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“Sind WTO-Dispute im Umwelt- und Verbraucherschutzbereich eskalationsträchtiger?”

Please read the version in German if possible because the version below contains substantial gaps and several errors. We provide this old version only because some participants may not be able to read the paper in German.

Dispute Escalation in the World Trade Organization: Are Conflicts over Environment, Health and Safety Regulation Riskier?

Thomas Bernauer* and Thomas Sattler**

Abstract

This paper examines the widely held but hitherto not systematically tested assumption that disputes over inter-jurisdictional differences in environment, health and safety (EHS) regulation are more prone to escalation than disputes over other issues. We develop and test this hypothesis with data on 506 dyadic WTO trade disputes in 1995-2003, using binary probit and Sartori selection models. The results show that, ceteris paribus, EHS disputes are less prone to escalation from the consultation to the panel/appellate body level, but more prone to escalation into compliance disputes once they have reached the panel/appellate body level. We then examine the subset of EHS cases to establish which cases within this subset are driving the overall statistical finding, and why some EHS cases may be more prone to escalation than other EHS cases. We find that EHS disputes over product regulations resting on legitimizing principles other than conventional externalities or commons problems are more likely to escalate.

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1. Introduction

Arcane domestic environmental, health and safety (EHS) regulations have become common objects of economic diplomacy. There is intense debate within trade and environmental policy circles over the causes and consequences of regulatory diversity. Some view differences in regulations of products as bona fide responses to environment, health and safety risks, while others see non-tariff barriers to trade. Some see variation in regulations governing production processes, e.g. air and water quality standards, as legitimate responses to national differences in environmental preferences, environmental conditions and wealth, while others see parochial efforts to attract investment and improve the competitive position of firms. The range of contemporary international conflicts over domestic product and process standards is striking. They include disputes over asbestos, growth hormones, quarantine regulation, agricultural biotechnology, and many other issues.

We argue that dominant theories of trade policy – mainly those focusing on factor endowments, asset specificity, country characteristics (e.g. trade dependence, political system characteristics), and the Olsonian logic of interest group politics – offer incomplete explanations of government behavior, notably in trade disputes in the EHS area. We seek to fill this gap in two ways. First we test in a straightforward manner for the population of WTO disputes whether EHS disputes are more prone to escalation than other disputes. This test is done on 506 dyadic WTO trade disputes for 1995-2003, using binary probit and Sartori selection models. The results show that, *ceteris paribus*, EHS disputes are in fact less prone to escalation at the consultation to panel stage, but more prone to escalation once they have reached the panel stage. Second, we focus on the subset of EHS disputes and on interaction between legitimizing principles, a distinction of product and process regulation, and conflict. The aim is to establish which cases within this subset are driving the overall statistical findings. We find that disputes focusing on EHS product regulation that rests on deontological legitimizing principles are more likely to escalate.

In addition to contributing to the wider literature on trade policy we also contribute to the international trade disputes literature more specifically by unpacking the “sensitive case” variable, by measuring escalation more directly, and by using selection models to study three stages of the escalation process. In doing so we connect two types of literature: first, the environmental policy literature, which tends to highlight the conflictive nature of trade disputes over EHS issues but does not embed such arguments in a generic theory of and empirical evidence on the population of EHS and non-EHS trade disputes; second, the trade disputes literature, which pays little attention to the characteristics of contested domestic regulation and explains concessions by the defendant rather than dispute escalation *per se*.

The remainder of the paper is as follows. First we review the relevant literature on trade policy and trade disputes with a view to extracting from the extant literature arguments on why EHS disputes may or may not be more prone to escalation. We then outline a novel theoretical argument on why some EHS disputes may in fact be more likely to escalate than other EHS disputes. Second, we present the results of our empirical analysis of 506 WTO trade dispute dyads. Third, we look more closely at the subset of EHS cases.

2. Review of Literature

There is a surprising separation between the general trade policy literature and the literature on international trade disputes. The dominant explanations of trade policy, which seek to explain market opening and market closure (liberalization, protectionism), concentrate on factor prices, asset specificity, and interest group politics (cites, Milner etc.). The literature on trade disputes (cites), which seeks to account for dispute outcomes mainly in terms of trade liberalization by the defendant, pays virtually no attention to differences in factor prices and asset specificity, interest group politics, and the characteristics of disputed trade policies more generally. It focuses primarily on country characteristics, e.g. democracy, trade dependence, or relative economic power. In reviewing the extant literature we examine two questions. First, what are the gaps in the extant literature on trade disputes? Second, how could the literature on trade policy be connected with the literature on trade disputes? We conclude that the properties of trade issues and, connected to that, interest group politics and the ability to compensate those suffering from trade concessions are useful connecting points.

In terms of a preface, it is worthwhile to discuss briefly why focusing on trade disputes instead of trade policies more broadly can be useful. While the reasons for concentrating on differences in trade policies across countries and/or time are obvious, the reasons for focusing on trade disputes are perhaps less clear and rarely discussed in the extant literature. They are twofold. Focusing on trade disputes can offer insights into the ‘robustness’ of particular trade policies. Trade disputes are situations where such policies are put to the test and where governments need to decide on whether to uphold, modify or abandon them. Hence they tell us something about how strong particular countries’ preferences and commitment for or against market opening really are. Moreover, focusing on trade disputes offers insights into the performance of international institutions designed to manage or resolve conflicts over differing trade policies.

We now discuss some of the principal gaps in the extant literature on trade disputes. Most of the literature on GATT/WTO dispute settlement focuses on explaining dispute initiation, the choice of institutional mechanisms for trade conflict resolution, and the extent of trade liberalization associated with dispute outcomes (notably, the level of concessions by the defendant). On the explanatory side, most authors emphasize the characteristics of plaintiffs and defendants, notably, income, size of the economy, trade dependence, trade balance, democracy, as well as partisan composition of government and other domestic political variables. This literature also examines the implications of strategic factors for dispute settlement, such as bandwagoning and countersuits. (See, e.g., Cemerin 2004, Reinhardt 2000, Martinez 2004, Garrett and Smith 2002, Davis 2003, Bush/Reinhardt 2002, Widsten 2004, Leitner and Lester 2004, Davis 2003, Dixon 2004)

At least two gaps in this literature, which otherwise has provided important insights into the causes and consequences of trade disputes, offer opportunities for further, complementary research.

