Estimating a Model of Settlement Bargaining in the World Trade Organization*

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Abstract

I utilize canonical models of settlement bargaining under asymmetric information (namely, Bebchuk 1984, and Reinganum and Wilde 1986) to analyze the dispute settlement patterns in the World Trade Organization. I extend these models to study the determinants of out-of-court settlement in a situation where the parties' relationship is characterized by a prisoners' dilemma— a feature of most trade partnerships. This added feature alters the prediction of the classic models that the allocation of litigation costs between disputants has no bearing on the likelihood of settlement. In particular, I find that the likelihood of settlement is more sensitive to the defendant's litigation costs than to the complainant's litigation costs. I estimate the above bargaining models using a database of the WTO disputes. I conduct both structural and reduced form analysis and I find evidence in support of the bargaining models as extended in this paper. In particular, the distribution of litigation costs between the disputants is an important determinant of settlement likelihood.

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1 Introduction

Engaging in the Dispute Settlement Process (DSP) of the World Trade Organization (WTO) can be quite costly for the WTO member countries. Therefore, one may expect that if any dispute arises it should be settled in the early stages of DSP in order to save on the costs of negotiations and litigation. However, the pattern of dispute settlements shows that only 45 percent of all disputes are resolved in the consultation stage and more than 30 percent of cases reach the Appellate Body ruling or further stages[1] (Figure 1).

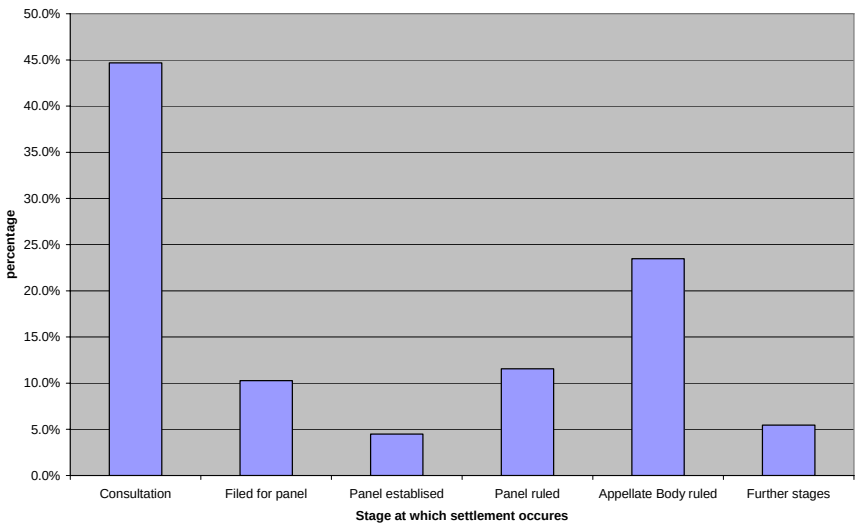

Figure 1: Settlement Rates at different stages of the WTO Dispute Settlement Process (1995-2005)

Under a domestic court setting, the models of settlement bargaining with asymmetric information provide an explanation for the failure of settlement negotiations between two

[1]The main stages of WTO DSP are Consultation (pre-trial negotiations between disputants), Dispute Panel, and Appellate Body. See Beshkar and Bond (2008) for a summary of the DSP.

disputants that leads to the costly process of the court. Two classic models in this literature are Bebchuk (1984) and Reinganum and Wilde (1986). A central theme of these models is that, disputing parties engage in pre-trial negotiations to reach a settlement in order to avoid costs of pursuing the dispute in a court of law. Pretrial negotiations, however, may fail due to asymmetric information regarding amount of damages that the plaintiff has suffered or whether or not the defendant is responsible for the damages.

In disputes between private parties, a settlement normally involves a cash transfer from the defending party to the complaining party. However, cash transfer has rarely been used in the WTO to settle a trade dispute. Instead, a complaining country is usually compensated through policy adjustments, such as a reduction in import tariffs in the defending country. The type of available compensation mechanisms determines the payoff structure in the bargaining process, which may also affect the outcome of the process. In particular, while cash transfer is a zero-sum transaction, a policy adjustment is not necessarily zero-sum. For example, as is well-known in the trade literature, a reduction in import tariffs in an importing country generates more gains for the exporting country than losses to the importing country.

In this paper, I show that due to differences in methods of compensation in private and the WTO disputes, classic models of settlement bargaining cannot correctly explain the settlement pattern in the WTO. To show this, I extend those models to study the determinants of out-of-court settlement under situations where the available compensation mechanism features a positive-sum transaction. This added feature alters some of the important predictions of the classic models. The models of Bebchuk (1984) and Reinganum and Wilde (1986) imply that the allocation of litigation costs between disputants has no bearing on the likelihood of settlement. In contrast, I show that under a positive-sum compensation

mechanism, the likelihood of settlement is more sensitive to the defendant's litigation costs than to the complainant's litigation costs. This analysis has important policy implications, as it suggests that for the sake of a more efficient dispute settlement process, i.e., one that results in a higher settlement rate, a larger fraction of litigation costs should be allocated to the defending parties in the WTO.[2]

The WTO and its predecessor, GATT, restrict a small set of policies, such as tariffs, while a wide array of economic policies is left to the discretion of the governments.[3] Article XXIII of the GATT, however, gave member countries the right to initiate a complaint against another member that had taken actions that "nullified or impaired" the benefits resulting from the agreement. Therefore, if a government manipulates its unrestricted policies in a way that effectively nullifies the benefit of the other parties to the agreement, it might face a dispute based on the allegation of "indirect breach" of the agreement. Examples of indirect breach, or non-violation cases, are subsidies in the case of agreements to cut tariffs, and lack of property-right enforcement in the case of the agreement on Trade-Related Intellectual Properties (TRIPS). In a dispute that is initiated based on allegations of indirect breach, the dispute is over the extent of damages that are imposed on the complaining parties as a result of the actions taken by the defending country. In contrast, in a complaint of direct breach (i.e., a violation case), the dispute is over the right of the defending country to suspend its obligations based on the prevailing contingency. A prime example of violation cases is disputes over the adoption of safeguard measures. I analyze settlement bargaining under

[2]The DSP can influence the allocation of litigation costs by adopting appropriate rules about the allocation of the burden of proof, for example.

[3]Horn, Maggi, and Staiger (2006) show that at the presence of contracting costs, it is optimal to write incomplete agreements and leave the determination of some aspects of the trade policy to the discretion of the governments.

