The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in the AD legal case.

Even though the number of investigations in Europe has remained relatively constant between 1985 and 1994, undertakings have played a diminishing role in the termination of AD cases in Europe. An average of 27.2% of all investigations initiated ended with the acceptance of price undertakings between 1985 and 1989, whereas the proportion was only of 14% in the following 5-year period. Price undertakings have been important in the beginning of the 1980's but their dominance has declined over time. Out of 249 cases in which an affirmative decision was reached during the period

1980-87 more than 72% were terminated with the acceptance of undertakings whereas this proportion only amounts to one third of the 343 cases during the period 1985-94 as shown in Table 5.4. The decreasing frequency in the use of price undertakings has continued until more recent years. Between 1994-03, 48% ended with definitive duties and only 14% with the acceptance of undertakings. Zanardi (2004b) reports a slightly higher proportion (40.6%) for the twenty-year period that ranges from 1981 until 2001. Only for Japan, Finland and Sweden (before entering the·EU) was this proportion higher than that for Europe.

The incidence of undertakings, as measured by the average annual value of imports, is on average smaller than that of duties. The average size of the cases that ended up with the imposition of duties is 12% higher than the average size of those that ended with the acceptance of price undertakings (Table 5.4). However, the average value of imports in cases ending with undertakings is extremely large in certain years, especially in 1989 and 1992. This is mainly because in four out of the thirteen cases decided in these years, the cases correspond to products like photocopiers, serial dot printer parts, video recording parts and dynamic random access memories (DRAMs) originating from Japan which have very high values of imports. These high values illustrate how aggressively new importers can enter the EU market.

There exists a country and a sector bias in European undertakings. The biggest number of undertakings involve imports from Russia and Eastern European countries (Yugoslavia, Romania, Czechoslovakia, Poland and Bulgaria) followed by those from Japan and South Korea. The products involved are predominantly chemicals (46%) and iron and steel products (20%) as shown in Table 5.8. The range of products originating in Russia and Eastern Europe are homogeneous and similar to those produced in the EU. However, those originating from Japan and the South East Asian countries are differentiated products.

The incidence of undertakings - measured by the average case size - is very asymmetrical when analysed by groups of countries. Even though the majority of undertakings accepted involve non-market economies (NME), for these countries the average value of imports is very small (6.5 million ECU) as can be seen in Table 5.6. At the other extreme, price undertakings involving Japanese products are 60 times bigger on average in terms of imports (396 million ECU), followed by those originating in Newly Industrialised Countries (NIC). The incidence is very different for less developed countries as well as shown in Table 5.7. For these countries, the average annual value of imports amounts to 14 million ECU.

4   The Hypotheses

Several hypotheses have been suggested to explain the choice of the European authorities (the Commission and the Council of Ministers) and their preference for price undertakings over definitive AD duties. Zanardi (2004a) analyses a model for the US in which some AD petitions are withdrawn because firms reach a collusive agreement. In his model, coordination costs among firms and bargaining power are crucial elements in reaching a collusive agreement. The probability of withdrawing a petition is negatively related to the coordination cost, for a given bargaining power.

In Europe, however, it is not possible to conduct statistical analysis with the withdrawn investigations due to the small number of cases that fall in this category. One can establish a parallelism between withdrawn petitions in the US and the use of undertakings in Europe. There might be an element of "mediated" collusion – similar to the one suggested by Prusa (1992) and Zanardi (2004a) - in the kind of formal acceptance of price undertakings observed in Europe. But, the main difference between the withdrawal of investigations and undertakings is the process of mediation exercised by the European Commission.

In what follows, I present the explanatory hypotheses. They incorporate elements of the theory of the political economy of protection and antidumping and are based on the previous research outlined.

i) Ability to monitor

An important factor influencing the decision to accept price undertakings is the possibility to monitor the price agreement. This ability to monitor the price undertaking is clearly established in the WTO AD Agreement (1994) and in the EU regulations. It is clearly stated that when undertakings have been accepted the importing countries may request periodic "…information relevant to the fulfilment of such an undertaking and to permit verification of the data…". The ability to request and verify data is related to the number of products involved in the case, among other things. The definition of a product is expressed in 6-digits NIMEXE and 8-digits CN codes for the period under investigation. The number of NIMEXE-CN codes mentioned in the legal case is used as a proxy for the number of products involved in each case (TECH). Accordingly, the

expected sign for this variable is negative, suggesting that a price undertaking involving a big number of products is more difficult to monitor than one that involves just a few. Therefore, the bigger the number of products the lower is the probability that price undertakings will be accepted. The variable that captures this effect is TECH. Another variable is used as a proxy for the ability to monitor for the period 1995-03, the number of foreign firms (NOFF).

ii) Bilateral trade deficits

There is a rent transfer to exporters implicit in price undertakings. On political economy grounds, it is feasible that these transfers will be conceded to countries, which do not have excessive surpluses in their trade with the EU. Moreover, lawyers working in AD cases believe that price undertakings are difficult to negotiate in cases in which the EU and the country of the defendant face persistent trade deficits as reported by Tharakan (1991b). Several proxies of these trade balances are considered. Some refer to the trade balance of just one year whilst some include the effect of several years of trade previous to the price undertaking being accepted. The expected sign of the dummy variables is negative, meaning that the EU trade deficits with the country of the defendant are associated with an increase in the probability of duties being imposed. When the variables are measured as the average trade deficit the expected sign is positive since the dummy takes value one when there is a deficit. The variables capturing these effects are specified in the next section and data sources in Appendix 5B.

iii) Fear of retaliation

Being on good terms with trade partners seems to be a plausible and desirable target of any trading nation. Retaliation is expected to be higher the higher the proportion of exports from the EU to the country of the defendant. If the "fear of retaliation" induces the European authorities to accept undertakings instead of applying AD duties, this variable should have a positive sign. Deciding on "softer" remedies like the acceptance of undertakings instead of duties might reduce the negative effect from potential retaliation. While this argument has never been made explicit by the Commission in the decisions published, it may be influencing the discretion it benefits from the existing regulations. So, it could be an implicit determinant influencing the decision not to impose AD duties. RETAL denotes the variable that captures this effect.

iv) Constructive remedy

The GATT/ WTO Agreement recommends that the possibility for constructive remedies should be explored before imposing AD duties in those cases where developing countries are involved. The WTO AD Agreement (Article 15) states that:

> "It is recognised that special regard must be given by developed country Members to the special situation of developing country Members when considering the application of antidumping measures under this Agreement. Possibilities of constructive remedies provided for by this Agreement shall be explored before applying antidumping duties where they would affect the essential interests of developing country Members".

Two dummy variables are included to test whether the EU is being especially "tough" or "soft" with less developed countries (LDC) and with the newly industrialised countries (NIC). A preliminary examination of the data suggests that a high proportion of less developed countries are involved in the acceptance of undertakings (table 5.7). These variables are defined very broadly. The dummy variable for NIC includes semi-industrialised and South East Asian (SEA) countries. See Appendix 5B for a classification of countries

v) Domestic Political Influences-bargaining power

It is possible that political influences relative to industry size or lobbying power could play an important role in the acceptance of price undertakings. The smaller the number of firms operating in an industry the more likely they are to overcome coordination failure problems. Coordination costs are lower. The more concentrated an industry - measured by the output of the five biggest firms - the more likely that a case would end with the imposition of duties. According to Zanardi (2004a) an important channel that can affect domestic is the pressure to obtain import relief. Employment is a potentially good indicator of bargaining power. More employees lead to stronger political influence because injury from unfair imports would negatively affect more workers. Another proxy for bargaining power is the size of the case - as measured by the percentage of EU imports of product k from country j in the total of EU imports. However, higher imports could simply indicate the relevance of the case and bear no link to the industry's potential political influences. Industry size can also be approximated by the value added in the industry (VA). But, since this variable is highly correlated with employment as can be observed in Table 5.10, it is not included in the results reported. The variables used are an industry concentration (CON), industry employment (LAB) and case size (SIZE).

vi) Protection of high technology industries

The hypothesis is that the Commission is more reluctant to accept the offer of price undertakings by foreign exporters in high technology industries in order to foster the EU industries. The Commission has an important concern to foster high technology industries. Practitioners involved with European AD do not rule out the possibility that the "softer" option to end AD cases might be denied to exporters selling hi-tech products in the European market (Tharakan, 1991b). Although, different variables can be used to capture this effect, the variable used is a dummy variable that takes the value one when a product is classified as a high technology product (EUROSTAT, 1989) and zero, otherwise (HI-TECH). The hypothesis formulated is that cases are less likely to end with a price undertaking for high technology products.

vii) Japan

A dummy variable is introduced to capture the effect described by many practitioners that cases involving Japanese firms are likely to reject the offering of undertakings (JAP).

viii) China

A dummy variable is introduced to capture the effect observed in recent year that cases involving Chinese firms are likely to reject the offering of undertakings (CHINA).

iv) Non-market economies

A dummy variable is introduced to capture the effect that in cases involving firms from non-market economies the EC is more likely to accept the offering of undertakings (NME). Many firms in non-market economies operate under a "soft budget constraint" which gives more importance to quantity targets than profitability. When this is the case, the choice of AD duties may induce the exporting firms to decrease prices even more with no effect on imports, since the state would absorb the firms' losses.

The data

The data set used consists of all European AD investigations initiated between 1985 and 2003 which ended either with the imposition of definitive AD duties or with the acceptance of price undertakings. Each observation considers the decision made for an individual country named in the investigation. The sample covers 517 decisions and

involves 47 countries. In this period, 365 investigations ended with the imposition of AD duties (71%) and 152 in price undertakings (29%).

Table 5.1: Variables and Expected Signs: Acceptance of Price Undertakings

Hypotheses and variables	Name	Sign
Ability to monitor		
Number of products covered by the case	TECH	-
Number of foreign firms	NOFF	-
Trade tension		
1) Bilateral trade deficit in previous five years	BTD_5	+/-
2) Bilateral trade deficit in previous three years	BTD_3	+/-
3) Bilateral trade deficit in the preceding year	BTD_1	+/-
Fear of retaliation		
Share of EU exports imported by the country of the defendant	RETAL	+
Constructive remedy		
1) Dummy for Less Developed Country	LDC	+
2) Dummy for Newly Industrialised Countries	NIC	+
Domestic political influences- bargaining power		
1) Market share of the biggest 5 firms in the industry	CON	-
2) Value of imports of the product from defendant's country	SIZE	+
3) Number of people employed in the industry	LAB	+
4) Value added in the industry	VA	+
Protection of high technology industries, Dummy	HI-TECH	-
Dummy for Japan	JAP	-
Dummy for China	CHINA	-
Dummy for Non-Market Economy	NME	+

Information contained in the legal documents is used to construct the data set. It includes the date of initiation and termination of the case, the product name and code, the number of product codes (NIMEXE 6-digit and CN 8-digits codes), the countries named, the number of foreign firms and the type of final measures imposed. Investigations terminated by the Commission because the investigation period expires or because of withdrawals are excluded. These cases never reached the definitive-decision stage.