First, in most extant work dispute outcomes are defined in terms of trade liberalization by the defendant (e.g. Busch and Reinhardt 2002, 2002a, Garrett and Smith 2002). This definition of “success” of dispute settlement provides an incomplete picture of dispute escalation or the intensity of disputes. One might argue, for example, that for the stability and effectiveness of the global trading system the extent to which this system helps in constraining or preventing escalation of disputes may in the long run matter more than the extent to which defendants actually make concessions (liberalization) in particular cases. Moreover, empirically, concessions and escalation – in terms to be defined more closely – do not appear to be fully,

inversely correlated, though there is an obvious relationship. For example, we observe a substantial number of cases where the defendant has made no or only minor concessions but where the intensity of the dispute has remained rather low (see also Garrett and Smith 2002). Note also that compliance in the WTO system is primarily defined by agreement between plaintiff and defendant, rather than by the decisions of WTO panels or the WTO Appellate Body. Consequently, dispute escalation per se needs to be better defined, measured and explained (see also Cemerin 2004).

Second, very few authors have paid attention to the properties of disputed domestic policies. If at all, explanatory variables capturing issue properties are simply added as control variables to multivariate analyses. Busch and Reinhardt (2002a, 2002), for example, include “agricultural case”, “discriminatory measure”, and “sensitive case” (defined as SPS cases or cases over “cultural matters”) in their analysis. Interestingly in view of our focus on EHS cases, they find – without theoretical argument and discussion – that in their sample of GATT/WTO cases 1980-2000 “sensitive cases” are significantly less likely to result in concessions by the defendant. Similar results obtain for their sample of 85 US-EC GATT/WTO cases for the period 1960-2001 – concessions in such cases are 43% less likely (Busch/Reinhardt 2002). These results suggest that EHS disputes might be more prone to escalation. Yet, there clearly is a need for better definition and measurement of issue properties and for theoretical and empirical analysis of the effects of issue properties on the propensity of trade disputes to escalate.

Some recent work has focused more systematically on the determinants of trade dispute *escalation*. Garrett and Smith (2002) provide an interesting argument on why only few disputes in the WTO have in fact escalated. They attribute this outcome primarily to three factors: strategic restraint by potential complainants, particularly in cases where the defendant appears very unlikely to make concessions; strategic conciliation by the Appellate Body in decisions involving powerful defendants; and strategic bargaining between plaintiff and defendant outside the WTO over the terms and timing of compliance. These three factors have acted as “safety valves” for the toughest cases, understood as those in which the defendant finds it very difficult to make concessions. Again, however, from an empirical standpoint Garrett and Smith’s analysis focuses on explaining concessions by the defendant rather than escalation per se. Moreover, it appears somewhat difficult to simply inverse the theoretical arguments by Garrett and Smith and thus explain when and why the three “safety valves” fail and escalation occurs. In any event, Garrett and Smith (2002) do not systematically examine why some disputes that, *ex ante*, appeared prone to escalation, did not escalate while some others did.

As to the latter, Garrett and Smith (2002) note that “doggedly pursuing sensitive, high-stakes cases...poses a significant threat to the future of the WTO”. In view of this argument one should expect the EU and USA to push contentious trade disputes (escalation) only if they do not fear de-legitimizing the WTO system through such behavior. But this argument appears difficult to operationalize with testable *ex ante* predictions. From Garrett and Smith’s argument about strategic conciliation by the Appellate Body one might conclude that cases with less powerful defendants are more likely to escalate because the Appellate Body is less likely to reason in favor of the defendant. With regard to the failure of the third safety valve (bilateral bargaining on compliance) the authors observe that “Such breakdowns of bargaining could occur either because the actors did not accurately understand each other’s preferences and constraints or because domestic political considerations created an essentially empty set of acceptable outcomes in the international bargaining game.” Garrett and Smith, in referring to the bananas and foreign sales corporations (FSC) disputes, note that these failures are associated with the following conditions: (a) previous histories of the same case in GATT, (b) prior rulings in the area against defendants, (c) unambiguous violation of WTO rules but little

prospect of the defendant making concessions, (d) defendants did not believe their policies would be challenged, (e) the EU launches the FSC case in retaliation for the US attack in the bananas case. Finally, if one accepts Garrett and Smith's argument that conciliation by the Appellate Body is more likely in cases where treaty principles are less clear-cut we should see more escalation where treaty principles are clearer. This prediction does not square well with several cases of obvious escalation, such as the hormones and agricultural biotechnology cases, where the legal situation is far from clear. In any event, it appears difficult to determine *ex ante* when treaty principles are more or less clear and to derive predictions from this.

Studies on trade disputes have, thus far, connected to the trade policy literature primarily via interest group and democracy arguments. Davis (2003) hypothesizes that cases with strong interest groups in the initiator and the defendant country are more likely to escalate. But she offers no procedure for the measurement of interest group strength across countries and trade disputes. In addition, there are some unresolved theoretical problems with the interest group argument. According to the Olsonian logic of collective action small interest groups experiencing concentrated costs (or benefits) will find it easier to organize and successfully exert pressure on government to escalate a trade dispute. Yet, one might also claim that such groups, because they are small and easily identifiable, are easier to compensate once a defendant is trying to back down and de-escalate a dispute. Conversely, some environment, health and safety (EHS) cases are characterized by large and diffuse interest groups (e.g. the growth hormones, endangered species, and biotech cases), substantial domestic political pressure on the defendant government not to back down, and difficulties in compensating opponents of de-escalation. How the Olsonian logic plays out appears to hinge on the nature of the contested domestic regulation.