Table 1: Settlement rate and the size of the defending and complaining parties

	Small-Economy Complainant	Large-Economy Complainant	All
Small-Economy Defendant	85.3% (34 cases)	62.5% (40 cases)	73.0% (74 cases)
Large-Economy Defendant	47.8% (23 cases)	49.3% (77 cases)	49.0% (100 cases)
All	70.2 (57 cases)	53.8% (117 cases)	59.2% (174 cases)

both types of allegations and show that the effect of litigation costs and the stake at dispute on the settlement outcome are similar in both cases.

The theoretical analysis of this paper can shed light on some of the settlement patterns in the WTO. A close look at the dispute settlement pattern in the WTO reveals some specific relationships between the likelihood of settlement and the type of disputing countries. A first observation is that countries with larger economies settle a dispute with a lower probability. As demonstrated in Table (1), having a large country, as opposed to a small country, as the complaining party, decreases the likelihood of settlement by 16.4 percentage points (i.e., from 70.2% to 53.8%). Similarly, A large-economy defendant decreases the likelihood of settlement by 24 percentage points. A more interesting observation is that in a dispute between a large country and a small country, an early settlement is less likely when the small country is the complaining party. As is shown in Table (1), 62.5 percent of disputes in which a large country presses charges against a small country is settled without establishing a dispute panel. In contrast, if a small country presses charges against a large country, only 47.8 percent of disputes are settled without establishing a dispute panel.

A potential explanation for the latter observation may be offered by the political science literature that attributes settlement behavior in an international setting to the relative power of disputing parties. A power-based view of the DSP would explain this observation by

the inability of a small-country complainant to induce the large-country defendant to give concessions without the involvement of the WTO dispute settlement body.

In this paper, I provide an alternative explanation for different settlement behavior of small and large countries, which is based on relative litigation costs of these countries. I construct a measure of litigation costs based on the assumption that the cost of pursuing a dispute in the DSP is greater for poorer countries. It is a widely held view among observers of the WTO that less developed countries have relatively higher costs of legal work in the dispute settlement process. For example, Shaffer (2003) points out that "lack of legal expertise in WTO law and the capacity to organize information concerning trade barriers and opportunities to challenge them [... and] lack of financial resources, including for the hiring of outside legal counsel," are challenges faced by the developing countries in using the WTO legal system effectively. In response to a survey, the WTO delegations from developing countries have cited the high cost of litigation or a lack of private sector support as main reasons for not pursuing a complaint (Busch, Reinhardt, and Shaffer, 2008).[4]

I also construct a measure of the "stake at dispute" based on the volume of export in the disputed sector from the complaining country to the defending country. Using a Maximum Likelihood Estimation (MLE), I show that the probability of settlement is positively correlated with the litigation costs of the disputants and negatively correlated with the stake at dispute. These observations are consistent with the prediction of the classic models as well as the extended model introduced in this paper.

[4]In fact, in response to concerns about the relatively high costs of legal works for poorer countries, the Advisory Centre on WTO Law (ACWL) was established in 2001 to provide developing countries with subsidized legal aid for participation in the DSP. Developing countries can access legal aid through ACWL for an hourly charge that ranges from $25 for the least developed countries to $200 for the highest income developing countries (see www.ACWL.ch).

It is also empirically verified in this paper that the litigation costs of the defending party has a significantly larger effect on the likelihood of settlement than the litigation costs of the complaining party. While consistent with the prediction of my model, this observation is at odds with the prediction of the classical settlement bargaining models, where the total litigation costs of the disputants –not the distribution of costs– is what matters for the likelihood of settlement.

I also provide empirical evidence regarding the effect of third-parties and multiplicity of complainants in the bargaining process. I show that a case with multiple complainants is less likely to be settled without trial. However, I find no or little evidence regarding the effect of third parties in the pre-trial negotiations. The latter observation is in contrast to the findings of Busch and Reinhardt (2001) who argue that the presence of third parties in a dispute hinders the negotiation process and increases the likelihood of litigations. I show that their result is generated by an endogeneity problem in their empirical work. Once I correct for this endogeneity problem, this effect is reversed under some specifications of my model, while it is statistically insignificant under other specifications.

Retaliatory capacity of the complaining parties is also shown to be an important factor in inducing early settlement. I show that an early settlement is more likely the larger is the defending country's volume of exports to the complaining countries. A large volume of exports from the defending country to the complaining countries gives the complaining countries the capacity to impose retaliatory trade barriers against the defending country if it does not comply with its obligations.

My empirical observations also suggest that the defending country's import in the disputed sector from third parties has a significant effect on the likelihood of pre-trial settlement,

so that the larger is imports from the rest of the world the higher is the likelihood of a pre-trial settlement. I provide two alternative explanation for this phenomenon, one which draws on the terms-of-trade argument for protection and one which concerns the adverse effects of publicizing a dispute in the WTO.

In the past decade there has been a growing number of empirical studies of the dispute settlement process of GATT and the WTO.[5] Guzman and Simmons (2002) consider the relationship between the nature of the dispute and likelihood of an early settlement. They hypothesize that if the subject matter of the dispute has an all-or-nothing character and leaves little room for compromise (for example, health and safety regulations), the parties' ability to reach an agreement is limited and a higher rate of litigation is expected for such disputes. They find empirical support for their hypothesis only among democratic states. Busch and Reinhardt (2003) consider the success of developing countries as complainants in this process by investigating the level of concessions that they have been able to induce from defending countries. In particular, they find that the introduction of a more legalized system of dispute settlement under the WTO has exaggerated the gap between developed- and developing-country complainants with respect to their ability to get defendants to liberalize disputed policies. Nevertheless, Bown (2004 a) provides evidence that developing country complainants have had more economic success in resolving trade disputes under the WTO than was the case under the GATT.

A number of papers study the determinants of the decision to initiate a formal dispute. Bown (2005) investigates the determinants of participation in the DSP and examines whether the new regulations of the DSP under the WTO discourages active engagement by developing

[5] Busch and Reinhardt (2002) provide a survey of this literature.

countries. He finds that the size of exports at stake and legal capacity are important factors in deciding whether to initiate a dispute. Wilckens (2007) also finds that a country is more likely to file a complaint if its retaliatory capacity is large. Horn, Mavroidis, and Nordstrom (1999), however, argue that the bias in the pattern of disputes that have been initiated under the WTO is due to the fact that developed counties have a larger diversity of imports and exports that naturally leads to more disputable trade policies and a more frequent use of the DSP by the developed countries.

In Sections 2-4 of this paper, I focus on disputes under the allegation of direct breach. In Section 2, I introduce my assumptions regarding the costs and benefits of settlement to the disputing parties. In Section 3, I set out an screening model of pre-trial bargaining, which is a modified version of the Bebchuk (1984) model. Similarly, in Section 4, I follow Reinganum and Wilde's (1986) approach to model the pre-trial settlement bargaining in the WTO as a signalling game. I turn my attention to non-violation cases in Section 5 and show that the effect of litigation costs and the stake at dispute on the settlement outcome are similar in violation and non-violation cases. Section 6 provides a brief discussion of the data sets and explanatory variables. The empirical models are introduced in Section 7 and estimation results are presented and discussed in Section 8. Section 9 concludes.