A dichotomous dependent variable is specified based on the type of definitive measures imposed. Provisional measures are disregarded. The information is obtained from the Commission of the European Communities, Official Journals (C and L series). Within an investigation, price undertakings are granted to individual firms. In most investigations price undertakings are accepted for all the firms involved in the export of the relevant product to the EU. However, in some cases, the final measures may consist of a mixture of undertakings and AD duties. For example, price undertakings may be granted to several individual firms and a residual AD duty may be applied to the remaining firms in the case. Between 1985 and 1994, 231 investigations ended with the imposition of AD duties applied to all firms in the case (67%), 90 in price undertakings to all firms (27%) and only 22 cases ended with a combination of undertakings and duties (6%). Between 1995 and 2003, 132 investigations ended with the imposition of

AD duties applied to all firms in the case (76%), 35 in price undertakings to all firms (20%) and only 7 cases ended with a combination of undertakings and duties (4%). The dependent variable is a binary variable that takes the value one when price undertakings are accepted from all firms in the case or when a combination of price undertakings and residual duties are imposed. The variable takes the value zero when AD duties are imposed to all firms in the case.

For each case, annual import and export trade data of the EU by source is collected from EUROSTAT COMEXT External Trade and United Nations COMTRADE. This data is used to calculate bilateral trade deficit ratios and to define the share of European exports to the country of the defendant over total European exports. A correction of country codes is applied to Easter European countries that were split into separate countries like Czechoslovakia, Yugoslavia and the Soviet Union or have ceased to exist, like the German Democratic Republic.

A series of industrial concentration is constructed using the market share of the 5 biggest firms in an industry in 1989. The data is obtained from Lyons and Davies (1996) "Industrial organization in the EU: structure, strategy and competitive mechanism", for most industries at the 3-digit NACE Rev 1. For the textile and chemical industries, the information is obtained from the European Commission (1989) "Horizontal mergers and competition policy".

For each product investigated, annual import trade data of the EU by source are collected from EUROSTAT trade statistics (NIMEXE 6-digit and CN 8-digit codes) and the United Nations COMTRADE database (CN 6-digit codes). For each product, import values by country of origin are collected for the year in which the case was initiated. For data collected from EUROSTAT, the import values are translated into US dollars using the exchange rate ECU-US dollars (International Monetary Fund, International Financial Statistics) and expressed in constant prices of 1990. The deflator used is the US implicit value added deflator for the manufacturing sector from the OECD STAN database. The Commission has changed several classification country codes. Corrections are applied to countries that were split into separate countries or have ceased to exist. Data obtained from the United Nations, import values are obtained in US dollars and expressed in constant 1996 prices using the US GDP (Gross Domestic Product) deflator.

The econometric analysis refers to industries in the manufacturing sector[56]. For the period 1985-94 the 343 investigations involve 17 industries. Each product is

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[56] All investigations in the sample occurred in manufacturing industries.

associated with an industry (3-digit ISIC Revision 3). The industry associated with each product is obtained by using the International Concordance published jointly by the Department of Commerce, EUROSTAT and Statistics Canada. Two industrial series are constructed using the OECD STAN database for the relevant years: employment and value added. Value added is measured in constant 1990 prices of local currencies and transformed into US dollars using the exchange rate (OECD STAN) for the relevant countries and years. The price index used is the value added industry-specific deflator. For the period 1995-03 the 174 investigations involve 29 industries. Each product is associated with an industry (3-digit NACE Revision 3.1). The industry associated with each product is obtained by using correspondence tables from EUROSTAT. Value added is measured in constant 1995 prices in Euros. The price index used is the GDP deflator for 15 European countries.

Finally, a binary choice variable is specified indicating either that the product is a technology intensive one or not. The data is obtained from EUROSTAT (1989) "Statistical Analysis of Extra-EUR 12 Trade in Hi-tech Products". The report lists the products that are considered as technology intensive by the European Commission, at SITC 5 digit level. The correspondence between SITC 5-digit and NIMEXE 6-digit CN 8-digit codes is made based on EUROSTAT (1988) "External trade, nomenclature of goods".

A series of the growth rate of GDP for Europe was constructed using GDP at constant prices from the World Economic Outlook (GEO) database for the period 1985-94 and Eurostat for the period 1994-03. A series of bilateral aggregate trade deficit for Europe was constructed using trade flows from UN COMTRADE and measured in constant prices.

5 The Variables and the Econometric Specification

The aim of the statistical analysis is to determine the influence of political economy and regulatory variables on the likelihood of the acceptance of price undertakings. The sample covers all 343 cases which ended either with the imposition of definitive AD duties or with the acceptance of undertakings.

Using a probit model, I estimate the probability that an affirmative investigation ends with the acceptance of price undertakings. The independent variable takes the

value one when the Commission accepts price undertakings and zero when it imposes definitive AD duties. In theory, cases in which undertakings were refused and cases in which undertakings are not proposed are clearly different. In practice, however, the number of cases in which undertakings are proposed and rejected are minimal. An analysis of a random sample of 50 cases where affirmative decisions were reached indicates that only 6% of cases fall under this category. The majority of undertakings are not proposed according to what is written in the legal documents.

The underlying model is,

$$y_i = \beta' x_i + u_i$$

where x_i is a vector of k regressors and a constant α, β is a vector of k+1 coefficients and u_i is a normally distributed error term. The estimates of the coefficients β can be obtained by maximum likelihood estimation (MLE). More specifically, the following form for the underlying model is considered, when the trade remedy hypothesis refers to less developed countries (LDC):

$$P(y_i = 1) = f(\alpha, TECH, BTD, RETAL, LDC, CON, LAB, SIZE, NME, JAP, z) \quad (2)$$

Alternatively, when the hypothesis refers to newly industrialised countries (NIC) the specification used is:

$$P(y_i = 1) = f(\alpha, TECH, BTD, RETAL, NIC, CON, LAB, SIZE, VA, NME, JAP, z) \quad (3)$$

where α is a constant and z is a vector of controls and all variables are as defined as specified below. The specification controls for industry heterogeneity and macroeconomic effects. A list of data sources is presented in Appendix 5B.

The variables

(TECH): Represents the number of products (NIMEXE 6-digit and CN 8-digit codes) covered by the case and was obtained from the relevant issues of the Official Journal. Since 1985 the classification of products becomes more precise and therefore a bigger number of products would mean that the case is more difficult to monitor making it less likely that price undertakings are accepted.

(NOFF): Represents the number of foreign firms named in the investigation.

(BTD): The bilateral trade deficit is defined as the value of imports minus the value of exports from and to the country of the defendant. Three different measures of bilateral trade deficit are used. The bilateral trade deficit in the year previous to the decision made was defined as a proportion of total trade, as follows: $RATIO\_BTD\_1_j = \dfrac{BTD_{EU}^j}{(X+M)_{EU}^j}$. Similarly, the ratio is defined for the previous three years as the average 3-year annual ratio, $AVRATIO\_BTD\_3_j = \sum_1^3 \left(\dfrac{BTD_{EU}^j}{(X+M)_{EU}^j} \right) \dfrac{1}{3}$ and for the previous five years as the 5-year average ratio, $AVRATIO\_BTD\_5_j = \sum_1^5 \left(\dfrac{BTD_{EU}^j}{(X+M)_{EU}^j} \right) \dfrac{1}{5}$. Alternative proxies are also used, namely, BTD5_5, BTD3_5 and BTD_1. BTD5_5 is defined as a dummy variable that takes the value one if there is a bilateral trade deficit in each of the five years preceding the case decision and zero, otherwise. BTD3_5 is a dummy variable that takes the value one if a deficit occurred in at least three out of five years preceding the case decision and zero, otherwise. BTD_1 is a dummy variable that takes the value one if there is a bilateral trade deficit in the year previous to the case decision and zero, otherwise.

(RETAL): Defined as the share of European exports to the country of the defendant in total European exports. It is calculated as $X_j = \dfrac{X_{EU}^j}{X_{EU}}$, where X_{EU}^j is the total exports from the EU to country j and X_{EU} is the total exports of the EU for the year of the investigation. This variable represents the dependence of EU exports markets on the country of the defendant.

(LDC): Indicator variable that takes value one if the country of the defendant is a less developed country and zero, otherwise.

(NIC): Dummy variable that takes value one if the affected country is a newly industrialised country and zero, otherwise.

(CON): A proxy for market concentration is defined as the market share (percentage) of the 5 biggest firms in an industry in the European Union.

(SIZE): Two different proxies of case size are defined. The first one (SIZE2) is defined as the total imports during the year in which the case was initiated by the EU of product k from country j divided total imports by the E.U rescaled by 1000, $s = \left(\dfrac{M_j^k}{M_{EU}} \right) * 1,000$. The second one (SIZE1) is defined as the value of total imports (at constant 1990 prices) during the year in which the case was initiated by the EU of the products involved in the case from country j, M_j^k, where country j is the country of the defendant. The empirical results reported refer to variable SIZE2, although they remain qualitatively unchanged is SIZE1 is used instead.

(LAB, VA): OECD STAN database for the relevant years. *LAB* is the number of people employed in the industry, *VA* is the value added in the industry. For the period 1985-94, VA is measured in constant 1990 prices in local currencies and transformed into US dollars using the exchange rate for the relevant country and year and deflated using the US value added implicit deflator[57]. Employment and value added are highly correlated, therefore, only one of them is included in the results reported. For the period 1995-03, value added is obtained from EUROSTAT Structural Business Statistics is measured in 100 billion Euros and transformed into constant prices using the GDP deflator for 15 countries in Europe (EU-15). The NIMEXE 6-digit and CN 8-digit product codes were correlated with the industry codes using correspondence tables (EUROSTAT).

(HI-TECH): The dummy variable is constructed using a study by the EC (EUROSTAT, 1989), which contains a list of products that are considered to be technology intensive. The study analyses the external trade of the European Community in technology intensive products. The information is presented at a much-disaggregated level (STIC 5-digits). Each product (NIMEXE 6-digit and CN 8-digit codes) as defined in the Official Journal is assigned the respective SITC 5-digit code using European Commission

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[57] Similarly a variable representing the relative importance of employment and value added in industry j in the total European for each industry was created and used in the estimations. The main results remain unchanged.

(1988). This dummy variable takes the value one if the product is defined by the European Commission to be hi-tech and zero, otherwise.

(NME): Dummy variable that takes value one if the affected country has a non-market economy and zero, otherwise.

(JAP): Dummy variable that takes value one if the affected country is Japan and zero, otherwise.

(CHINA): Dummy variable that takes value one if the affected country is China and zero, otherwise.