Arguments about the effects of democracy on trade disputes are closely related to the aforementioned interest group hypotheses. Reinhardt (2000) and others have examined the effects of democracy on domestic pressure for dispute escalation. Theoretical claims and empirical evidence in this respect have remained contradictory. While some authors see a positive effect of democracy on cooperation (and a negative effect on escalation) (e.g. Gaubatz, Verdier, Remmer) others point to a positive effect on escalation because democracies pursue "bounded competition" domestically and abroad (e.g., Dixon, Raymond). Reinhardt (2000) adds that interest groups are easier to mobilize in democracies, that producers find it easier to organize than consumers, and that politicians in democracies are more sensitive to interest group pressure. He then assumes that both import- and export-competing producers in a (potential) plaintiff country are interested in trade liberalization by a defendant country. From this, he derives that, across the board, democracies are more likely to escalate trade disputes than non-democracies. Empirically, he finds that democracy strongly promotes participation in trade disputes. Also, disputes involving a democracy are less likely to end cooperatively. These findings hold primarily for the monadic versions of the democracy proposition. Dixon (2003) argues that trade disputes among democratic dyads are likely to last longer but finds only mixed evidence.

Explanations centering on factor prices and asset specificity, which are widely used in the trade policy literature, have not yet been applied in the literature on trade disputes. In principle, we might expect more escalation in cases where variation in factor prices and asset specificity is such that it strongly predicts market opening in one and market closure in another country. Thus we could construct a dataset comprising the population of WTO country dyads and categories of tradable goods and associated industries/economic actors. Controlling for other influences, dyads with stronger differences in factor prices and higher asset specificity should display a higher probability of trade disputes and trade dispute escalation. Such empirical research does not (yet) exist.

Guzman and Simmons (2002) examine whether or not disputed trade issues have an all-or-nothing character. The argument is that such issues make transfer payments and concessions harder and are thus more likely to escalate. They find support for this claim among democratic states. This work comes closest to what we are trying to do in this paper. Its limitations are as follows. The dependent variable is whether disputes result in a panel or not. We will show in this paper that probabilities of escalation may differ radically if we consider also escalation beyond the panel stage. The coding of the principal explanatory variable, the continuous nature of issues, is rather broad. It includes EHS issues, but also other issues. (Other problems with this paper? Expand...)

In summary, we contribute to the literature on trade policy and trade disputes primarily by unpacking the “sensitive case” variable, by measuring escalation more directly and at three levels, and by using selection models to study the three stages of the escalation process. In doing so we connect two types of literature: first, the environmental policy literature, which tends to highlight the conflictive nature of trade disputes over EHS issues but does not embed such arguments in a generic theory of and empirical evidence on the population of EHS *and* non-EHS trade disputes; second, the trade disputes literature, which pays little attention to the characteristics of contested domestic regulation and explains concessions by the defendant rather than dispute escalation per se.

3. Environment, Health and Safety (EHS) Disputes

(this section is still very sketchy)

Analysts of global trade and environment, health and safety (EHS) issues are unclear on or divided over whether trade disputes over such issues are more susceptible to escalation than disputes over other issues. Those studying EHS disputes have usually focused on particular disputes, such as the conflict over growth hormones, agricultural biotechnology, the tuna-dolphin case, and a few others (e.g. Caduff 2004, Young 2003, Bernauer 2004, DeSombre and Barkin 2002, DeSombre 2000). That is, they concentrate on when and why particular EHS issues escalate or not. While some of these authors suggest, at least implicitly, that EHS disputes are particularly sensitive (e.g. Caduff 2004), others (e.g. Young 2005) argue that the probability of escalation of EHS disputes is actually very small. The limitations of such analyses are that theoretically and empirically they are placed within the subset of WTO disputes that are EHS disputes. Broader arguments about EHS versus non-EHS disputes are, strictly speaking, not possible on such empirical grounds. As noted above, those studying trade disputes quantitatively have not (with the exception of Guzman and Simmons 2002) offer theoretical arguments and systematic empirical evidence on whether or not EHS disputes are more prone to escalation.

From the trade policy literature we can, nonetheless, derive some arguments on why disputes over EHS regulation should be, or should not be, more prone to escalation.

Arguments in favor of higher probability of escalation. Contested EHS regulation is usually supported by larger parts of the electorate of the defendant country than other contested domestic economic regulation. EHS regulation is more frequently rooted deeply in domestic value systems. Moreover, oftentimes in EHS cases the scientific basis of domestic regulation, and therefore justifications for regulation, are more contested and harder to clarify in trade disputes. That is, it is harder to distinguish protectionist regulations from regulations genuinely driven by domestic EHS concerns. For those reasons defendant countries whose EHS regulations are attacked in trade disputes are less likely to make concessions and lower domestic standards, be it before formal WTO verdicts (in the “shadow of the law”) or after. One additional reason why defendants in EHS disputes may find it harder to make

concessions is that it is frequently difficult if not impossible to compensate domestic interest groups for a lowering of standards because such standards are widely regarded as non-fungible.

Arguments against a higher probability of escalation. Those arguing that EHS and other types of trade disputes should have approximately the same propensity to escalate claim that economic regulations often cater to narrowly defined interest groups. Such interest groups are bound to experience concentrated costs from concessions by the defendant. Hence they are easier to organize for collective action and are more likely to resist concessions by their (defendant) government. This promotes escalation.

Heterogeneity of EHS issues. Previous case-study work on EHS regulation by the authors of this paper (cites...) suggests that it may be problematic to focus simply on whether or not EHS cases are more prone to escalation. The reason is that EHS cases are quite heterogeneous, and that we need to look more closely at the theoretical implications of this heterogeneity. We have identified in particular three dimensions along which EHS cases vary: the target of regulation (products vs. processes); the primary justification offered for regulation (legitimizing principles); and the degree of scientific uncertainty over the risks addressed by EHS regulation. Figure 1 shows that we expect a higher probability of escalation for regulation that is product regulation and centers on risk shielding / information asymmetry or species and ecological rights.

Figure 1: Characteristics of EHS regulation and probability of escalation

	Principal justification	offered for regulation	
	Externality/commons	Risk shielding / information asymmetry	Species and ecological rights
Product regulation		High probability of escalation	High probability of escalation
Process regulation	Low probability of escalation		

The product-process distinction is more conventional: regulation focusing on products (e.g. regulation requiring particular packaging of products) can have immediate effects on trade flows; process regulation, in contrast, has more indirect and longer-term effects on the competitive position of economic actors. Hence we expect a higher probability of escalation of conflicts over product regulation.