2 Basic Setup

In this and the two subsequent sections, I focus on the case of direct breach. In a direct breach, the dispute is on the nature of the prevailing contingency. If such a case is litigated, the court issues its opinion on the nature of the contingency and rules whether the defendant

is in violation of its obligation or not. If ruling is against the defendant, the defendant is supposed to reduce its tariff rate to a lower level (possibly the agreed-upon level) as specified by the court. Similarly, a settlement schedule is a tariff rate (lower than the disputed tariff rate) offered by one of the two parties.

The defendant's tariff rate on the imports from the complainant at the time of the dispute is denoted by τ^d, while τ^a $\left(\leq \tau^d\right)$ denotes the tariff rate that the defendant should adopt in order to be in compliance with its obligations. When a dispute arises, *renegotiation* takes place in order to find a "mutually agreed solution". A settlement proposal is characterized by a new tariff rate, τ $\left(< \tau^d\right)$, to be adopted by the defending country. If a mutually agreed solution is not achieved, the case will escalate to the dispute panel. If at the panel stage the defendant is found in violation of its obligations, it should reduce its tariff from τ^d to τ^a. Otherwise, the defending party can continue to adopt the disputed tariff rate, τ^d.

Let $W_D(\tau)$ and $W_C(\tau)$ denote the welfare of the defendant and the complainant, respectively, as functions of the defendant's tariff rate, where $W_D'(\tau) > 0$ and $W_C'(\tau) < 0$. Then the defendant's welfare loss from lowering its tariff from the disputed level (i.e., τ^d) to τ is given by

$$\Omega(\tau) \equiv W_D\left(\tau^d\right) - W_D(\tau).$$

Similarly, the complainant's benefits from this policy adjustment is given by

$$\Delta(\tau) \equiv W_C(\tau) - W_C\left(\tau^d\right).$$

Assuming that trade is a positive-sum game, any increase in tariff rates by one party would decrease the two parties' aggregate payoff. So if deviation from the agreement benefits

one party it should hurt the other party to a larger extent. Similarly, the defendant's loss from reducing its tariff rate is smaller than the complainant's benefits from this policy adjustment, i.e. $\Omega(\tau) < \Delta(\tau)$. For the sake of the tractability of the model I impose more restriction on the functions Ω and Δ as follows:

Assumption 1: $\Omega(\tau) = \alpha\Delta(\tau)$ *for all* $0 \leq \tau \leq \tau^d$, *where* $\alpha < 1$.

As will be seen in the subsequent sections, modifying the classical models of settlement bargaining (e.g., Bebchuk (1984) and Reinganum and Wilde (1986)) according to this assumption, reveals some interesting features of the settlement bargaining in the WTO.

3 A Screening Model

Consider a case in which the defendant has better information about the dispute case. In the case of implementing safeguard measures, for example, the defendant is better informed about the economic conditions surrounding its import-competing industries. Therefore, the defendant can make a better prediction about the ruling of the dispute panel in case of litigation. On this basis, I assume that the probability of an adverse ruling against the defendant, p, is private knowledge of the defendant, while the complainant knows only that p is distributed over interval $\left[\underline{p}, \overline{p}\right]$ by a distribution function $F(.)$. Here, p is interpreted as the defendant's type.

The Bebchuk (1984) framework can be readily employed to model this situation. Suppose that the complainant demands that the defendant adopts τ^s rather than τ^d. If the defendant fulfills this demand the case is settled, the complainant earns $\Delta(\tau^s)$ and the defendant incurs a cost of $\Omega(\tau^s)$. On the other hand, if the defendant does not accept this offer, the parties

would bring the case before the dispute panel, in which case each of them should pay their respective legal fees, namely, c_D and c_C.

Assuming that the panel ruling is enforceable, the defendant accepts τ^S if and only if:

$$\Omega(\tau^s) \leq (1-p) \times 0 + p\Omega(\tau^a) + c_D, \tag{1}$$

or, equivalently, if and only if:

$$p \geq \frac{\Omega(\tau^s) - c_D}{\Omega(\tau^a)}. \tag{2}$$

Hence, the defendant will accept τ^s if and only if its type p is equal to or higher than $q(\tau^s)$, where $q(\tau^s)$ is the marginal defendant type defined by

$$q(\tau^s) = \frac{\Omega(\tau^s) - c_D}{\Omega(\tau^a)}.$$

On the other hand, the complainant's expected payoff from demanding τ^s is given by

$$\begin{aligned} A(\tau^s) &= \{1 - F[q(\tau^s)]\}\Delta(\tau^s) \\ &\quad + F[q(\tau^s)]\left\{-c_C + \frac{\Delta(\tau^a)\int_{\underline{p}}^{q(\tau^s)} xf(x)\,dx}{F[q(\tau^s)]}\right\}. \end{aligned}$$

Therefore, the FOC is given by $A'\left(\tau^S\right) = 0$, where

$$\begin{aligned} A'(\tau^s) &= -f[q(\tau^s)]q'(\tau^s)\Delta(\tau^s) + \{1 - F[q(\tau^s)]\}\Delta'(\tau^s) \\ &\quad -f[q(\tau^s)]q'(\tau^s)c_C + \Delta(\tau^a)q(\tau^s)f(q(\tau^s))q'(\tau^s) \\ &= \{1 - F[q(\tau^s)]\}\Delta'(\tau^s) - f[q(\tau^s)]q'(\tau^s)[\Delta(\tau^s) + c_C - \Delta(\tau^a)q(\tau^s)]. \end{aligned}$$

Substituting $q(\tau^s) = \frac{\Omega(\tau^s)-c_D}{\Omega(\tau^a)}$, and $q'(\tau^s) = \frac{\Omega'(\tau^s)}{\Omega(\tau^a)}$ in this equation and then applying Assumption 1, i.e. $\Omega(\tau) \equiv \alpha\Delta(\tau)$, yield:

$$\begin{aligned} A'(\tau^s) &= \{1 - F[q(\tau^s)]\}\Delta'(\tau^s) - f[q(\tau^s)]\frac{\Omega'(\tau^s)}{\Omega(\tau^a)}\left[\Delta(\tau^s) + c_C - \Delta(\tau^a)\frac{\Omega(\tau^s) - c_D}{\Omega(\tau^a)}\right] \\ &= \{1 - F[q(\tau^s)]\}\Delta'(\tau^s) - f[q(\tau^s)]\frac{\alpha\Delta'(\tau^s)}{\alpha\Delta(\tau^a)}\left[\Delta(\tau^s) + c_C - \Delta(\tau^a)\frac{\alpha\Delta(\tau^s) - c_D}{\alpha\Delta(\tau^a)}\right] \\ &= \left\{\{1 - F[q(\tau^s)]\} - f[q(\tau^s)]\frac{c_C + \frac{c_D}{\alpha}}{\Delta(\tau^a)}\right\}\Delta'(\tau^s). \end{aligned}$$