6 Empirical Results

The econometric analysis of the hypothesised determinants on the choice of the European Commission between accepting price undertakings and imposing antidumping duties confirms some of the hypotheses presented in the previous section. The main results of the estimated probit model are reported in Table 5.2.1 and 5.2.2 with robust standard errors corrected for heteroscedasticity. The observations (sub-cases) in each legal case are considered as one cluster when estimating the standard errors, since the observations within an investigation may not be independent while observations across investigations are. The results reported are the marginal effects of the probability of acceptance of price undertakings; conditional on an affirmative decision being made (after both dumping and injury are found to exist). All the reported results include industry, year dummies, GDP growth and the EU trade deficit that control for sector heterogeneity and macroeconomic effects. The variables that are measured in nominal terms such as case size and value added (originally measured in different currencies and converted by using the exchange rate) may capture some of the effects of the exchange rate.

The results for the period 1985-94 are presented in Table 5.2.1 and are consistent with some of the hypothesis formulated. First, the evidence shows that the share of European exports to the country named in the investigation is positively associated with the probability of AD duties being imposed. The greater the exports to

the country of the defendant the lower the probability that price undertakings are accepted. The "tougher" remedy of AD duties is more likely to be imposed to those countries that are receivers of EU exports. This result is very robust since the variable (RETAL) is significant at conventional levels in all specifications of the model.

Second, there is some evidence confirming the political economy hypothesis. Some of the domestic political influences are found to be significant in some specifications, especially the variables that measure industrial concentration. Third, some of the countries' characteristics are found to be significant. Some of the evidence suggests that the EU is less likely to apply the "softer" remedy of price undertaking in cases involving non-market economies, especially china (see Column 5).

Column (1) reports the estimates for the hypothesised determinants of the decision to accept price undertakings by the European Commission for the main specification of the model (equation 2). It uses the five-year average of the proportional bilateral trade deficit (AVRATIO_BDT_5) as a proxy for the trade tension hypothesis. It includes a dummy for LDC to test for the constructive remedy hypothesis, concentration and employment as proxies for domestic political influence. We can reject the hypothesis that all coefficients except the intercept are zero at the 0.05 level $(Wald\chi^2 = 44.9, df = 28, p < 0.05)$.

The main results are that the proportion of European exports to the country of the defendant and the dummy for non-market economies are significant covariates in the decision to reject price undertakings. As shown in Table 5.12, a one standard deviation - which corresponds to a 3% - increase in the proportion of European exports to the country of the defendant decreases the probability of undertakings by 10 percentage points holding all variables at their means. This represents a considerable effect since it reduces the probability of undertakings by 36.5%. Exporters from countries absorbing a high proportion of EU exports have had difficulties having cases terminated by the acceptance of undertakings.

The estimates suggest economically significant effects for one of the control regressors on undertakings' probabilities. Cases involving exports from non-market economies have a 14-percentage point lower probability of undertakings being accepted at the means of the regressors, everything else being equal. This is a considerable and significant effect given that the sample average undertaking probability is 32.7%.

There is no evidence of the technical ability to monitor hypothesis suggested by the European regulations. The coefficient of the variable representing the number of

Table 5.2.1: Probit Estimates (marginal effects) of the Acceptance of Undertaking Decisions by the European Union (1985-1994): Main Specification

Hypothesis and Variables	(1)	(2)	(3)	(4)	(5)
*Ability to Monitor(-)					
Number of Products	-0.005	-0.006	-0.008	0.006	0.004
	-0.44	*-0.45*	*-0.65*	*0.51*	*0.33*
*Trade Tension (-)					
Bilateral Trade Deficit in previous 5 years	-0.066	-0.002	-0.062	0.04	-0.002
(average ratio)	*-0.48*	*-0.01*	*-0.45*	*0.04*	*-0.01*
*Fear of retaliation (+)					
Share EU export to country of defendant	-3.82***	-2.28**	-3.83***	-3.47***	-1.94**
	-2.80	*-2.46*	*-2.76*	*-2.65*	*-2.24*
*Constructive remedy					
Less Developed Country (+)	-0.261		-0.241	-0.192	
	-1.29		*-1.20*	*-0.95*	
Newly Industrialised Country (+)		0.079			
		1.08			
*Domestic Political Influences-bargaining power					
Concentration (-)	-0.008	-0.009*	-0.010*	-0.005	-0.006
	-1.53	*-1.79*	*-1.84*	*-1.22*	*-1.35*
Industry Size: Employment (+)	0.183	0.174		0.009	-0.022
	1.17	*1.24*		*0.13*	*-0.32*
Industry Size: Value Added (+)			1.605		
			1.64		
Relative Case Size: Imports (+)	1.363	1.532	1.433	1.791*	1.816*
	1.41	*1.52*	*1.49*	*1.87*	*1.93*
*Hi-tech products (-)	0.047	0.065	0.060	0.034	0.094
	0.35	*0.47*	*0.46*	*0.28*	*0.71*
*Non-market economy (?)	-0.140*	-0.149*	-0.121	-0.098	
	-1.65	*-1.93*	*-1.40*	*-1.23*	
*Japan (-)	-0.013	0.221	-0.026	-0.002	0.130
	-0.06	*1.15*	*-0.12*	*-0.01*	*0.80*
*China (-)					-0.303***
					-4.07
*GDP Growth rate	0.009	0.005	0.007	0.0123	0.010
	0.15	*0.09*	*0.11*	*0.20*	*0.16*
*European Trade Deficit	0.00004	0.00004	1.52e-6	9.61e+06	0.00001
	0.15	*0.14*	*0.01*	*0.04*	*0.06*
Year Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry Dummies (17)	*Yes*	*Yes*	*Yes*	*No*	*No*
Sector Dummies (5)	*No*	*No*	*No*	*Yes*	*Yes*
No. observations	297	297	297	335	335
Wald χ^2 (df)	44.9(28)**	39.7(28)*	41.5(28)**	44.8(23)***	56.1(22)***
Log likelihood	-157.9	-158.6	-155.9	-178.5	-171.4
Pseudo R^2	0.15	0.15	0.16	0.16	0.19

Notes: z-values presented in italics. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. Each regression also includes a constant. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for ""less developed country", "newly industrialised country", "hi-tech products", "non-market economy", "Japan" and "China" are for discrete changes in the variables from 0 to 1. In column (1), (2) and (3), 38 observations corresponding to seven industries are eliminated because decisions are deterministic. Either price undertakings are always accepted or always rejected (see text for details).

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products (TECH) is not significant. However, it presents a negative sign in nearly all specifications. This suggests that the greater the numbers of products in the case, the lesser are the chances of a case being terminated with the acceptance of price undertakings. Similarly, there is no evidence to confirm the validity of the trade tension hypothesis. The variable used as a proxy for trade tension is found to be non significant, but it has a negative sign, as expected. Short-term bilateral trade deficits do not seem to influence the decision to deny the acceptance of undertakings to the exporters.

It is worth mentioning that the dummy variable representing LDC has a negative sign. This would indicate that the European Commission is not following the recommendations of WTO/GATT about constructive remedies when the exporters' country of origin is a developing country. This result if also confirmed in the analysis of the most recent period.

The estimates also show statistically significant effects of industrial concentration. A one standard deviation increase in the market share of the 5 biggest firms decreases the probability of price undertakings by 11 percentage points, at the means of the regressors, everything else being equal. This represents a reduction in the probability of undertakings of 38% (Table 5.12), considering that the initial sample probability was 32.7%. The one standard deviation represents 15% of market share[58].

The controls include year dummies, industrial dummies, the rate of GDP growth and the trade deficit. Yearly dummies were found to be jointly insignificant as indicated by a likelihood ratio test $(\chi^2(7) = 13.95$ with P-value $= 0.052)$. A similar test for industry dummies indicates that they are jointly significant $(\chi^2(9) = 54.24$ with P-value $= 0.00)$. However, the individual t-statistics suggests that none of the industry and yearly dummies are significant.

In Column (2), the dummy for newly industrialised countries (NIC) is used instead of (LDC) to test the constructive remedy hypothesis. The main results remain qualitatively the same, except that the variable representing NIC has a positive sign, instead of a negative one, and one variable representing domestic political influence (CON) becomes significant. This would indicate that the EC follows the recommendations of WTO/GATT about constructive remedies when the exporters' country of origin is a newly industrialised country. This result is also obtained when other proxies for the trade tension hypothesis are used, as shown in Table 5.11.

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[58] I refer to the standardised results because the regressors are of a very different nature and measured in different units.

Moreover, the more concentrated the European industry in question the less likely that the case would end with the acceptance of price undertakings. The results reported in Column (2) should be more relevant than those presented in Column (1). In the latter the dummy variables relating to less developed countries and Japan present a relatively large and significant partial correlation coefficient of -0.70 (Table 5.10). Yearly dummies were found to be jointly significant $(\chi^2(9) = 15.20$ with P-value = 0.03). The same test for industry dummies indicates that they are jointly significant $(\chi^2(9) = 21.70$ with P-value = 0.01)

Column (3) in Table 5.2.1 reports the estimates when value added (VA) instead of employment is used. The results are the same except that only the proportion of EU exports and the concentration variables are significant. Finally, column (4) reports the marginal effects estimates when five control dummies corresponding to five aggregated sectors of economic activity are considered. The proportion of European exports to the country of the defendant and the value of imports are significant variables although this last variable (SIZE) is only significant at the 10% level of confidence. Yearly dummies were found to be jointly significant $(\chi^2(7) = 29.74$ with P-value=0.00) and the economic sector dummies are jointly significant $(\chi^2(9) = 12.93$ with P-value=0.01). However, the individual t-statistics suggests that in decisions made in the years 1987 and from 1989 up to 1994 are less likely to be the acceptance of price undertakings, everything else being equal. The t-statistics suggests that none of the economic sector dummies are individually significant.

There is no evidence that the EC refuses the acceptance of undertakings in cases that involve high technology products. The estimated coefficient for variable HI-TECH is positive in all specifications but it is not significant in any of them.

The results do not confirm the hypothesis that in cases involving exporters from Japan the EC is likely to reject the acceptance of undertakings. Although the estimated coefficient has the expected sign, the variable is not significant in any of the specifications of the model. However, the results confirm that in cases involving exporters from China it is likely that the EC would impose duties. The dummy variable is significant at the 1% level of confidence.

The regression results displayed in Columns (1) to (3) in Table 5.2.1 show that there are industrial sectors that always succeed in obtaining acceptance of undertakings. These sectors are: wood and wood products (ISIC 331, 5 observations), rubber products (ISIC 355, 2 observations), glass and glass products (ISIC 362, 6 observations), other

non-metallic mineral products (ISIC 369, 1 observation) and metal products except machinery (ISIC 381, 2 observations). On the other hand, there are sectors which never succeed in undertakings and that always obtain the imposition of duties. These are: other chemical products (ISIC 352, 17 observations) and transport equipment (ISIC 384, 5 observations). In total, 38 observations referring to those industries are omitted in the results reported.