The argument centering on justifications is more unconventional. We assume that justifications based on externalities or common property resource problems follow the widely understood and more broadly accepted logic of market failure. Hence they are less likely to be contested, and if contested more likely to be settled early. In contrast, justifications centering on risk-shielding / information asymmetry or species and ecological rights tend to be less amenable to traditional procedures for cost-benefit analysis and risk-assessment. They are more likely to reflect broader regulatory cultures and societal values (e.g. in respect to application of the precautionary principles, see Vogel 1986). This implies that it will be harder to achieve international consensus on the legitimacy of such regulation. Moreover, if litigation is initiated in such areas, it will be harder for the defendant to back down because it is virtually impossible to compensate domestic constituencies. For purposes of illustration we briefly look at three EHS cases.

Shrimp-turtle case: India, Malaysia, Pakistan and Thailand sued the US over restrictions by the latter on the importation of certain shrimp and shrimp products. The purpose of these restrictions was the protection of sea turtles. Under its Endangered Species Act the US required that US shrimp trawlers use “turtle excluder devices” (TEDs) in their nets in areas where sea turtles might be encountered. Since sea turtles do have any direct economic or public health value to the US this ban has been justified mainly in terms of species rights. The US then demanded that all imported shrimp meet similar standards in order to receive import certification. The US lost the WTO case because implementation of its regulation (not the regulation per se) was found to discriminate mainly between Caribbean and other countries. Interestingly (we will come back to this point), the dispute did not fully escalate into a compliance dispute (unlike the hormones case) because the US adopted some minor changes in implementing its regulation. Essentially, it used a combination of rewards and pressure to bring exporters of shrimp closer to the US standards. It did not relax the regulation as such. (See http://www.wto.org/english/tratop_e/envir_e/edis08_e.htm)

Growth hormones: The US and Canada sued the EU over the latter’s ban on imports of beef from cattle raised with growth hormones. The EU was found guilty but has not made any significant concessions. At the heart of this case is a fundamental clash over the legitimizing principles for EU regulation. Scientific risk-assessment have, in essence, eliminated justifications based on externality or commons management (no proof of negative effects on human health or the environment). The principal justification by the EU now rests on what it defines as prevailing consumer opinion, and on shielding consumers against potential (but not yet proven risks) that they might impose on themselves if, for example, hormone treated beef labeled as such were let into the EU market. (See http://www.wto.org/english/tratop_e/sps_e/sps_agreement_cbt_e/c5s3p1_e.htm)

US-Venezuela/Brazil gasoline case: Venezuela and Brazil sued the United States in the WTO claiming that the US applied stricter rules on the chemical characteristics of imported gasoline than it did for domestically refined gasoline. The contested US regulation was clearly focused on reducing air pollution through cleaner gasoline, that is, externality management. The US was found guilty and accepted and implemented the verdict. Both sides agreed on the logic of reducing air pollution. The complaint focused mainly on designing this regulation so that it did not impose higher costs on foreign than domestic suppliers. (See http://www.wto.org/english/tratop_e/envir_e/edis07_e.htm)

In our case-study research we also found two additional reasons that may cause variation in the risk-propensity of EHS disputes. The first is variation in scientific uncertainty. Where uncertainty over the substance of the phenomenon being regulated exists, regulations is more likely to vary across countries, reflecting differences in beliefs on risks and mitigation measures. Where uncertainty over the substance of the area being regulated exists, parties to potential trade conflicts may be more prepared to tolerate regulatory diversity and limit dispute escalation since the existence of uncertainty legitimates a wide range of regulations. As a result, uncertainty over the substance of policy may go a long way, as knowledge claims are constructed and deconstructed to serve political, economic and organizational ends. The second reason is strategic behavior of dispute participants. We might expect, for example, that in EHS cases that appear particularly prone to escalation plaintiffs and defendants exercise more restraint. We take another look at such explanations when we examine in more detail the subset of EHS cases in the WTO.

4. Quantitative Analysis

In this section we first discuss the data and methods. The second part presents descriptive results for the two main variables: escalation and EHS/non-EHS disputes. The third part focuses on the first stage of escalation, that is, when and why disputes escalate from the consultation to the panel or appellate body stage. The fourth part concentrates on when and why disputes escalate from the panel or appellate body stage to compliance disputes.

4.1 Data and Method

Dataset

The dataset constructed for this analysis covers all trade disputes that entered the WTO system from the establishment of the dispute settlement procedure (1995) until the end of 2003. That is, it includes all disputes that have been assigned a DS (dispute settlement) number by the WTO – see WTO document WT/DS/OV/23 (7 April 2005). We do not include GATT (1948-1994) trade disputes. Under the GATT system the dispute settlement procedure was very different from the WTO procedure – the key difference being that the defendant could stall the procedure at any time, which is not possible in the WTO. This makes it much harder (and less reliable) to code GATT disputes for their degree of escalation.

The cut-off date (end 2003) derives from the need to include only those disputes that have had a chance to escalate. If we included disputes that were initiated say in late 2004, such disputes could, because of the (mandatory) WTO dispute settlement procedure and its time-frames, not have escalated all the way to compliance disputes (see definition of escalation below). Opting for the end of 2003 leaves 18 months, which in terms of the relevant WTO procedures could have allowed any dispute initiated by late 2003 to escalate by mid-2005. Because some trade disputes may, for example, begin in 2003, escalate in 2004, de-escalate in 2005, and flare up again in 2006, there will always be some uncertainty when coding particular disputes for their degree of escalation. This problem remains the same whether we code the dependant variable in terms of trade concessions or escalation.

The further back from the present we set the cut-off date the less serious this problem is likely to be. Yet, there is a trade-off, since moving backward comes at the expense of the number of observations and hence the significance of results. This trade-off is particularly serious in our analysis because a comparatively large number of EHS disputes were initiated in 2003. As noted below the number of EHS cases is rather low. If we reduced the dataset to 1995-2002 the number of cases would decrease even further. Hence we opted for inclusion of the 2003 data.