Thus, the FOC can be written as:

$$\frac{f[q(\tau^s)]}{1 - F[q(\tau^s)]} = \frac{\Delta(\tau^a)}{c_C + \frac{c_D}{\alpha}}. \tag{3}$$

Moreover,

$$\begin{aligned} A''(\tau^s) &= -\left\{f\left[q\left(\tau^S\right)\right] + f'\left[q\left(\tau^S\right)\right]\frac{c_C + \frac{c_D}{\alpha}}{\Delta\left(\tau^A\right)}\right\}q'\left(\tau^S\right)\Delta'\left(\tau^S\right) \\ &= -\left\{f\left[q\left(\tau^S\right)\right] + f'\left[q\left(\tau^S\right)\right]\frac{c_C + \frac{c_D}{\alpha}}{\Delta\left(\tau^A\right)}\right\}\frac{\left[\Delta'\left(\tau^S\right)\right]^2}{\Delta\left(\tau^A\right)}. \end{aligned}$$

Therefore, the SOC, $A''(S) < 0$, is given by:

$$f[q(\tau^s)] + f'[q(\tau^s)]\frac{c_C + \frac{c_D}{\alpha}}{\Delta(\tau^a)} > 0. \tag{4}$$

Assuming a monotonic and increasing hazard function for distribution function F, the SOC will be always satisfied and the First-Order condition given in (3) yields a unique equilibrium.

3.1 Litigation costs and the likelihood of early settlement

Under the baseline model of Bebchuk (i.e., when $\alpha = 1$ in this setting), settlement rate is equally sensitive to the changes of the litigation costs of either party. However, under the current model (i.e., when $\alpha < 1$), settlement rate is more responsive to changes in the defendant's costs than to changes in the complainant's costs. To see this, denote the equilibrium value of $q\left(\tau^{s}\right)$ by q^{*} and rewrite the first-order condition (3) as follows

$$\frac{f\left(q^{*}\right)}{1-F\left(q^{*}\right)}=\frac{\Delta\left(\tau^{A}\right)}{\frac{c_{D}}{\alpha}+c_{C}}. \tag{5}$$

Since we assume a monotonically increasing hazard function, an increase in the RHS of this equation results in a higher equilibrium value for q^{*}, or equivalently, a lower equilibrium settlement rate. Therefore, the settlement rate is increasing in the litigation costs of either party.

Proposition 1 *The equilibrium settlement rate is increasing in the litigation costs of either party.*

Moreover, since $\alpha < 1$, a reduction in the defendant's litigation costs reduces the likelihood of settlement to a greater extent than does a reduction in the complainant's costs. Formally,

Proposition 2 *The equilibrium settlement rate is more sensitive to changes in the defendant's costs than to changes in the complainant's costs.*

Denoting the equilibrium settlement rate by R^*, propositions 1 and 2 imply:

$$\frac{dR^*}{dc_D} > \frac{dR^*}{dc_C} > 0.$$

Example 3 *Suppose that p is distributed according to Beta distribution with shape parameters given by $(2,2)$, i.e.,*

$$f(p) = \frac{\Gamma(4)}{\Gamma(2)\Gamma(2)} p(1-p),$$

where $p \in [0,1]$ and Γ is the gamma function. The hazard function of this probability distribution is given by

$$\frac{\frac{\Gamma(4)}{\Gamma(2)\Gamma(2)} p(1-p)}{1 - \frac{\Gamma(4)}{\Gamma(2)\Gamma(2)} \int_0^p t(1-t)\,dt} = \frac{6p}{1+p-2p^2}.$$

Using this hazard function, the equilibrium condition (5) can be written as

$$\frac{6q^*}{1+q^*-2q^{*2}} = \frac{\Delta\left(\tau^A\right)}{\frac{c_D}{\alpha} + c_C}.$$

Solving for q^* yields:

$$q^* = \frac{\Phi - 6 + \sqrt{-12\Phi + 9\Phi^2 + 36}}{4\Phi},$$

where, Φ is equal to the right-hand side of (5). Thus, the likelihood of settlement, $R^* = 1 - F(q^*)$, is given by

$$\begin{aligned} R^* &= 1 - \frac{\Gamma(4)}{\Gamma(2)\Gamma(2)} \int_0^{q^*} t(1-t)\,dt \\ &= 1 - \frac{3}{16\Phi^2}\left(\Phi - 6 + \sqrt{9\Phi^2 - 12\Phi + 36}\right)^2 + \frac{1}{32\Phi^3}\left(\Phi - 6 + \sqrt{9\Phi^2 - 12\Phi + 36}\right)^3 \end{aligned}$$

As is depicted in the following graph, R^* is a decreasing function of $\Phi \equiv \frac{\Delta\left(\tau^A\right)}{\frac{c_D}{\alpha}+c_C}$, and propositions 1 and 2 are verified.

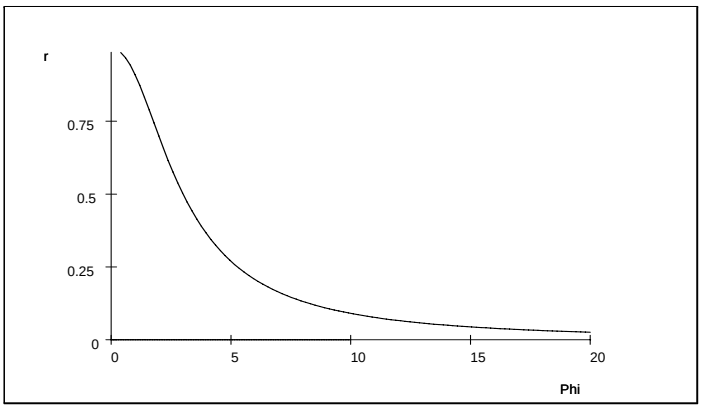

Figure 2: Equilibrium settlement rate, R^*, as a function of $\Phi \equiv \frac{\Delta\left(\tau^A\right)}{\frac{c_D}{\alpha}+c_C}$.

4 A Signaling Model

In the previous section I assumed that in the settlement bargaining game the uninformed party offers a settlement proposal and the informed party decides whether to accept or reject this proposal. In contrast, in this section I assume that the informed party is the one that offers a settlement and the uninformed party may accept or reject the offer.