The results for the period 1995-03 are presented in Table 5.2.2 and are also consistent with the hypothesis formulated. First, the evidence shows that bilateral trade deficits are associated with the rejection of price undertaking. The bigger the trade deficit the more likely it is that cases end up with the imposition of duties. Second, the share of European exports to the country named in the investigation is positively associated with the probability of AD duties being imposed. These results are very robust since the variable (RETAL) and (AVRATIO_BTD_5) are significant at 5% and 1% respectively in all specifications of the model.

There is also some evidence confirming the ability to monitor hypothesis. The number of products in the case is significant at the 1% in the specifications using 14 industries dummies (Columns 1 to 3) and the number of foreign firms are significant at the 5% and 1% in some specifications (Column 1 and 3 respectively).

There is no evidence confirming the constructive remedy hypothesis. The dummy for less developed countries is found to be significant at the 5% and 1% in some specifications and has a positive sign. This would indicate that the European Commission is not following the recommendations of WTO/GATT about constructive remedies when the exporters' country of origin is a developing country.

Some of the domestic political influences are found to be significant, especially the variables that measure industrial concentration and industry size (measured by employment and value added). Finally, some of the countries' characteristics are found to be significant at the 5% for some specifications (see Column 1). Some of the evidence suggests that the EU is less likely to apply the "softer" remedy of price undertaking in cases involving non-market economies. This pattern was also prevalent in the earlier period.

The regression results displayed in Columns (1) to (3) in Table 5.2.2 show that there are industrial sectors that never succeed in obtaining acceptance of undertakings. These sectors are: Leather, luggage, handbag and footwear (NACE 19, 6 observations), plastic products (NACE 25, 5 observations), machinery and equipment (NACE 29, 3 observations), electrical machinery (NACE 31, 2 observations), radio,

Table 5.2.2: Probit Estimates (marginal effects) of the Acceptance of Undertaking Decisions by the European Union (1995-2003): Main Specification

Hypothesis and Variables	(1)	(2)	(3)	(4)
Ability to Monitor(-)				
Number of Products	-0.111***	-0.114***	-0.069***	-0.016
	-3.09	*-2.83*	*-3.54*	*-0.64*
Number of Foreign Firms	-0.048**	-0.038*	-0.038***	0.016
	-2.29	*-1.81*	*-2.76*	*0.93*
Trade Tension (+)				
Bilateral Trade Deficit in previous 5 years	0.361**	0.608***	0.200***	0.691***
(average ratio)	*2.46*	*3.14*	*2.99*	*2.90*
Fear of retaliation (+)				
Share EU export to country of defendant	-8.61**	-10.49***	-4.676***	-10.98**
	-2.80	*-2.77*	*-3.35*	*-2.30*
Constructive remedy				
Less Developed Country (+)	-0.864**		-0.939***	-0.013
	-2.32		*-3.50*	*-0.04*
Newly Industrialised Country (+)		0.067		
		0.86		
Domestic Political Influences-bargaining power				
Concentration (-)	0.025***	0.028***	0.021***	0.002
	2.83	*2.94*	*3.49*	*0.29*
Industry Size: Employment (+)	4.809***	4.355***		0.010
	3.09	*2.57*		*0.02*
Industry Size: Value Added (+)			0.038***	
			4.14	
Relative Case Size: Imports (+)	5.974	5.851	8.427	-9.277
	0.66	*0.61*	*1.53*	*-1.64*
Hi-tech products (-)	n/a	n/a	n/a	n/a
Non-market economy (?)	-0.731**	-0.131*	-0.817	0.089
	-2.39	*-1.11*	*-3.49*	*0.26*
Japan (-)	n/a	n/a	n/a	n/a
GDP growth rate (?)	-0.381***	-0.378***	-0.351***	-0.276
	-3.57	*-3.10*	*-4.94*	*-1.59*
Year Dummies	*Yes*	*Yes*	*Yes*	*Yes*
Industry Dummies (14)	*Yes*	*Yes*	*Yes*	*No*
Sector Dummies (5)	*No*	*No*	*No*	*Yes*
No. observations	106	106	106	120
Wald χ^2 (df)	50.8(21)***	85.2(21)***	84.9(21)**	39.1(19)***
Log likelihood	-29.7	-31.8	-26.1	-48.8
Pseudo R^2	0.56	0.53	0.61	0.33

Notes: z-values presented in italics. The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. Each regression also includes a constant. Robust standard errors in parenthesis, corrected for heteroscedasticity and for clustering on each legal case. * indicates significant at the 10% confidence level; ** 5% level and *** 1% level (two-tailed test). Marginal effects for ""less developed country", "newly industrialised country", "hi-tech products", "non-market economy" and "Japan" are for discrete changes in the variables from 0 to 1. In column (1), (2) and (3), 34 observations corresponding to five industries, one year, cases involving Japan and Hi-tech products are eliminated because decisions are deterministic. Price undertakings are always rejected (see text for details).

television and communication equipment (NACE 32, 2 observations) and manufacture of other transport equipment (NACE 35, 1 observation). In total, 19 observations referring to those industries are omitted in the results reported. In this sample, cases involving high technology products are always rejected undertakings and 10 observations are omitted in Columns (1) to (3) in the previous table. The same happens with the 6 cases involving Japanese exports. This is consistent with the hypotheses formulated.

The sensitivity analysis for the period 1985-94 is presented in Table 5.3.1 Column (1) replicates the results of Column (1) in Table 5.2.1 for ease of comparability. The constructive remedy hypothesis refers to LDC, (equation 2). The results remain qualitatively unchanged when different proxies are used to capture the trade tension hypothesis. The model is robust to using other proxies for the trade tension hypothesis. There is no evidence to confirm the validity of the trade tension hypothesis. The variables used as proxies for trade tension are found to be non significant, but they all have a negative sign as expected. Whether the trade tension is represented by the average ratio of bilateral trade deficit of the five years preceding the decision, or by the average of the three previous years (AVRATIO_BTD_3) or just the trade balance of the year of the decision (RATIO_BTD_1), the results are qualitatively the same. The sign of the estimated coefficient indicates that the EC is more likely to opt for the "tougher" measure of imposing AD duties instead of accepting undertakings whenever there are trade deficits with the country of the defendant. The marginal effects of the other variables are not substantially affected when different proxies are used. Column (4) replicates the results of Column (2) in Table 5.2.1 when the constructive remedy hypothesis is referred to NIC (equation 3). The marginal effects of the other variables remain nearly the same when different proxies are used.

Another sensitivity test was carried out defining the bilateral trade deficit variables differently. The estimates when dummy variables are used to test the trade tension hypothesis are presented in Table 5.11. One of the variables used is defined as a dummy variable that takes the value one when there is a bilateral trade deficit in all of the five years preceding the decision and zero, otherwise (BTD5_5). Similarly, BTD3_5 takes the value one when there is a bilateral trade deficit in at least three of the five years preceding the decision and zero, otherwise. BTD_1 takes a value of one if there is a deficit in the year preceding the decision and zero, otherwise. The results remain qualitatively unchanged, except for the dummy that represents a bilateral trade deficit in at least three of the five years previous to the decision made (BTD3_5). This variable

Table 5.3.1: Sensitivity Analysis I: Probit Estimates (marginal effects) of the Decisions to Accept Price Undertaking by the European Union (1985-1994)

Hypothesis and Variables	(1)	(2)	(3)	(4)	(5)	(6)
*Ability to Monitor (-)	-0005	-0.005	-0.005	-0.006	-0.005	-0.006
Number of Products	-0.44	-0.43	-0.45	-0.45	-0.45	-0.45
*Trade Tension: Bilateral Trade Deficit in previous 5 years (-)	-0.066			-0.002		
(average ratio)	-0.48			-0.01		
Bilateral Trade Deficit in previous 3 years (-)		-0.080			-0.022	
(average ratio)		-0.61			-0.17	
Bilateral Trade Deficit in preceding year (-)			-0.055			-0.008
(average ratio)			-0.42			-0.06
*Fear of retaliation (+) Share EU exports to country of defendant	-3.82***	-3.81***	-3.83***	-2.28**	-2.26**	-2.28**
	-2.80	-2.79	-2.80	-2.46	-2.43	-2.44
*Constructive remedy: Less Developed Country (+)	-0.261	-0.262	-0.259			
	-1.29	-1.30	-1.28			
Newly Industrialised Country (+)				0.079	0.077	0.078
				1.08	1.06	1.07
*Domestic Political Influences- bargaining power: Concentration (-)	-0.008	-0.008	-0.008	-0.009*	-0.009*	-0.009*
	-1.53	-1.53	-1.52	-1.79	-1.79	-1.79
Industry Size: Employment (+)	0.183	0.184	0.183	0.174	0.174	0.174
	1.17	1.17	1.17	1.24	1.24	1.24
Relative Case Size: Imports (+)	1.363	1.359	1.361	1.533	1.534	1.533
	1.41	1.40	1.41	1.52	1.52	1.52
*Hi-tech Products (-)	0.047	0.046	0.049	0.065	0.064	0.065
	0.35	0.35	0.37	0.47	0.46	0.47
*Non-market Economy (?)	-0.140*	-0.141*	-0.143*	-0.149*	-0.149*	-0.149*
	-1.65	-1.65	-1.67	-1.93	-1.93	-1.92
*Japan (-)	-0.013	-0.019	-0.008	0.221	0.212	0.218
	-0.06	-0.09	-0.04	1.15	1.11	1.13
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies (17)	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	297	297	297	297	297	297
Wald χ^2 (df)	44.9(28)**	45.0(28)**	45.3(28)**	39.7(28)*	39.6(28)*	39.6(28)*
Log likelihood	-157.9	-157.8	-157.9	-158.6	-158.6	-158.6
Pseudo R^2	0.15	0.15	0.15	0.15	0.15	0.15

Note: see note Table 5.2.1

Table 5.3.2: Sensitivity Analysis I: Probit Estimates (marginal effects) of the Decisions to Accept Price Undertaking by the European Union (1995-2003)