We coded all trade disputes as dyads. The total is 506 dyads (and 305 trade disputes, as defined by DS numbers) for the time-period 1995-2003. The empirical literature on trade disputes usually divides disputes that involve multiple plaintiffs into country dyads (Horn et al. 1999; Busch 2000; Busch and Reinhardt 2003; Bagwell et al. 2004, Horn, Mavroidis and Nordstrom 1999) - note that there are no WTO disputes with multiple defendants. The reasons are as follows. First, settlement or escalation may occur bilaterally in disputes involving multiple complainants (Busch and Reinhardt 2003), and multiple complainants can file for consultations or panels at different times. Indeed, in many of the disputes in our dataset we observe that only some countries filing for consultation then escalate by demanding

a panel. Similarly, there are a number of cases where only a subset of plaintiffs involved at the panel stage escalate to a compliance dispute. Second, dyadic coding allows for inclusion of state-specific variables in models. Third, using dyads assigns greater weight to cases with multiple plaintiffs. The dilemma in following the dyadic approach is that our independent variable of principal interest does not vary across dyads within a given WTO case. However, aggregating different dyadic escalation levels and different values on the country-specific control variables within each dispute case to dispute case average would raise serious conceptual problems. This is why we stick to the dyadic approach.

Variables

Table 1 identifies and defines the two principal variables used in this analysis. Other (control) variables are defined in the annex.

Figure 2: Variables

Name	Description	Source(s)
Escal	Escal is the dependent variable. Escalation is coded in terms of three levels (1, 2, 3). Low degree of escalation (1) means that the dispute was formally declared as resolved (by the parties) and/or has not led to the establishment of a panel. Medium degree of escalation (2) means that a panel was established and/or the Appellate Body of the WTO became active. High degree of escalation (3) means that proceedings according to Articles 21.5 and/or 22.6 (compliance disputes) were initiated and/or a panel or Appellate Body report associated with those proceedings was issued. ¹	WT/DS/OV/23 (7 April 2005) and other WTO documents
EHS	EHS is the principal independent variable. It identifies a dispute as a dispute over environment, health, and safety (EHS) or non-EHS issues (0, 1). Based on WT/DS/OV/23 (7 April 2005) and other WTO documents we first identified disputes in which one of the parties referred to the SPS agreement or to Art. XX of GATT. We then examined the key arguments of plaintiffs and the defendant in more detail to establish the extent to which EHS aspects have played a role in the dispute. For the EHS variable we opted for a low-threshold approach: we also included disputes in which EHS issues have played a minor (but identifiable) role.	WT/DS/OV/23 (7 April 2005) and other WTO documents
EHSn	We re-examined all EHS cases identified for the EHS variable qualitatively and excluded those cases from the EHS definition (i.e., we recoded	WT/DS/OV/23 (7 April 2005) and other WTO documents

¹ Panels that were established but then suspended, or were established but then disappeared from the WTO records or never issued a report are coded as (2), for we code for the maximum escalation level a dispute has reached in its history. We code a dyad as (3) only if the respective plaintiff has formally invoked Articles 21.5 and/or 22.6. Countries that request Third Party status at the stage of consultations are not coded as a dyad. Countries that are plaintiffs at some point but then switch to Third Party status (e.g. when a dispute goes from consultations to panel) are not coded as being part of the group of escalating countries.

	them from 1 to 0) where the EHS component appears very indirect or vague (EHSn = EHS cases by narrower definition). For purposes of transparency we list all 71 EHS cases and all EHSn cases in the Annex.	
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Estimation Techniques

We are interested in the effect of the EHS/non-EHS dispute variable on escalation across all three stages of the WTO dispute settlement process. After a descriptive assessment (4.2) we use binary probit models to estimate the probability of escalation from the first to the second stage (4.3). We then estimate simultaneously the probability of escalation both from the first to the second and from the second to the third stage (4.3).

Statistical procedures available for the latter kind of analysis (4.3) include ordered probit models and sequential models. Ordered probit models assume that the influence of explanatory variables is the same across stages of dispute escalation. This assumption is likely to be violated in our analysis of escalation across all three stages. We could use conventional sequential models, that is, estimate separate binary probit models for each escalation stage and thus obtain coefficients to identify the varying influences of explanatory variables across stages of escalation. It has been recognized, however, that such models suffer from selection bias (see, e.g. Morrow 1989) because only those cases that escalated in the first stage have the chance to escalate in the second stage. If we do not account for the selection bias we are likely to obtain inconsistent estimates for the second stage estimation and hence draw inaccurate conclusions about the relationship between the dependent and independent variables.

Recent work in political science has tried to avoid such selection bias by using Heckman-type estimators (Reed 2000; Lemke and Reed 2001). In our study the main problem with traditional Heckman-type estimators is that there must be at least one explanatory variable that influences the selection process but not the final outcome (Achen 1986). To deal with this problem we use an estimator by Sartori (2003) for selection models where identical explanatory variables can be included in both the selection and the outcome equations. The key assumption of the Sartori estimator is that the correlation between the errors in the selection and in the outcome equation is 1. While the assumption of identical errors may not hold fully, it is a reasonable assumption in our context. Sartori notes that “the assumption is likely to be close match to reality when three conditions hold: (1) selection and the subsequent outcome of interest involve similar decisions or goals; (2) the decisions have the same causes; and (3) the decisions occur within a short time frame and/or are close to each other geographically” (Sartori 2003: 112). These conditions are clearly met in our case. In the context of trade disputes, the goals to protect the domestic industry from competition or consumers from environmental and/or health risks does not change during the period of analysis. Furthermore, the time-frame of these disputes is short enough so that the domestic and international structures does not vary in a way that fundamentally influences government behavior. In summary, we use binary probit analysis to examine escalation from the first to the second stage, and Sartori selection models to study escalation across all three stages.

4.2 Dispute Escalation in the WTO

As shown in Table 2 the dataset includes 71 EHS dispute *dyads*, out of 506 dyads in 1995–2003, that is a 14 percent EHS share.² A large number of EHS dispute dyads entered in 2003 (31 out of 71, i.e. more than 44%). This implies that our results could be affected by whether or not we include data for 2003 – for the first stage of escalation this should not be a problem because these disputes all had a chance to escalate in the meantime (see also below).