The model presented in this section is a modification of the signalling model of (Reinganum and Wilde 1986). As in the previous section, I assume that the defendant has private information about its probability of losing the case in the court, denoted by p. The signaling game is as follows. The defendant offers a reduction in its import tariff from τ^d to τ^s. The complainant's strategy, on the other hand, is a function, $r\left(\tau^s\right)$, which specifies the probabil-

ity that it rejects the the defendant's policy adjustment proposal. The expected payoffs of the complainant, if she chooses a rejection probability of ρ, is given by

$$\Pi_C(\tau^s, \rho; b) = [1-\rho]\,\Delta(\tau^s) + \rho\,[b(\tau^s)\,\Delta(\tau^a) - c_C]. \tag{6}$$

where, $b(\tau^s)$ represents the complainant's belief about p given the defendant's offer, τ^s.

Given function $r(.)$, the expected payoff of the defendant from offering τ^s is

$$\Pi_D(\tau^s; r(.)) = -[1-r(\tau^s)]\,\alpha\Delta(\tau^s) - r(\tau^s)\,[p\alpha\Delta(\tau^a) + c_D]. \tag{7}$$

An equilibrium for this problem is characterized by a triple (b^*, r^*, τ^{s*}). An interior solution for the complainant's problem requires:

$$\frac{\partial \Pi_C}{\partial \rho} = -\Delta(\tau^s) + b(\tau^s)\,\Delta(\tau^a) - c_C = 0. \tag{8}$$

Moreover, consistency requires $b(\tau^s) = p$. Therefore, (8) implies:

$$\Delta(\tau^{s*}) = p\Delta(\tau^a) - c_C \tag{9}$$

Furthermore, τ^{s*} must maximize the defendant's expected payoff, given $r^*(\cdot)$. That is, it should satisfy the defendant's first-order condition:

$$r'(\tau^{s*})\,\alpha\Delta(\tau^{s*}) - [1-r(\tau^{s*})]\,\alpha\Delta'(\tau^{s*}) - r'(\tau^{s*})\,[p\alpha\Delta(\tau^a) + c_D] = 0$$

or, equivalently,

$$-\alpha\Delta'(\tau^{s*}) + \alpha\Delta'(\tau^{s*})\, r(\tau^{s*}) - [\alpha c_C + c_D]\, r'(\tau^{s*}) = 0 \tag{10}$$

Equation (10) has a one-parameter family of solutions $r^*(\Delta'(\tau^s)) = 1 + \lambda \exp\left\{-\frac{\Delta'(\tau^s)}{\alpha c_C + c_D}\right\}$. The appropriate boundary condition is $r^*(\Delta'(\underline{\tau^s})) = 0$, where $\Delta'(\underline{\tau^s}) = \overline{p}\Delta'(\tau^a) - c_C$.[6] This implies that

$$\lambda = -\exp\left\{\frac{\overline{p}\Delta'(\tau^a) - c_C}{\alpha c_C + c_D}\right\}.$$

Therefore, the equilibrium probability of rejection as a function of τ^s will be given by:

$$\begin{aligned} r^*(\tau^s) &= 1 - \exp\left\{\frac{\overline{p}\Delta'(\tau^a) - c_C}{\alpha c_C + c_D}\right\} \exp\left\{-\frac{\Delta'(\tau^s)}{\alpha c_C + c_D}\right\} &(11)\\ &= 1 - \exp\left\{\frac{\overline{p}\Delta'(\tau^a) - \Delta'(\tau^s) - c_C}{\alpha c_C + c_D}\right\}. &(12)\end{aligned}$$

Finally, for a particular value of p, the equilibrium settlement rate, $R^* = 1 - r^*$, can be obtained by substituting $\Delta(\tau^{s*})$ from (9) into (11), namely:

$$R^* = \exp\left\{\frac{\overline{p} - p}{\alpha c_C + c_D}\Delta'(\tau^a)\right\}. \tag{13}$$

In contrast with the Reinganum and Wilde's (1986) original model, in the present formulation the probability of trial depends on the allocation of litigation costs. In particular, probability of trial is more responsive to changes in the defendant's litigation costs than to the complainant's litigation costs. Therefore, Propositions 1 and 2 hold under the signaling

[6] For a discussion of this boundary condition see Reinganum and Wilde (1986).

model as well.

5 Settlement Bargaining under the Allegation of Indirect Breach

In this Section, I consider disagreements over policies that are not explicitly restricted by the trade agreement but can potentially nullify or impair the benefits of a contracting party that were intended under the agreement. Such actions, if proved to nullify the effect of the agreement, may be categorized as indirect breach of the contract. In an indirect breach, while keeping its tariff rates fixed at the agreed-upon levels, the defendant adopts a policy, such as subsidies, etc, that potentially nullifies/impairs the benefits of the complainant from the agreement. If such a case is litigated, the court determines the extent to which the defendant's policy has nullified the complainant's gains from the agreement. If the court's ruling is against the defendant, the defendant is supposed to take mitigating actions that restore the benefits of the complainant from the agreement.

In this type of disagreements, the dispute is over the extent of damages imposed on the complaining party. Such disagreements may arise due to asymmetric information of the disputing parties about the size of the compensation, denoted by Δ, that the dispute panel would award to the complainant in case of litigation. I assume that Δ is the private information of the complaining party, while the defending party only knows that Δ is distributed according to $G(\cdot)$ on the interval $\left(\underline{\Delta}, \overline{\Delta}\right)$. I also maintain Assumption 1, which implies that the cost to the defendant of conforming to an adverse ruling by the panel is given by $\alpha\Delta$, where $0 < \alpha < 1$.

In this Section, I employ the signalling model of Reinganum and Wilde (1986) to analyze the settlement bargaining problem in the WTO. More specifically, I consider a bargaining process in which the informed party, i.e., the complainant, demands a policy adjustment on behalf of the defendant in exchange for settlement. Let S denote the benefit of the proposed policy adjustment to the complaining party. I continue to maintain Assumption 1, which implies that the cost of this policy adjustment to the defending party is given by αS.

The complainant's strategy is to demand S to maximize its expected payoff. The defendant's strategy, on the other hand, is a function, $r(S)$, which specifies the probability that it rejects the the complainant's policy adjustment proposal. The expected payoffs of a defendant who has received a settlement demand S and has a rejection probability of ρ, is given by

$$\Pi_D(S, \rho; b) = -[1-\rho]\alpha S - \rho[\alpha b(S) + c_D], \tag{14}$$

where, $b(S)$ represents the defendant's belief about Δ given the complainant's demand, S.