Hypothesis and Variables	(1)	(2)	(3)	(4)	(5)	(6)
*Ability to Monitor (-)	-0.111***	-0.124***	-0.122***	-0.114***	-0.126***	-0.125***
Number of Products	-3.09	-3.11	-3.10	-2.83	-2.84	-2.86
Number of foreign firms	-0.048**	-0.057***	-0.059**	-0.038*	-0.044*	-0.046*
	-2.29	-2.37	-2.35	-1.81	-1.80	-1.82
*Trade Tension: Bilateral Trade Deficit in previous 5 years (+)	0.361**			0.608***		
(average ratio)	2.46			3.14		
Bilateral Trade Deficit in previous 3 years (+)		0.273			0.560**	
(average ratio)		1.52			2.35	
Bilateral Trade Deficit in preceding year (+)			0.210			0.469**
(average ratio)			1.21			2.02
*Fear of retaliation (+) Share EU exports to country of defendant	-8.61**	-9.62**	-9.428***	-10.491***	-12.336***	-11.842**
	-2.80	-2.44	-2.75	-2.77	-2.64	-2.50
*Constructive remedy: Less Developed Country (+)	-0.864**	-0.993**	-0.938***			
	-2.32	-2.54	-2.69			
Newly Industrialised Country (+)				0.067	0.067	0.056
				0.86	0.73	0.58
*Domestic Political Influence-bargaining power: Concentration (-)	0.025***	0.027***	0.026***	0.029***	0.032***	0.030***
	2.83	2.83	2.77	2.94	3.02	2.97
Industry Size: Employment (+)	4.809***	5.461***	5.496***	4.355***	4.860***	4.911***
	3.09	3.14	3.14	2.57	2.62	2.60
Relative Case Size: Imports (+)	5.974	6.469	6.178	5.851	6.281	6.339
	0.66	0.64	0.61	0.61	0.60	0.60
*Hi-tech Products (-)	n/a	n/a	n/a	n/a	n/a	n/a
*Non-market Economy (?)	-0.731**	-0.831***	--0.847***	-0.131	-0.161	-0.164
	-2.39	-2.57	-2.66	-1.11	-1.18	-1.20
*Japan (-)	n/a	n/a	n/a	n/a	n/a	n/a
*GDP Growth Rate (?)	-0.381***	-0.422***	-0.433***	-0.378***	-0.38***3	-0.390***
	-3.57	-3.51	-3.51	-3.1	-2.85	-2.79
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies (14)	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	106	108	108	106	108	108
Wald χ^2 (df)	50.8(21)***	43.9(21)***	41.6(21)***	85.2(21)***	77.7(21)***	79.7(21)***
Log likelihood	-29.7	-30.6	-30.8	-31.7	-33.2	-33.7
Pseudo R^2	0.56	0.56	0.56	0.53	0.52	0.51

Note: see note Table 5.2.1

has a positive sign although it is not significant. The sign of the estimated coefficient indicates that short-term bilateral trade deficits may increase the probability of price undertakings being accepted.

The sensitivity analysis for the period 1995-03 is presented in Table 5.3.2. The results do not change in any significant way when different proxies for the bilateral trade tension hypothesis are used; except that the variable that captures the effect of deficits over the 3-year and 1-year period previous to the investigation is found to be significant only in some specifications (see Columns 4 and 5, Table 5.3.2). The controls used include year dummies, industrial dummies and the rate of GDP growth.

A final caveat is that the results for the period 1995-2003 should be interpreted with caution since the sample contains new AD investigations and only 15 review cases. Most review cases are omitted. In Europe, AD measures are imposed for a period of 5 years and after that, they ceased automatically (provided there is no review of the case). The review can be requested by the filing firms or by the European Commission. In cases that are reviewed a new investigation is carried out. The reviewed cases are, therefore, like new cases and in the period 1985-94 represented 36% of all investigations (188 out of 525 investigations).

7 Conclusions

Chapter 3 has provided the background information on the evolution of AD law and its implementation whereas the previous chapter has analysed empirically the determinants of the dumping and injury decisions in Europe. After dumping and injury have been found, investigating authorities can end an investigation by accepting price undertakings. This chapter examined the several hypotheses about the decisions of acceptance of price undertakings versus the imposition of definitive duties conditional on an AD "affirmative" decision on dumping and injury having been made by the EC for investigations initiated in the period 1985-2003. The role of undertakings in Europe has decreased quite dramatically towards the end of the 1980s and beginning of the 1990s. This decreasing trend has continued to exist in the most recent period.

The economic benefits of undertakings (relative to duties) for the exporter are that it allows it to raise prices instead of paying duties. The less harming option of price undertaking allows foreign exporters to capture some of the rents that would otherwise

accrue to the importing country. But, it is not clear why the European authorities would prefer this way of ending affirmative cases instead of imposing duties. This chapter statistically analysed several hypotheses related to these decisions.

The results are consistent with some of the hypothesis formulated. First, the probit estimates show a statistically significant association between the share of EU exports to the country of the defendant and the probability of undertakings. The evidence suggests that the potential loss from retaliation has not prevented the Commission from imposing AD duties. The "tougher" remedy of AD duties is more likely to be imposed on firms located in those countries that are receivers of EU exports. These results are robust and found in all specifications of the model and are consistent with the findings of a previous study. However, this result should be interpreted with caution as this variable could also be seen as a proxy for stable trade relations between the EU and its trade partners. Accordingly, using the "tougher" option of AD duties may be less likely to affect the exports to trade partners. A third interpretation of this result could be that the EU is using "tougher" measures against its trade partner because these in turn are using AD heavily against the EU.

There is some evidence that bilateral trade deficits have an impact on the EC choice between the acceptance of price undertakings and the imposition of duties.

As shown in the previous chapter, the share of EU exports to the country named in the investigation was found to be associated with the Commission's decisions on dumping and injury. These are the decisions that can be challenged in European courts and at the GATT/WTO level. However, when choosing between AD duties and undertakings – after dumping and injury have been found - the Commission is "tougher" (uses AD duties) on those trading partners that have a bigger share of European exports. Bown (2004) empirically assesses the GATT/WTO dispute settlement mechanism. He finds that there are various forms of GATT-illegal protection against trading partners that are unable to credibly threaten retaliation. In addition, Bown et al (2003) suggest that less developed countries are targeted by US AD because of differences in administrative capacity and limited retaliatory ability. An analysis of some descriptive statistics indicates that the ability to threaten retaliation and the limitation in administrative capacity might be important determinants in the explanation of the Commission's choice of "tougher" measures. There seems to be a strong bias in the use of AD duties in "affirmative" decisions. The number of cases ending with duties is geographically concentrated in South East Asian Countries, China and Russia, representing 51% of all affirmative investigations measures (Table 5.13). Between 65%

and 100% of cases against this group of countries ends up with duties. These countries are not heavy users of antidumping against the EU. Their retaliatory ability is limited. This may explain why the EC chooses to use AD duties once dumping and injury have been found. The extent to which the limited administrative capacity or retaliatory ability of the trading partners targeted by European AD affect the choice of measures imposed remains an issue for further empirical research.

Second, there is some evidence confirming the domestic political influence-bargaining power hypothesis. Some of the variables are found to be significant in some specifications. The estimates show statistically significant effects of employment, value added and industrial concentration on the probability of undertakings. The results suggest that more employment increases the probability of acceptance of undertakings. This result is in accordance with results for withdrawal decisions the US antidumping.

Third, the evidence suggests that some countries' characteristics are significant. The results show that the EU is less likely to apply the "softer" remedy of price undertaking in cases involving non-market economies and, in particular, China. Not only is the Commission more likely to find dumping when exports originate from these countries - as shown in Chapter 4 - but also is also more likely to choose the "tougher" remedy of AD duties in affirmative cases. This contradicts results from previous studies but can be explained because a great proportion of these centrally planned economies started a transition towards a market driven mechanism towards the middle of the period investigated. Interestingly, there is no evidence that the EC takes into account the possibility of constructive remedies when deciding the type of measures imposed.

There is some evidence to confirm the alleged ease or ability to "monitor" the price undertakings hypothesis, as indicated in the guidelines of the GATT/WTO Agreement.

One caveat is that the results for the period 1995-2003 should be interpreted with caution since the sample contains all new AD investigations and only some review cases are included.

The present study uses a unique data set with information gathered from the reports published by the EC in the Official Journal and other sources. It contains information on 517 AD investigations initiated between 1985 and 2003 in which an affirmative decision has been made. The analysis improves on previous studies in that, first, it explicitly controls for industry heterogeneity and macroeconomic effects. Second, it presents an analysis of the economic significance of the findings.

The comparative analysis with earlier empirical research on the subject suggests that the determinants of the acceptance of price undertakings are partly different. In a previous study (Tharakan 1991b) factors such as the prevalence of bilateral trade deficits, country characteristics especially for cases related to Japanese imports; and the lobbying potential of the domestic industry were found to be correlated with the decision to refuse the offer of undertakings. In this study, the evidence shows that the share of European exports to the country named in the investigation is associated with an increase in the probability of AD duties being imposed. Country characteristics are also significant. However, it is imports from non-market economies that are relevant. The analysis presented in this Chapter highlighted the importance of slightly different variables associated with the decisions. However, the results are similar in that some political economy-bargaining power factors are found to be significant. More employment is associated with an increase in the probability of undertakings being accepted. This is clearly important given that the reasons for accepting undertaking are not openly stated in the publications in the Official Journal and, therefore, remain mostly unknown. In this way an option that is intended to be mainly corrective is influenced by other factors. The differences between the variables found to be significant in this study and in the previous one could partly be explained by the decreasing overall importance of price undertakings to terminate AD investigations as well as a change in the strategic objectives of the investigating authorities. As Veugelers and Vandenbussche (1999) suggest an increasing importance of consumer interests in the government welfare function leads to an increasing number of AD duties. They show that when consumer surplus has increasing importance in the government's welfare function the number of undertakings decreases, in the presence of national and international cartels. This theoretical research suggests that the tendency towards duties instead of undertakings may be the result of a change in the European Commissions' preferences. The results of the descriptive and econometric analysis discussed in this chapter indicate that it is plausible that the European authorities' objectives were granting greater weight to consumer welfare.

A previous empirical study (Messerlin, 1990) provides evidence of European AD cases that are "twinned" to antitrust cases and suggests that AD action may be part of a strategy of cartelisation. It suggests that AD action may be part of a strategy of European cartels to force foreign exporters to the EU to join the cartel. This research suggests that collusive agreements may be relevant in Europe. Further research would be needed to ascertain their magnitude and extent. Although, one might suspect the

existence of cartelisation strategies, more research is required to assess its existence and impacts on trade.

In a way, price undertaking can be viewed as mediated price agreements. Whether the determinants of these mediated price agreements are different when requested by the Commission or by the exporters remain an issue for further research.