Figure 3: Trade dispute dyads by year of initiation

<i>Initiation</i>	<i>Non-EHS (0)</i>	<i>EHS (1)</i>	<i>Non-EHSn (0)</i>	<i>EHSn (1)</i>
1995	21	7	23	5
1996	37	9	38	8
1997	51	2	51	2
1998	37	6	42	1
1999	55	2	57	0
2000	40	2	41	1
2001	24	3	27	0
2002	128	9	129	8
2003	42	31	44	29
Total	435	71	452	54
Share of T.	86%	14%	89%	11%

A large share of the EHS disputes in our dataset is over agricultural issues, particularly quarantine regulations (for comparison, a recent WTO report lists 7 environment-trade dispute cases). In 17 of our 71 EHS cases the EHS component of the dispute is quite small, vague or unclear. For example, in some cases the plaintiff argues that, if the contested regulation were based on EHS concerns (something the defendant has not made explicit), this regulation could not be defended under the SPS Agreement or GATT Article XX. If we drop these 17 disputes from the subset of EHS cases (EHSn variable) the share of EHS disputes in the population of WTO dispute dyads decreases from 14% to 11% percent. In other words, EHS disputes are, in simple numerical terms, of rather little importance compared to disputes over other issues.

Even if the share of EHS disputes in the population of WTO disputes is small, are these disputes perhaps disproportionately prone to escalation? As a starting point Figure 4 shows the probability distributions of dyadic dispute escalation levels for EHS and EHSn and for non-EHS and non-EHSn disputes.

² It also includes 39 EHS dispute cases, out of 305 cases 1995–2003, i.e., a 13 percent EHS share.

Figure 4: Probability Distributions

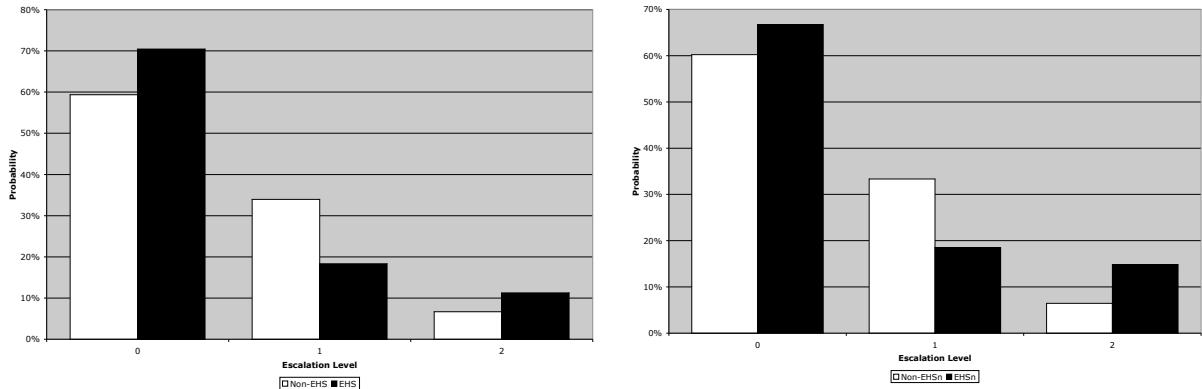


Figure 4 shows that EHS disputes are *less* likely than non-EHS disputes to escalate from consultation to panel/appellate body. We also ran a bivariate probit analysis to cross-check the visual observation. The estimated probability of escalation decreases from around 40% for non-EHS cases to around 30% for EHS disputes, i.e. the predicted probability of escalation decreases by more than 10% if the dispute involves EHS issues. When moving to a higher level of escalation the EHS effect changes direction. Among those disputes that escalate to panel/appellate body, EHS disputes are *more* likely to escalate into compliance disputes. The predicted probability of escalation, given that a dispute has reached the panel/appellate body level, increases from below 20% for non-EHS disputes to above 40% for EHS disputes.

4.3 Multivariate Analysis

The empirical literature on trade disputes (e.g. Busch 2000; Busch and Reinhardt 2003, 2002; Dixon 2004; Widsten 2003, 2004; Garrett and Smith 2002) offers a rather wide range of explanatory variables to account for trade dispute outcomes (usually defined as concessions by the defendant). We include several such variables as control variables in our models, notably:

- *Number of plaintiffs* involved in the dispute. This effect is likely to be theoretically ambiguous. Higher numbers of plaintiffs could generate more pressure on the defendant to make concessions (and, thus, perhaps also a lower probability of escalation). However, a higher number of plaintiffs could also imply that the respective case is particularly contentious because it attracts several plaintiffs, and thus prone to escalation.
- *Relative economic power*. We assume that if the plaintiff country is economically more powerful than the defendant country, this will motivate the defendant to back down, which in turn reduces the probability of escalation.
- *Directed trade asymmetry*. We assume that the probability of escalation decreases with asymmetry in favor of the plaintiff.
- *Democracy*. The literature on trade disputes has found contradictory and inconsistent effects of (dyadic) democracy on trade dispute outcomes. Bush (2000), for example, found that under the GATT system highly democratic dyads were more likely to achieve concessions at the consultation stage, but that such dyads were more likely to

escalate to the panel stage and not more likely to achieve concessions in doing so. We assume for a start that democratic dyads are more prone to escalation.

Figures 5 and 6 show summary statistics and correlations for all independent variables.