Expected payoffs of a complainant who would receive an award of the size Δ by the dispute panel, demands S to settle, and takes as given the strategy $r(S)$ of the defendant, is given by

$$\Pi_C(S; r) = [1 - r(S)]S + r(S)[\Delta - c_C]. \tag{15}$$

An equilibrium for this problem is characterized by a triple (b^*, r^*, S^*). An interior solution for the defendant's problem requires:

$$\frac{\partial \Pi_D}{\partial \rho} = \alpha S - \alpha b(S) - c_D = 0. \tag{16}$$

Moreover, consistency requires $b(S) = \Delta$. Therefore, (16) implies:

$$S^* = \Delta + \frac{c_D}{\alpha}. \tag{17}$$

Furthermore, S^* must maximize the complainant's expected payoff, given $r^*(\cdot)$. That is, it should satisfy the complainant's FOC:

$$[1 - r(S^*)] + [1 - r'(S^*)] S^* + r'(S^*)[\Delta - c_C] = 0,$$

or, equivalently,

$$1 + S^* - r(S^*) - \left(c_C + \frac{c_D}{\alpha}\right) r'(S^*) = 0. \tag{18}$$

Equation (18) has a one-parameter family of solutions $r^*(S) = 1 + \lambda \exp\left\{-\frac{S}{c_C + \frac{c_D}{\alpha}}\right\}$. Applying appropriate boundary conditions, the equilibrium probability of rejection as a function of S will be given by:

$$r^*(S) = 1 - \exp\left\{-\frac{S - \underline{\Delta} - \frac{c_D}{\alpha}}{c_C + \frac{c_D}{\alpha}}\right\}. \tag{19}$$

Finally, for a particular value of Δ, the equilibrium settlement rate, $R^* = 1 - r^*$, can be obtained by substituting S^* from (17) into (19), namely:

$$R^* = \exp\left\{-\frac{\Delta - \underline{\Delta}}{\frac{c_D}{\alpha} + c_C}\right\}. \tag{20}$$

Note the similarity between this result and equation (13), which is the equilibrium settlement rate in the signalling model of Section 4. In both cases the equilibrium settlement rate is more responsive to changes in the defendant's litigation costs than to the complainant's

litigation costs and propositions 1 and 2 continue to hold.

6 Data

Data on the disputes filed under the DSU from 1995 to 2004 is taken from Horn and Mavroidis (2006). This includes information about the disputing parties, the status of each dispute (i.e., the most recent stage of the dispute), and the Harmonized System (HS) codes of the products that are subject to dispute. I updated the information regarding the status of the dispute by checking for new information released on the WTO website. I also modified the data in cases where the range of products at dispute, as reported by the complaining parties, was exaggerated or mis-specified. When several parties have similar complaints against a defending party, they may file a single complaint as co-complainants or they may file separate complaints. In either case, similar complaints are addressed as a single case by the DSB. Therefore, when similar cases are filed separately, I combine them into one single dispute case with multiple complainants. Moreover, in instances where the same dispute between a pair of member countries is filed multiple times, I eliminated all but the most recently-filed case.

Data on trade volume in disputed sectors comes from Feenstra et. al. (2005) for year 1999. In cases where this piece of data was not available from Feenstra et al, I took the corresponding 2001 trade volume from the UNComtrade database.

6.1 Measure of the stake at dispute

I use $\ln(trade)$ as a measure of the stake at dispute, where $trade$ is the size of the bilateral trade that is affected by the disputed policy. Ideally, the magnitude of the alleged trade barrier as well as the elasticities of demand and supply in the disputed sector should be also included in the calculation of the size of the stake at dispute. However, I don't have reliable data on these variables.

The stake at dispute may be also affected by the defending country's volume of imports from third countries. In a three-country model of trade where the defending party imports from the complaining party as well as the rest of the world, it can be shown that the stake at dispute for the defending party is decreasing in its import volume from the rest of the world. To account for this effect, I also include $\ln(I\_ROW)$ in the regression model, where I_ROW is the defending party's volume of imports in the disputed sector from the rest of the world.

6.2 Measure of litigation costs

It is a widely held view among observers of the WTO that less developed countries have relatively higher costs of legal work in the dispute settlement process. For example, Shaffer (2003) points out that "lack of legal expertise in WTO law and the capacity to organize information concerning trade barriers and opportunities to challenge them [... and] lack of financial resources, including for the hiring of outside legal counsel," are challenges faced by the developing countries in using the WTO legal system effectively. In fact, in response to concerns about the relatively high costs of legal works for poorer countries, the Advisory Centre on WTO Law (ACWL) was established in 2001 to provide developing countries with

subsidized legal aid for participation in the DSP.[7]

On this basis, I use $\frac{\ln(GDP\_US)\ln(\overline{c})}{\ln(GDP\_D)}$ and $\frac{\ln(GDP\_US)\ln(\overline{c})}{\ln(GDP\_C)}$ as a measure of D's and C's litigation costs, respectively, where $\overline{c}$ is the average legal fees paid by disputing countries in case of litigation, GDP_D and GDP_C are gross domestic product in D and C, and GDP_US is the GDP of the United States. This measure only depends on the disputing party's GDP and not on the characteristics of the case, e.g., the complexity of the legal issues involved. While it would be interesting to include case-specific factors in the construction of this measure, it has been pointed out by observers that litigation costs are more or less independent of the commercial stakes involved in a dispute (Nordström and Shaffer, 2008).

I construct an alternative measure of litigation costs using the information about the size of the country's mission to the WTO in Geneva. This data is taken from Michalopoulos (1999). The idea is that if a country has a larger mission to the WTO in Geneva, it will face a smaller *marginal cost* of pursuing a dispute case in the DSP, while a country with a small or no permanent mission will have to hire additional staff to represent the country in the DSP. The cost of maintaining a permanent mission will be considered a sunk cost at the time that a government makes a decision about pursuing a dispute and, thus, it does not affect the litigation decision.

6.3 Other control variables

As was mentioned above, some disputes involve multiple complaining parties or third parties that join the dispute as interested parties. The existence of multiple parties in a dispute can have a significant effect on the outcome. To control for these potential effects, I include

[7] Developing countries can access legal aid through ACWL for an hourly charge that ranges from $25 for the least developed countries to $200 for the highest income developing countries (see www.ACWL.ch).

multiple-complainant and third-party dummy variables in the estimation models below.