Appendix 5A

Table 5.4: Number of Cases and Value of Imports in European Antidumping. Investigations Terminated by the Imposition of Definitive Duties and the Acceptance of Undertakings: (1985-2003)

Year	Number of cases — Imposition of definitive duties	Number of cases — Acceptance of undertakings	Value of imports during the year of the case decision (in 1,000 ECU) — Imposition of definitive duties	Value of imports during the year of the case decision (in 1,000 ECU) — Acceptance of undertakings	Average annual "case size" (in 1,000 ECU) — Imposition of definitive duties	Average annual "case size" (in 1,000 ECU) — Acceptance of undertakings
1985	12	21	827,957	268,209	68,996	12,772
1986	20	17	771,314	155,723	38,568	9,160
1987	31	9	4,272,045	521,196	137,808	57,911
1988	23	22	418,282	1,681,294	18,186	76,422
1989	11	6	542,688	958,551	49,335	157,759
1990	27	12	623,383	59,202	23,088	4,934
1991	28	7	942,324	290,991	33,654	41,570
1992	29	7	1,486,971	869,832	51,275	124,262
1993	26	4	1,011,728	58,501	38,913	14,625
1994	24	7	834,493	206,555	34,771	29,507
1985-94	**231**	**112**	**11,731,235**	**5,070,054**	**50,785**	**45,268**

Year	Number of cases — Imposition of definitive duties	Number of cases — Acceptance of undertakings	Value of imports during the year of the case decision (in 1,000 US 1996 Dollars) — Imposition of definitive duties	Value of imports during the year of the case decision (in 1,000 US 1996 Dollars) — Acceptance of undertakings	Average annual "case size" (in 1,000 US 1996 Dollars) — Imposition of definitive duties	Average annual "case size" (in 1,000 US 1996 Dollars) — Acceptance of undertakings
1995	14	5	1,358,608	192,131	97,043	38,426
1996	12	4	1,210,889	151,703	100,907	37,926
1997	17	5	1,235,188	514,451	72,658	10,290
1998	4	9	64,307	112,467	16,077	12,496
1999	34	12	2,386,360	434,958	70,187	36,247
2000	18	2	611,851	32,210	33,992	16,105
2001	21	2	1,032,563	10,183	49,170	5,091
2002	8	0	295,297	0	36,912	0
2003	6	1	257,098	17,697	42,850	17,697
1995-03	**134**	**40**	**8,452,161**	**1,002,799**	**63,076**	**25,070**

Source: Commission of the European Communities (Official Journal, Series C and L) and EUROSTAT, Intra and Extra EU Trade and UN COMTRADE

Figure 5.1: Number of European Antidumping Investigations Ending in Duties and Price Undertakings 1985-1994 (1985=100)
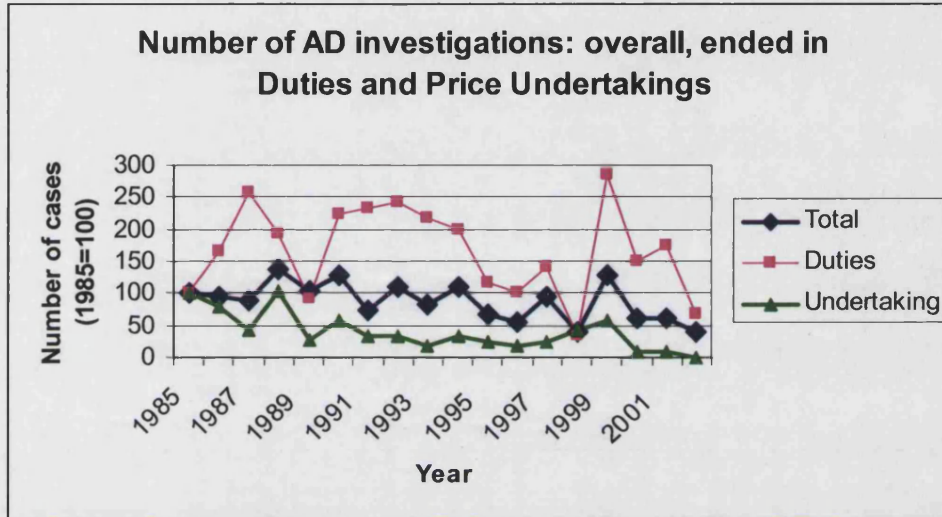
Source: Commission of the European Communities (Official Journal, Series C and L)

Table 5.5: Final Outcome of AD Investigations in Europe (1985-2003), by year

Year	Total	Rejection of the claim		Imposition of Duties		Price Undertakings		Withdrawn	Expired
		No dumping or Injury	Community Interest	Sub-total	% of total	Sub-total	% of total		
1985	51	18	0	12	24	21	41	0	-
1986	48	8	0	20	42	17	35	3	0
1987	45	5	0	31	69	9	20	0	0
1988	71	26	0	23	32	22	31	0	0
1989	53	30	0	11	21	6	11	0	6
1990	66	20	1	27	41	12	18	6	0
1991	37	1	0	28	76	7	19	1	0
1992	56	14	1	29	52	7	13	4	1
1993	42	8	0	26	62	4	10	4	0
1994	56	8	0	24	43	7	13	17	0
Total	**525**	**138**	**2**	**231**		**112**		**35**	**7**
Percentage	**100**	**26**	**0**	**44**		**21**		**7**	**1**
1995	34	7	0	14	41	5	15	8	n/a
1996	28	11	0	12	43	4	14	1	n/a
1997	48	12	5	17	41	5	12	3	n/a
1998	21	4	0	4	19	9	43	4	n/a
1999	65	10	0	34	52	12	18	9	n/a
2000	31	9	0	18	58	2	6	2	n/a
2001	31	7	0	21	68	2	6	1	n/a
2002	21	6	0	8	38	0	0	7	n/a
2003	7	0	0	6	86	1	14	0	n/a
Total	**280**	**66**	**5**	**134**		**40**		**35**	
Percentage	**100**	**23**	**2**	**48**		**14**		**13**	

Note: The unit of observation is the sub-case. A sub-case is defined as the investigation against each single country named in the AD legal case.

Source: Commission of the European Communities (Official Journal, Series C and L)

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Table 5.6: Number of AD Investigations and Average Value of Imports Terminated by the Acceptance of Undertakings, Yearly (1985-1994), by Region

	Undertakings Total	Newly Industrialised Countries	Average Value of Imports (1,000 ECU)	Non Market Economies (a)	Average Value of Imports (1,000 ECU)	Japan	Average Value of Imports (1,000 ECU)	Other Countries	Average Value of Imports (1,000 ECU)
1985	21	6	4,165	5	2,178	2	60,626	8	13,885
1986	17	4	18,483	10	5,418	0	0	3	9,203
1987	9	3	74,060	3	5,053	1	265,809	2	9,025
1988	22	7	11,140	5	1,627	2	721,821	8	18,942
1989	6	1	1,102	0	0	2	440,003	3	25,815
1990	12	4	8,264	5	2,258	0	0	3	4,952
1991	7	3	90,184	3	6,201	0	0	1	1,836
1992	7	3	5,172	0	0	2	426,962	2	196
1993	4	0	0	4	14,623	0	0	0	0
1994	7	1	11,267	5	17,168	0	0	1	109,448
Total	112	32	22,830	40	6,565	9	396,070	31	16,524

Note: The unit of observation is the sub-case. See note in Table 5.5. (a) NME excludes Yugoslavia that is classified as Newly Industrialised Country.

Source: Commission of the European Communities (Official Journal, Series C and L)

Table 5.7: Number of AD Investigations and Average Value of Imports Terminated by the Acceptance of Undertakings, Yearly (1985-1994), Less Developed Countries

	Undertakings Total	Less Developed Countries	Average Value of Imports (1,000 ECU)	Other Countries	Average Value of Imports (1,000 ECU)
1985	21	13	5,425	8	24,710
1986	17	16	9,618	1	1,828
1987	9	7	34,821	2	138,723
1988	22	15	5,858	7	227,631
1989	6	4	19,637	2	440,003
1990	12	11	4,595	1	8,661
1991	7	7	41,570	0	0
1992	7	5	3,182	2	426,962
1993	4	4	14,626	0	0
1994	7	7	29,508	0	0
Total	**112**	**89**	**14,125**	**23**	**165,780**

Note: The unit of observation is the sub-case. See note in Table 5.5.
Source: Commission of the European Communities (Official Journal, Series C and L)

Table 5.8: Number of Investigations Terminated by the Acceptance of Price Undertakings, Yearly (1985-1994), by Sector of Economic Activity

	85	86	87	88	89	90	91	92	93	94	Total	Percentage
Chemicals	0	14	7	9	3	7	3	4	2	2	51	46
Iron steel	0	1	0	7	2	3	3	0	2	5	23	20
Textiles	7	0	0	0	0	0	0	1	0	0	8	7
Electronics &Elect. Mach.	2	1	2	4	1	0	1	2	0	0	13	12
Other	12	1	0	2	0	0	0	2	0	0	17	15
Total	**21**	**17**	**9**	**22**	**6**	**10**	**7**	**9**	**4**	**7**	**112**	**100**

Note: The unit of observation if the sub-case. See note in Table 5.5.
Source: Commission of the European Communities (Official Journal, Series C and L)

Table 5.9.1: Descriptive Statistics of Variables Used in European Price Undertakings' Regressions (1985-1994)

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient Variation
Dependent variable					
UDT	0.326531	0.469629	0	1	1.43824
Regressors					
TECH	2.597668	3.115927	1	24	1.19951
BTD5_5	0.609468	0.488593	0	1	0.80167
BTD3_5	0.707101	0.455767	0	1	0.55668
BTD_1	0.745562	0.436191	0	1	0.58505
RETAL	0.021638	0.030329	0	0.218096	1.40166
CON1	35.90294	16.2198	5	73	0.45177
SIZE1	0.584207	1.835691	0	14.56577	3.14219
SIZE2	0.012036	0.039528	0	0.33431	2.28425
VA	0.669104	0.364031	0.098123	1.52731	0.54406
RVA	0.051474	0.028686	0.007325	0.10787	0.55730
LAB	1.270704	0.869377	0.261018	3.19632	0.68417
RLAB	0.043690	0.030102	0.009989	0.10582	0.68899
HI-TECH	0.157434	0.364742	0	1	2.31679
NME	0.454811	0.498571	0	1	1.09646
LDC	0.810496	0.392481	0	1	0.48425
NIC	0.259475	0.438987	0	1	1.69183
JAPAN	0.104956	0.306945	0	1	2.92450
NOC	3.166181	2.098125	1	8	0.66267

Note: It refers to 343 observations. The unit of observation is the sub-case. Statistics are calculated for each sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. See Appendix 5B for more details on data construction and sources.