Figure 5: Summary statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
First stage Escal	0.389	0.488	0	1
Two-stage Escal	0.462	0.628	0	2
EHS	0.140	0.347	0	1
EHSn	0.107	0.309	0	1
Trade asymmetry	0.031	0.109	-0.413	0.587
Joint democracy	19.777	2.321	6.481	21
Developing dyad	0.132	0.339	0	1
Number of plaintiffs	5.008	5.816	1	19
Relative power	0.377	0.355	0.000	0.990

Figure 6: Correlations of independent variables

	EHS	EHSn	Trade Asym.	Joint Democ.	Develop. Dyad	Number	Rel. Power
EHS	1.0000						
EHSn	0.8552	1.0000					
Trade asymmetry	-0.0794	-0.1017	1.0000				
Joint democracy	0.0636	0.0689	0.0951	1.0000			
Develop. dyad	-0.0365	-0.0760	-0.1780	-0.1973	1.0000		
Number	-0.0349	0.0340	0.1258	-0.0745	-0.2224	1.0000	
Relative power	-0.0358	-0.0928	-0.1969	-0.0224	0.2337	-0.5083	1.0000

Escalation to Panel or Appellate Body

Figure 7 reports our estimates of the probability of escalation to panel or appellate body (Escal is the dependent variable). Model (1) is the baseline model, which includes all control variables, but not the EHS or EHSn variable. Model (2) adds the EHS and Model (3) the EHSn variable.

Figure 7: Probit Estimates for Escalation to Panel or Appellate Body

	Model (1)	Model (2)	Model (3)
EHS		-0.426** (-2.51) -0.152	
EHSn			-0.252 (-1.36) -0.092
Number of Plaintiffs	-0.084*** -(6.38) -0.032	-0.085*** (-6.55) -0.032	-0.084*** (-6.43) -0.032
Relative Economic Power	-0.551** -(2.45) -0.209	-0.601*** (-2.63) -0.229	-0.582** (-2.55) -0.221
Directed Trade Asymmetry	-1.250** -(1.99) -0.476	-1.433** (-2.29) -0.545	-1.335** (-2.11) -0.508
Joint Democracy	-0.028 -(1.12) -0.010	-0.025 (-0.97) -0.009	-0.026 (-1.03) -0.009
Developing Dyad	-0.810*** -(4.09) -0.264	-0.819*** (-4.15) -0.266	-0.820*** (-4.15) -0.267
Constant	1.023* (1.90)	1.040* (1.93)	1.021* (1.90)
N	498	498	498
Wald chi2	56.75	65.48	59.96
Prob > chi2	0.0000	0.0000	0.0000
% Correctly classified	63.45	64.86	64.46

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level; z-values listed in brackets under the coefficients; third number in each cell reports the estimated marginal effect, $d\Pr[\text{Panel}]/dx$, holding the other independent variables at their means; Huber-White heteroskedasticity-robust standard errors are used; Cutoff point for correctly classified cases is 0.5.

As shown in Figure 7 the models including EHS variables have a slightly higher predictive power. The marginal effect (third number in each cell) shows how much the predicted probability of reaching the panel stage increases if the respective variable increases by one unit, holding the other independent variables at the means. Model (2) predicts that the probability of a panel decreases by more than 15% if the disputes involves EHS issues. This is even more than predicted by the bivariate estimation, which yields a decrease by around 10%. The predicted probability of a panel decreases by less than 10% for the EHSn variable.

All theoretically relevant variables have a statistically significant effect, except democracy. Effect of joint democracy is not significant. The principal reason, we submit, is that most WTO disputes involve countries that score very high on the democracy variable. The mean of the democracy variable is close to 20, the maximum is 21, i.e. the mean is close to the maximum. The standard deviation of around 2 is small; this implies that most dyads include two highly democratic states. The coefficient for the number of plaintiffs is highly significant. The more plaintiffs, the less likely the disputes reaches the panel stage. The marginal effects imply that the probability of escalation decreases by around 3% if the disputes includes an additional plaintiff. The coefficient for economic power is also significant. The stronger the plaintiff relative to the defendant, the less likely the disputes escalates. The marginal effects show that the probability of escalation decreases by 20% if the variable increases from 0 to 1.

The interpretation of this result is as follows. 0 means that the defendant is extremely strong relative to the plaintiff; 1 means that the plaintiff is extremely strong relative to the defendant; 0.5 means that plaintiff and defendant are equally strong (have equal GDPs). The 20% decrease thus refers to a change from a fully dominant defendant to a fully dominant plaintiff. For example: In one dispute, San Marino sues the EU; in another dispute, the US sues Andorra. The probability that the US / Andorra disputes escalates is 20% lower than the probability that the San Marino / EU dispute escalates (all else equal). As to trade asymmetry, the coefficient shows that the greater the plaintiff's trade dependence relative to the defendant's trade dependence, the less likely is escalation. The marginal effects imply a 47% decrease in the probability of escalation if trade asymmetry increases by one unit. This variable is defined such that it varies between -0.413 and 0.587. The 47% decrease thus reflects a change in probabilities from one extreme to the other (in fact, empirically, the difference between the minimum and maximum is even less than unity). Finally, trade disputes are less likely to escalate if both the defendant and the plaintiff are developing countries. The probability of escalation decreases by more than 26% if both countries are from the developing world.

Escalation from Consultation to Panel/Appellate Body to Compliance Disputes

Figure 8 summarizes the results from three selection models. Again, Model (1) is the baseline model, which includes all control variables, but not the EHS or EHSn variable. Model (2) adds the EHS and Model (3) the EHSn variable. The Selection part of the models estimates the probability of disputes escalating from consultation to panel or appellate body, the Outcome part estimates the probability of disputes escalating from panel or appellate body to compliance disputes.

Figure 8: Selection models

	Model (1)	Model (2)	Model (3)
Selection			
EHS		-0.421** (-2.41) -0.159	
EHSn			-0.243 (-1.25) -0.092
Number of plaintiffs	-0.083*** (-6.27) -0.031	-0.082*** (-6.33) -0.031	-0.081*** (-6.23) -0.030
Relative economic power	-0.554** (-2.52) -0.210	-0.595*** (-2.70) -0.225	-0.575*** (-2.62) -0.218
Trade asymmetry	-1.368* (-1.93) -0.519	-1.582** (-2.19) -0.599	-1.475** (-2.06) -0.560
Joint democracy	-0.026 (-0.99) -0.009	-0.022 (-0.84) -0.008	-0.023 (-0.89) -0.008
Developing dyad	-.805*** (-4.11) -0.305	-0.810*** (-4.13) -0.307	-0.813*** (-4.15) -0.308
Constant	0.975* (1.77)	0.981* (1.77)	0.959* (1.74)