7 The Econometric Models

I use several econometric models to test the predictions of the model set out above. I first take a structural approach and estimate the parameters of the screening model set out above. Recall from the screening model presented in Section 3 that p denotes the probability of a guilty determination by the dispute panel and $q(c_C, c_D, \Delta)$ denotes an equilibrium cutoff point such that a settlement is achieved iff $p \geq q(c_C, c_D, \Delta)$. Therefore, the probability of settlement as a function of c_C, c_D, and Δ, is given by

$$\Pr[p \geq q(c_C, c_D, \Delta)] = 1 - F[q(c_C, c_D, \Delta)],$$

and the likelihood function can be written as

$$L = (1 - F[q(c_C, c_D, \Delta)])^s (F[q(c_C, c_D, \Delta)])^{1-s},$$

where s is the settlement dummy. In order to run an MLE, some functional forms should be assumed for F and q. Since $0 \leq p \leq 1$, a natural choice for F is the Beta Distribution, whose support is $[0, 1]$. As shown in Example 1, assuming $F \tilde{} Beta(2, 2)$, the equilibrium probability of settlement is given by

$$\begin{aligned} \Pr(s = 1 | c_C, c_D, \Delta) &= 1 - \frac{3}{16\Phi^2}\left(\Phi - 6 + \sqrt{9\Phi^2 - 12\Phi + 36}\right)^2 \\ &\quad + \frac{1}{32\Phi^3}\left(\Phi - 6 + \sqrt{9\Phi^2 - 12\Phi + 36}\right)^3, \end{aligned} \tag{21}$$

where, $\Phi = \frac{\Delta}{\beta_1 c_D + \beta_2 c_C}$, and β_1 and β_2 are structural parameters to be estimated. Note that Propositions 1 and 2 predict that $\beta_1 > \beta_2 > 0$, and my objective is to test this prediction empirically.

One difficulty in estimating β_1 and β_2 is the high correlation between $\frac{c_D}{\Delta}$ and $\frac{c_C}{\Delta}$, which are the explanatory variables in this econometric model. The cause of the high correlation is the common denominator, Δ, used in the construction of these variables. One approach to solve this colinearity problem is to use the average value of Δ in the above formulation. I normalize this average value to 1 so that $\Phi = \frac{1}{\beta_1 c_D + \beta_2 c_C}$.

I also estimate probability models that are not based on the above model but can be used to test the correlation between the settlement decision and relevant explanatory variables. In one specification, I relax some of the structure that was introduced by the theoretical model, by assuming a linear relationship between q, i.e., the marginal type of the defendant, and the explanatory variables. In particular, I consider the following probability model:

$$\Pr(s = 1|X) = \Pr\left(1 - p < \beta' X\right), \tag{22}$$

where, X is the vector of explanatory variables and β is the vector of parameters to be estimated. As before, I assume that p is distributed according to the Beta distribution with shape parameters given by $(2, 2)$. Finally, I take a fully non-structural approach and estimate probit and logit models.

8 Empirical Results

In this Section, I evaluate the following hypotheses that are derived from Propositions 1 and 2:

Hypothesis 1: Settlement rate is negatively correlated with the trade volume between the disputing parties in the disputed sector.

Hypothesis 2: Settlement rate is positively correlated with the measures of litigation costs.

Hypothesis 3: Settlement rate is more sensitive to changes in the litigation costs of the defending party than to changes in the litigation costs of the complaining party.

In addition to these hypotheses, I will also be able to discuss other factors that may influence the outcome of settlement negotiations, including the existence of third parties and co-complainants, and relevant trade flows.

Table (2) reports the estimated values of the parameters of the structural probability model represented by equation (21). This estimation provides strong support for Hypothesis 2, which states the likelihood of settlement is positively correlated with the litigation costs of each party. In specifications 2, 3, 5, and 6, I control for different trade flows that are potentially related to the dispute, including the total exports from the complainants to the defendant in the disputed sector. Consistent with Hypothesis 1, the likelihood of settlement is negatively correlated with this trade volume. Hypothesis 3, which states that settlement likelihood is sensitive to the allocation of litigation costs, is also supported empirically when we control for relevant trade flows. As seen in columns 2 and 3, this hypothesis is rejected with probability 0.05 and 0.1 respectively.

Similar results are obtained from the other empirical models that were introduced in

the previous Section. The coefficient for the bilateral trade volume in the disputed sector is always negative and statistically significant across all models. Therefore, Hypothesis 1 cannot be rejected. Also consistent with Hypothesis 2, the coefficient for the litigation cost of the defending party is positive and significant across all models. The coefficient for the litigation of the complaining party is also generally consistent withe Hypothesis 2. These models also provide empirical evidence in support of Hypothesis 3. In each table, I report the result of a one-sided t-test that the coefficient for the defending party's litigation cost is larger than that of the complaining party's litigation cost. As in the structural model, these estimations are consistent with Hypothesis 3 when we control for relevant trade flows.

8.1 Is three a crowd?

What is the effect of third parties on the outcome of pre-trial negotiations? Busch and Reinhardt (2006) hypothesize that third parties undermine pre-trial negotiations by increasing the negotiation costs. In fact, as they point out, "61 percent of disputes with no third parties ended in early settlement, in contrast to 26 percent of disputes with third parties. Likewise, nine percent of disputes without third parties ended in a ruling, whereas fully 45 percent of disputes with third parties went the legal distance." However, it is important to note that most third parties join a dispute after pre-trial negotiations break down. Therefore, one can argue that this is the breakdown of pre-trial negotiations that attracts third parties to join the dispute, and not the other way around.

To analyze the effect of third parties on the pre-trial negotiations, I define a third-party dummy variable that is equal to 1 if at least one third party joined the negotiations *prior* to the establishment of a WTO dispute panel. My estimation does not provide evidence in

support of the Busch and Reinhardt hypothesis. As can be seen in Tables $2-5$, the third-party dummy is not statistically significant in most of the models. Moreover, in specifications where this dummy variable is statistically significant (column 4 in Table 2 and column 5 in Table 3), the sign of the coefficient is positive. In other words, my empirical results indicate that if third parties have any effect on pre-trial negotiations, it is an increase in the likelihood of out-of-court settlement.

While I do not find strong empirical evidence regarding the influence of third parties in pre-trial negotiations, I do find evidence regarding the effect of multiplicity of complainants in the outcome of negotiations. As can be seen in Tables $2-5$, the coefficient of the multiple-complainant dummy is negative and statistically significant in almost all specifications. The existence of multiple complainants may reduce the likelihood of settlement by increasing the stake at dispute. However, this result is robust even if we control for measures of the stake at dispute such as the disputed trade volume between the defendant and the complaining parties.

8.2 Retaliation capacity

The Dispute Settlement Process of the WTO does not provide any external enforcement of the agreement. Instead the system relies on the retaliatory power of the injured countries against the offending countries to enforce trade agreements. Therefore, the retaliatory capacity of the complaining parties may influence the outcome of the pre-trial negotiations. Retaliatory actions are normally in the form of import restrictions in the injured country against the products from the offending country. Thus, the volume of export from the defending country to the complaining countries can be used as a measure of the complainants'

retaliation capacity.