Table 5.9.2: Descriptive Statistics of Variables Used in European Price Undertakings' Regressions (1995-03)

Variable	Mean	Standard Deviation	Minimum	Maximum	Coefficient Variation
Dependent variable					
UDT	0.234286	0.4247669	0	1	1.81303
Regressors					
TECH	3.051724	2.833306	1	12	0.92835
BTD5_5	0.411767	0.493607	0	1	1.19876
BTD3_5	0.623529	0.485732	0	1	0.77932
BTD_1	0.656977	0.476105	0	1	0.72469
RETAL	0.015065	0.014348	0.000277	0.153022	0.95239
CON1	31.90058	16.11673	3	65	0.50522
SIZE1	5.51e+07	1.53e+08	0	1.81e+09	2.77695
SIZE2	0.007011	0.020363	0	0.244124	2.90443
VA	15.37376	12.78224	0.051718	36.96233	0.83143
LAB	0.107616	0.101274	0.000018	0.369443	0.94107
HI-TECH	0.057471	0.233413	0	1	4.06138
NME	0.428571	0.496292	0	1	1.15801
LDC	0.942857	0.232781	0	1	0.24689
NIC	0.137143	0.344985	0	1	5.51552
JAPAN	0.028571	0.167077	0	1	5.84768
NOC	4.068571	2.460232	1	10	0.60469

Note: It refers to 175 observations. The unit of observation is the sub-case. Statistics are calculated for each sub-case. A sub-case is defined as the investigation against each single country named in an AD legal case. See Appendix 5B for more details on data construction and sources.

Table 5.10.1: Correlation Matrix (1985-1994)

	LAB	VA	CON	SIZE	RETAL	NME	LDC	JAP	BTD
LAB	1								
VA	0.90*	1							
CON	-0.16*	-	1						
SIZE	-	-	-023*	1					
RETAL	-	-	-	-	1				
NME	-0.17*	-	-	-0.21*	-0.25*	1			
LDC	-	-	-	-0.39*	-0.63*	0.44*	1		
JAP	0.25*	0.20*	0.16*	0.51*	0.26*	-0.31*	-0.70*	1	
BTD	-	-	-	0.15*	-0.15	-	-	-	1

Note: The above tables report pair wise correlations using 297 observations;
(*) indicates partial correlation coefficients significant at the 5% level of confidence

Table 5.10.2: Correlation Matrix (1995-2003)

	LAB	VA	CON	SIZE	RETAL	NME	LDC	JAP	BTD
LAB	1								
VA		1							
CON	-0.26*	-	1						
SIZE	-	-	-	1					
RETAL	-	-	-	-	1				
NME	-	-	-	-	-	1			
LDC	-	-	-	-0.37*	-0.53*	-	1		
JAP	-	-	-	0.46*	0.32*	-	-0.78*	1	
BTD	-	-	-	0.20*	-	0.20*	-	-	1

Note: The above tables report pair wise correlations using 166 observations;
(*) indicates partial correlation coefficients significant at the 5% level of confidence

Table 5.11: Sensitivity Analysis II: Probit Estimates (marginal effects) of the Decisions to Accept Price Undertaking by the European Union (1985-1994)

Hypothesis and Variables	(1)	(2)	(3)	(4)	(5)	(6)
Ability to Monitor (-) Number of Products	-0006	-0.006	-0.005	-0.006	-0.006	-0005
	-0.48	-0.50	-0.45	-0.47	-0.48	-0.43
Trade Tension						
Bilateral Trade Deficit in previous 5 years (-)	-0.025			-0.041		
	-0.40			-0.68		
Bilateral Trade Deficit in at least 3 of the previous 5 years (-)		0.083			0.076	
		1.33			1.23	
Bilateral Trade Deficit in the preceding year (-)			-0.024			-0.027
			-0.37			-0.42
Fear of retaliation (+) Share of EU exports to country of defendant	-3.94***	-3.68***	-3.90***	-2.45***	-2.08**	-2.34**
	-2.82	-2.68	-2.81	-2.57	-2.27	-2.45
Constructive remedy						
Less Developed Country (+)	-0.247	-0.262	-0.252			
	-1.23	-1.32	-1.24			
Newly Industrialised Country (+)				0.084	0.074	0.080
				1.16	1.02	1.11
Domestic Political Influences-bargaining power						
Concentration (-)	-0.008	-0.008	-0.008	-0.009*	-0.009*	-0.009*
	-1.52	-1.48	-1.52	-1.79	-1.74	-1.79
Industry Size: Employment (+)	0.185	0.180	0.179	0.178	0.173	0.171
	1.18	1.19	1.16	1.25	1.25	1.22
Relative Case Size: Imports (+)	1.352	1.357	1.371	1.515	1.536	1.543
	1.40	1.39	1.42	1.51	1.51	1.53
Hi-tech Products (-)	0.053	0.047	0.051	0.070	0.062	0.066
	0.40	0.36	0.38	0.50	0.45	0.48
Non-market Economy (?)	-0.146*	-0.132	-0.143*	-0.152*	-0.140*	-0.149*
	-1.71	-1.54	-1.67	-1.95	-1.82	-1.93
Japan (-)	0.030	-0.015	0.021	0.246	0.193	0.230
	0.14	-0.07	0.10	1.32	1.05	1.24
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies (17)	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	297	297	297	297	297	297
Wald χ^2 (df)	45.0(28)**	48.0(28)**	45.6(28)**	40.5(28)*	40.6(28)*	39.8(28)*
Log likelihood	-157.9	-157.2	-157.9	-158.4	-158.0	-158.5
Pseudo R^2	0.15	0.16	0.15	0.15	0.15	0.15

Note: see note Table 5.2. Marginal effects for "bilateral trade deficit" variables are calculated as discrete changes from 0 to 1.

Table 5.12: Economic Significance: Percentage Changes in the Probability of Acceptance of Price Undertakings (1985-1994)

Hypothesis and Variables	Sign	(1)	(2)
Ability to Monitor Number of products	-	-5.92	-6.28
Trade Tension Bilateral Trade Deficit in Previous 5 years	-	-4.73	-12.39
Fear of Retaliation Share of EU Exports to Country of Defendant	+	-36.49***	-22.86**
Constructive Remedy Less Developed Country	+	-51.84	
Newly Industrialised Country	+		29.45
Domestic Political Influences- bargaining power Concentration	-	-37.79*	-43.21**
Relative Case Size: Imports	+	21.00	23.65
Industry size: Employment	+	62.04	58.46
Hi-tech products	-	16.94	23.74
Non-market economy	?	-39.28***	-40.74***
Japan	-	-4.59	83.51
Year Dummies		*Yes*	*Yes*
Industry Dummies		*Yes*	*Yes*
No. observations		297	297

Notes: * indicates significant at the 10% confidence level; ** 5% level and *** 1% level. Expected sign next to variable name. Robust standard errors are calculated using the delta method.

Table 5.13: Number of cases ending with AD duties and undertakings, ranked in descending order by share of EU exports, 1985-1994

Country name/Country Group	AD duties	Undertakings	Total	AD Duties (in %)	Share of EU exports (in %) Minimum	Share of EU exports (in %) Maximum
United States	7	0	7	100%	16.9	21.8
South East Asia						
Japan	27	9	36	75%	2.7	5.5
Hong Kong	6	1	7	86%	1.4	2.0
Singapore	3	0	3	100%	1.4	1.6
South Korea	15	8	23	65%	0.9	1.9
Taiwan	8	4	12	66%	0.7	1.6
Malaysia	4	1	5	80%	0.3	1.0
Indonesia	5	3	8	63%	0.5	0.9
Thailand	8	3	11	67%	0.6	1.1
China	42	3	45	93%	1.3	2.3
Russia	19	7	26	73%	1.3	3.3
Sub-total (in %)	144 (62%)	39 (35%)	183 (53%)			
Total number of cases	231	112	343		0	21.8

Note: the unit of observation is the sub-case. See note in Table 5.5.
Source: Commission of the European Communities (Official Journal, Series C and L) and EUROSTAT, Intra and Extra EU Trade.

Appendix 5B

The Data

(Basic legal cases information): The information on a legal case decision to build a dichotomous dependent variable for AD duties as opposed to price undertakings was obtained from the Commission of the European Communities, Official Journals (C and L series) available on CD-Rom. Several pieces of information were obtained for each legal document: the investigation (legal case) number, date in which the investigation was initiated, product under investigation, countries named in the investigation (country of the defendant), the final decisions reached (AD duties or price undertakings) and the year in which the investigation ended. The products involved in each case are identified at the NIMEXE 6-digit level and CN 8-digit level. Different series of related industry level data were used to match the case information. For the period 1995-2003, the information was obtained from the Global Antidumping Database Version 2.0 available in http://people.brandeis.edu/~cbown/global_ad/ .The data collection project was lead by Chad Bown and funded by the Development Research Group of the World Bank and Brandeis University (Bown, 2006).

Firms located in more than one country could be named in an investigation. The method for counting investigations used consists of considering each country named in an investigation as one separate sub-case. This is a preferred approach since the final measures are imposed for each country of origin. When more than one country is named in the investigation, each country is considered as one sub-case and therefore, as one observation in the econometric analysis.

(TECH): Represents the number of products (CN 8-digits) covered by the case and was obtained from the relevant issues of the Official Journal. Since 1985 the classification of products becomes more precise and therefore a bigger number of products would mean that the case is more difficult to monitor making it less likely that price undertakings are accepted.

(BTD): The data was obtained from EUROSTAT-COMEXT, External Trade figures NIMEXE-CN exports and imports for the relevant years and from United Nations COMTRADE database. The bilateral trade deficit is defined as the value of imports minus the value of exports from and to the country of the defendant over total trade.

Three different measures of bilateral trade deficit were used. The bilateral trade deficit in the year previous to the decision made was defined as a proportion of total trade, as follows: $RATIO\_BTD\_1_j = \dfrac{BTD_{EU}^j}{(X+M)_{EU}^j}$. Similarly, the ratio was defined for the three years previous as the average 3-year annual ratio, $AVRATIO\_BTD\_3_j = \sum_1^3 \left(\dfrac{BTD_{EU}^j}{(X+M)_{EU}^j} \right) \dfrac{1}{3}$ and for the five years previous as the 5-year average ratio, $AVRATIO\_BTD\_5_j = \sum_1^5 \left(\dfrac{BTD_{EU}^j}{(X+M)_{EU}^j} \right) \dfrac{1}{5}$. Alternatively, BTD5_5 is a dummy variable that takes the value one when there is a bilateral trade deficit with the country of the defendant in each one of the 5 years preceding the decision to accept price undertakings, and zero, otherwise. Similarly, BTD3_5 is a dummy variable that takes the value one when there is a trade deficit in at least three of the five years preceding the decision, and zero, otherwise. Finally, BTD_1 is a dummy variable that takes the value one when there is a trade deficit in the year preceding the decision, and zero, otherwise.

(RETAL): For each investigated country, annual export trade from the EU was collected using EUROSTAT-COMEXT, External Trade figures NIMEXE-CN exports and imports and from the United Nations COMTRADE database. The data was used to construct the share of the value of European exports to the country of the defendant in the value of total European exports.