Outcome			
EHS		0.240 (1.06) 0.076	
EHSn			0.431* (1.80) 0.136
Number of plaintiffs	-0.059** (-2.59) -0.018	-0.057** (-2.49) -0.018	-0.057** (-2.50) -0.018
Relative economic power	-0.557* (-1.64) -0.177	-0.552* (-1.65) -0.175	-0.542 (-1.61) -0.171
Trade asymmetry	-0.039 (-0.04) -0.012	0.058 (0.06) 0.018	0.089 (0.10) 0.028
Joint democracy	0.021 (0.46) 0.006	0.019 (0.41) 0.006	0.015 (0.34) 0.005
Developing dyad	-0.748* (-1.79) -0.238	-0.743* (-1.79) -0.236	-0.681 (-1.62) -0.215
Constant	-1.359 (-1.42)	-1.370 (-1.42)	-1.332 (-1.39)
N	498	498	498
Wald chi2	53.40	59.28	55.06
Prob > chi2	0.0000	0.0000	0.0000
% Correctly classified (Selection / Outcome)	62.85 / 81.21	64.85 / 81.21	63.45 / 81.21

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level; z-values listed in brackets under the coefficients; third number in each cell reports the estimated marginal effect, $d\Pr[\text{Panel}]/dx$, holding the other independent variables at their mean.

The outcome part of the estimates shows that, whereas EHS disputes are *less* likely than other disputes to escalate from consultation to panel/appellate body, they are *more* likely to escalate to compliance disputes. As to the EHSn variable, the probability that a disputes escalates to a compliance dispute, given that it has reached the panel or appellate body stage, increases by more than 13% if the dispute is coded as EHSn. The effect for the EHS variable points in the same direction, but is not statistically significant. The results confirm our initial view that ordered probit can not be used because the effect of EHS and EHSn across different levels of escalation is fundamentally different.

Using a Wald test developed by Brant (1990), we were able to formally prove that the coefficients for the EHS and EHSn variables are not identical across the two equations and that the parallel regression assumption underlying ordered probit is violated for EHS and EHSn (though not for the other variables). Using the Sartori model therefore is the correct choice.

As to the control variables, their effects in the outcome equations are broadly similar to their effects in the selection equations – this is why the Brant test is not positive for these variables. Again, the probability of escalation decreases, the higher number of plaintiffs. The marginal effects show that per additional plaintiff the probability of escalation decreases by around 2%. The effect of relative economic power and developing dyads is negative, but rather weak. Trade asymmetries do not play a role.

We assessed the reliability of the above results in a variety of ways. Figure 6 shows that multicollinearity is not a serious problem. Only the number of plaintiffs and relative economic

power are correlated to a significant degree. The reason probably is that disputes with a large number of plaintiffs are almost always directed against the US or the EU, both of which are economically very strong and therefore systematically have low values for relative economic power (the latter measures the economic strength of the plaintiff relative to the defendant). To assess this problem, we split the sample and estimated the model without cases where the EU or the US are defendant (split sample). When excluding the US, relative economic power becomes insignificant. When excluding the EU, the results hold. The effects of EHS and EHSn become insignificant because many EHS cases involve the EU or US or both. Finally, we ran the analysis without observations for 2003, the year when many EHS cases entered the WTO. The results remain similar. The effects of EHS and EHSn in the selection equations become insignificant, the effects in the outcome equations become stronger. However, it should be noted that the number of EHS (EHSn) dyads in the compliance disputes category becomes so small that these findings may not be very meaningful.

5. Analysis of the EHS Subset

(this section remains to be written)

6. Conclusion

(this section remains to be written)

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Appendix

Figure A1: Variable Definitions

Start	Year of formal dispute initiation in the WTO.	WT/DS/OV/23 (7 April 2005) and other WTO documents
Plaintiff	Country that initiated the dispute settlement procedure.	WT/DS/OV/23 (7 April 2005) and other WTO documents
Defendant	Country that is accused of violating WTO rules.	WT/DS/OV/23 (7 April 2005) and other WTO documents
DS no.	Official WTO number assigned to each dispute. This number is used to rearrange the dataset and run the analysis for cases instead of dyads.	WT/DS/OV/23 (7 April 2005) and other WTO documents
Number	Number of plaintiffs involved in the dispute.	WT/DS/OV/23 (7 April 2005) and other WTO documents
PolityP	Democracy score of the plaintiff.	Polity IV Project (Marshall et al. 2002)
PolityD	Democracy score of the defendant.	Polity IV Project (Marshall et al. 2002)
Jdemo	For jdemo we use a measure that is widely employed in the literature on conflict escalation (see, e.g., Lemke and Reed 2001). Based on the Polity IV dataset, a joint democracy index is constructed by adding 11 to the Polity scales of both countries to make all values positive. The new, positive values of defendants and plaintiffs are multiplied, and we use the square root of this product.	Based on Polity IV Project (Marshall et al. 2002)
ExportsP	Exports from plaintiff to defendant country.	IMF Directions of Trade Statistics
ImportsP	Imports by plaintiff from defendant country.	IMF Directions of Trade Statistics
ExportsD	Exports from defendant to plaintiff country.	IMF Directions of Trade Statistics
ImportsD	Imports by defendant from plaintiff country.	IMF Directions of Trade Statistics
Trade Asymmetry	Trade Asymmetry measures the extent to which the defendant and the plaintiff countries are equally/unequally dependent on trade with each other. We use directed trade asymmetry, defined as plaintiff trade dependence minus defendant trade dependence. Trade dependence of the plaintiff is defined as exports of the plaintiff plus imports of the plaintiff divided by the GDP of the plaintiff. Trade dependence of the defendant is defined as exports of the defendant plus imports of the defendant divided by the GDP of the defendant. Export and imports relate to bilateral trade between plaintiff and defendant.	Based on IMF Directions of Trade Statistics
GDPP	GDP of plaintiff country	IMF Directions of Trade Statistics
GDPD	GDP of defendant country	IMF Directions of Trade Statistics
Relpower	Relpower measures relative economic power. It is defined as GDP of the plaintiff divided by the sum of GDP of plaintiffs and GDP of the defendant.	Based on IMF Directions of Trade Statistics