(LDC): A dummy variable that takes the value one if the country named in the investigation is a developing country. Less developed countries are defined in a broad sense including Albania, Algeria, Argentina, Belarus, Bosnia Herzegovina, Brazil, Bulgaria, China, Croatia, Czech Republic, Czechoslovakia, Egypt, German Democratic Republic, Georgia, Hong-Kong, Hungary, India, Indonesia, Kazakhstan, Kuwait, Libya, Lithuania, Macao, Macedonia, Malaysia, Mexico, North Korea, Pakistan, Philippines, Poland, Romania, Russia, USSR, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Taiwan, Thailand, Trinidad and Tobago, Turkey, Turkmenistan, Ukraine, Venezuela, Vietnam, Yugoslavia and Zimbabwe.

(NIC): Dummy variable that takes value one if the affected country is a newly industrialised country (NIC) and zero, otherwise. This group includes Mexico, Brazil, Argentina, Singapore, South Korea, Taiwan, Hong-Kong and Yugoslavia.

(CON): Market share of the 5 biggest firms in an industry in the European Union. The data used is reported in B. R. Lyons and S. W. Davies (1996) for most industries at 3-digit NACE Rev. 1, available for 1989. For some textile and chemical industries, the information was obtained from the European Commission (1989) "Horizontal merges and competition policy".

(SIZE1) and (SIZE2): The number of products involved in each one of the cases was identified from the relevant issues of the EU Official Journal (NIMEXE 6-digits and CN 8-digits). For each investigated product, annual imports trade was collected from EUROSTAT: COMEXT, NIMEXE-CN and EUROSTAT: Intra AND Extra EU Trade (annual data, combined nomenclature) and from United Nations COMTRADE database for the relevant years. The number of NIMEXE 6-digit and CN 8-digit codes that define a product was identified from the relevant issues of the EU Official Journal. For the period 1985-94, the variable SIZE1 representing the import values is measured in hundred million (108) US dollars. Originally in ECU they are translated into US dollars using the exchange rate ECU-US dollar (International Monetary Fund) and in constant prices of 1990 using the US implicit value added deflator for the manufacturing sector from OECD STAN database. Value of imports obtained from United Nations are expressed in US dollars and expressed in constant 1996 prices using the US Gross Domestic Product (GDP) deflator.

(LAB, VA): OECD STAN database for the relevant years. *LAB* is the number engaged (total employment) in the industry and it is measured in millions. *VA* is the value added in the industry. For the period 1985-94, it is measured in hundred billion (10^{11}) US dollars. It is measured in constant 1990 prices of local currencies and transformed into billions of US dollars using the exchange rate (International Monetary Fund, International Financial Statistics). For the period 1995-03, value added in measured in 100 billion Euros and transformed into constant prices using the GDP deflator for 15 countries in Europe (EU-15). The NIMEXE 6-digit and CN 8-digit product codes were correlated with the industry codes using correspondence tables provided by EUROSTAT.

(HI-TECH): Obtained from EUROSTAT (1989). The report lists the products considered as technology intensive.

(NME): Dummy variable that takes value one if the affected country has a non-market economy and zero, otherwise. This group is defined in a very broad sense and it includes Albania, Belarus, Bosnia Herzegovina, Bulgaria, Croatia, China, Czech Republic, Czechoslovakia, German Democratic Republic, Georgia, Hungary, Kazakhstan, Lithuania, Macedonia, North Korea, Poland, Romania, Russia, USSR, Slovakia, Slovenia, Yugoslavia, Turkmenistan, Ukraine and Vietnam.

(JAPAN): Dummy variable that takes value one if the affected country is Japan and zero, otherwise.

(CHINA): Dummy variable that takes value one if the affected country is China and zero, otherwise.

(GDP) A series of the growth rate of GDP (Gross Domestic Product) for Europe was constructed using GDP at constant prices from the World Economic Outlook (GEO) database for the period 1985-94 and Eurostat for the period 1994-03. The composition of Europe has changed in 1985 and 1995. A correction was applied to reflect this change (EU-10, EU-12 and EU-15).

Chapter 6   Conclusions

The motivation behind this thesis is to understand different aspects of trade theory and policy. One of the main objections to the theory of strategic trade policy is that it assumes the government has prefect knowledge of things such as the nature of competition or the cost structure of certain industries. There is an established body of literature that has investigated the implications of incomplete information in strategic trade policy theory.

In Chapter 2, I analysed the design of an optimal tariff when a domestic government and a local firm do not know the cost level of a foreign competitor. The chapter contributes to the existing literature in the following ways. Firstly, it concentrates on the design of strategic trade policy in the presence of a particular type of informational asymmetry, namely, that between an uninformed domestic government and firm and an informed foreign competitor. In the presence of incomplete information, output can be taken as a signal of costs to the government and a domestic firm. Secondly, unlike other work it concentrates on asymmetries of information about the unknown cost efficiency of a foreign firm. Thirdly, it compares the optimal tariff and output in the presence of signalling with the situation in which output does not signal costs.

The analysis suggests, first, that a firm with low costs has an incentive to misrepresent them and to pretend it has high costs in order to obtain a lower import tariff on its exports. In equilibrium, this incentive does not exist because the government anticipates the action of the foreign firm and acts rationally when choosing the optimal tariff. It is shown that a unique separating sequential equilibrium exists and that strategic trade policy can effectively be designed in the presence of informational asymmetries. The government faces a trade-off. The optimal policy should equate the marginal loss of consumer welfare with the marginal gain from profit shifting and tariff revenue.

Second, the government chooses a tariff that is lower than the tariff that would prevail in the absence of signalling. Because the low cost firm has an incentive to mimic the inefficient firm, the latter distorts output away from the complete information output. The high-cost firm distorts equilibrium output downwards whereas the low cost firm chooses to produce at the full information output level. There is a "signalling" effect. Signalling creates a costly distortion in terms of domestic welfare. The government sets a first period tariff which is lower than the optimal tariff when no

signalling occurs because it anticipates the incentive of the foreign firm. In a separating sequential equilibrium, incomplete information lessens the rent extracting argument for a tariff. Furthermore, pooling equilibria can be ruled out because it requires unreasonable beliefs to support them.

Finally, expected foreign output is lower when signalling and domestic output is higher, shifting profits to the domestic firm. Because a lower specific tariff is needed to commit the home firm to greater expected output, the low-cost firm output is higher due to a "lower tariff" effect. The low-cost firm is able to obtain full information profits but its output is greater than when no signalling occurs. On the contrary, for the high cost foreign firm the "signalling" effect is stronger than the "lower tariff" effect. Therefore, for a given level of the tariff and domestic firm's output, the equilibrium output chosen by the high-cost foreign firm is lower. Overall, the "signalling" effect prevails over the "lower tariff" effect. Expected foreign production is lower and domestic production is higher.

The model can be extended to analyse the filing decision of the domestic. The results should not change in any qualitative manner. The government would design policy optimally and the outcome will have the desirable property that optimal duties are imposed.

Chapter 3 and subsequent chapters focused on the analysis of antidumping. A growing amount of research in trade policy has concentrated on the study of this frequently used trade policy instrument. Antidumping regulations allow countries to impose unilateral measures against dumped imports causing material injury to domestic firms. However, they are more often used as trade protection rather than as a trade remedy. The complexity of antidumping regulations requires that the necessary background information is presented before proceeding to analyse its determinants empirically. The descriptive analysis in the third chapter provided a panoramic view of the evolution of antidumping activity and legislation worldwide and in Europe. It also included a detailed explanation of the investigation procedure in Europe and it highlighted the main differences with the implementation of AD laws in the US. Finally, it presented a detailed description of the investigation procedure in Europe as well as an account of its main institutional features that would help understand the results of the empirical analysis discussed in Chapters 4 and 5.

Chapter 4 focused on the analysis of the political and technical influences in AD investigations in Europe in the period 1985-2003. The results of the empirical analysis

are as follows. First, the empirical findings suggest that Europe is operating a double track AD mechanism. The model is robust to the use of different proxies.

Second, the number of countries named in AD investigations was found to be a significant determinant of the dumping and injury decisions. There is a non-linear effect on the probability of an affirmative decision of dumping and injury being made. Filing investigations against a larger number of countries decreases the probability of dumping and injury to start with until the number of named countries reaches a critical value of four. When more than four countries are named in the investigation the probability of dumping and injury increases. Third, the results are similar when cumulated imports from the other countries named in the case are considered. Finally, the main significant determinants remain unchanged when excluding different sectors of economic activity.

This chapter contributes to the existing literature in the following respects. First, it controls for macroeconomic factors and sector heterogeneity. A decision on dumping and injury being positive is associated with the general features of the double track model of administered protection as captured by the regressors and it is not sector specific. Second, it assesses the importance of multiple-country filing in the decisions of dumping and injury. The effect of the number of named countries in the outcome of an investigation is analysed as well as the importance of the cumulation rule by which the European Commission can cumulate imports when an AD investigation involves several countries. Finally, the economic significance of the results is analysed.

Chapter 5 concentrated on the analysis of different hypotheses relating to European price undertaking in the period 1985-2003. The results of the empirical analysis are consistent with some of the hypotheses formulated and can be summarised as follows. First, the estimates show a statistically significant effect of the proportion of European exports to the country against which an investigation is carried out on the probability of price undertakings. Greater exports to the country of the defendant lower the probability that price undertakings are accepted. The "tougher" remedy of AD duties is more likely to be imposed on those countries that are receivers of EU exports. There is also some evidence that bilateral trade deficits have an impact on the EC choice between the acceptance of price undertakings and the imposition of duties. There is some evidence to confirm the alleged ease or ability to "monitor" the price undertakings hypothesis, as indicated in the guidelines of the GATT/WTO Agreement.

Second, several variables confirm the domestic political influence-bargaining power hypothesis in the decision to accept price undertakings. There is some evidence that higher levels of employment are associated with a probability of "softer" measures

being imposed. Third, some of the countries' characteristics are found to be significant. There is some evidence suggesting that the EU is less likely to apply the "softer" remedy of price undertaking in cases involving non-market economies. The European Commission is more likely to find dumping when exports originate from these countries but it is also more likely to deny the softer remedy of price undertakings.

This chapter contributes to the existing literature in the following respects. First, by using a unique dataset of legal cases and other trade and industrial statistics, it controls for sector heterogeneity and macroeconomic factors. A decision to accept price undertakings by the European Commission as opposed to AD duties is explained by the general hypotheses formulated as captured by the regressors. Second, it assesses the importance of political economy determinants. Third, it includes a sensitivity analysis. Fourth, it presents the economic significance of the results.

On the whole, I believe that this thesis makes a contribution to our understanding of several aspects of trade policy. In particular, the design of an optimal tariff policy in the presence of incomplete information with respect to the level of competitiveness of a foreign firm. It also contributes to the understanding of the political economy and economic determinants of antidumping decisions in Europe and it helps to understand the changes that have occurred in the use of European price undertaking since the mid 1980s. It also offers some ideas for future research.

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