My empirical observation suggests that total volume of exports from the defending country to the complaining countries has a positive effect on the likelihood of settlement. In other words, when the threat of retaliation is more serious a settlement is more likely. It might indicate the fact that a defending country is more willing to give concessions when the prospect of retaliations is stronger.[8]

8.3 Imports from the rest of the world: the terms-of-trade argument and the effect of nondiscrimination clause

My empirical observation suggests that the defending country's import in the disputed sector from third parties has also a significant effect on the likelihood of pre-trial settlement. In most of the specifications, the coefficient of this variable is positive and statistically significant. That is, while the volume of the defendant's imports from the complaining countries has a negative effect on the likelihood of settlement, its volume of imports from the rest of the world (ROW) is positively correlated with the probability of pre-trial settlement.

There are two potential channels through which the defendant's volume of imports from the ROW can affect the likelihood of settlement. First, consider a three-country world, with countries labeled as D (for defendant), C (for complainant) and ROW (for rest of the world), in which D imports a particular product from C and ROW. Suppose that D imposes a tariff

[8]My study, however, does not provide direct support for this hypothesis since I do not have information regarding the level of concessions offered in pre-trial negotitations. Bown (2004b) uses the increase in the exports from the complaining country to the defending country in the disputed sector as a measure of concessions given by the defending country, and shows that this measure is positively correlated with a measure of retaliatory capacity of the complaining country. In another paper (Bown 2004c) he shows that power consideration also affects the countries' decision to choose from different types of protectionist policies.

on imports from C while it maintains free trade with the ROW (i.e., D discriminates against C). D can gain from the tariffs imposed on the imports from C by improving its terms of trade. However, it can be shown that D's terms-of-trade gains are diluted if imports from the ROW picks up in response to a reduction in imports from C. In other words, a defending country's stake at dispute is inversely related to its volume of imports in the disputed sector from the rest of the world. Therefore, the positive coefficient of this variable is consistent with Hypothesis 1 of this paper. Moreover, this observation is consistent with the findings of Bagwell and Staiger (2006) that trade negotiators are concerned with the terms-of-trade externality of trade policies.

Now consider a case where D imposes a non-discriminatory trade barrier against imports from all foreign countries, i.e., C and ROW, but only C challenges the policy through a formal WTO dispute. The countries in the ROW may not want to initiate a dispute due to high costs of negotiations or their low individual stake at dispute. However, once the dispute panel rules against the disputed action, all affected countries, including those in the ROW, will also benefit from the ruling. This is because a policy adjustment in the defending country must conform to the Most Favored Nation (MFN) clause.

As a result of the MFN clause, the cost to the defending party of losing in the court is potentially much larger than the cost of compensating the complaining party. Therefore, a defending party has more incentive to settle without a formal trial in order to avoid attracting more interested parties to the dispute. This incentive to settle is stronger, the larger is the defending country's volume of import in the disputed sector from the ROW.

9 Conclusion

My objective in this paper was to highlight the effect of the compensation mechanism that is available to disputing parties on the outcome of pre-trial negotiations. In particular, I considered trade disputes among the WTO members in which trade policy adjustments, rather than cash payments, are used to transfer wealth among the member countries. As opposed to cash payments, policy adjustments are not zero-sum transactions, in the sense that the payee receives a different amount than is paid by the payer. I extended the classical settlement bargaining models, which consider cash payments as the method of compensation, to study settlement bargaining in an environment where compensations are implemented through policy adjustment.

I showed that when policy adjustment is the only compensation mechanism, the litigation costs of the defending party has a pronounced effect on the likelihood of pre-trial settlement. Thus, the classic result regarding the independence of the settlement likelihood and the allocation of litigation costs does not follow under this alternative compensation mechanism. This result suggests that legal procedures that allocate a larger fraction of the burden of proof on the defending party should result in a higher settlement rate.

This theory can explain some stark differences between the behavior of the large versus small counties in the dispute settlement process of the WTO. In a dispute between a large and a small economy, the likelihood of settlement is significantly lower when the large country is named as the defending party. Assuming that smaller countries, which are also poorer countries in my data set, have higher litigation costs, this observation can be interpreted as an indication of the pronounced effect of the defending countries' litigation costs in pre-trial negotiations.

In the empirical part of this paper I focused on the determinants of early settlements, while interesting questions regarding the policy adjustments as a result of settlement negotiations remain unexplored in this paper. Nevertheless, Bown (2004b) and Busch and Reinhardt (2003), provide interesting empirical observations regarding the effect of pursuing a dispute in the WTO on trade policies of the defending party.

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Table 2: Estimated Parameters for the Semi-Structural Model using Beta Distribution

Beta Distribution (semi-structural)	1	2	3	4	5	6
	GDP used to construct a measure of litigation costs			Mission-size dummy used to construct a measure of litigation costs		
Litigation costs of the defending party	0.136	0.342	0.331	0.153	0.098	0.103
	(0.058)**	(0.096)***	(0.097)***	(0.045)***	(0.037)***	(0.037)***
Litigation costs of the complaining party	0.106	0.205	0.218	0.119	0.061	0.064
	(0.056)*	(0.079)***	(0.081)***	(0.045)***	-0.038	(0.038)*
Total exports from Complainants to Defendant in the disputed sector		-0.073	-0.075		-0.031	-0.031
		(0.015)***	(0.016)***		(0.016)*	(0.016)*
Defendant's imports from the ROW in the disputed sector		0.068	0.068		0.021	0.02
		(0.010)***	(0.010)***		(0.010)**	(0.009)**
Total exports from Defendant to the Complainants		0.056	0.056		0.017	0.016
		(0.023)**	(0.023)**		-0.011	-0.011
Multiple Complainant Dummy	-0.148	-0.094	-0.101	-0.126	-0.139	-0.152
	(0.058)**	-0.064	-0.065	(0.052)**	(0.062)**	(0.062)**
Third-party Dummy	0.068		0.072	0.141		0.088
	-0.083		-0.085	(0.081)*		-0.084
Constant	-1.195	-4.202	-4.189			
	(0.508)**	(1.349)***	(1.359)***			
Observations	174	173	173	174	173	173
log likelihood	-108.32	-104.38	-103.99	-114.14	-106.71	-106.09
Probability of the rejection of Hypothesis 3	0.359	0.052	0.101	0.348	0.285	0.273

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Maximum Likelihood Estimation Results using Beta Distribution (Non-Structural)

Beta Distribution (non-structural)	1	2	3	4	5	6	7	8
	GDP used to construct a measure of litigation costs			Mission-size dummy used to construct a measure of litigation costs			No cost measure included	
Litigation costs of the defending party	0.112	0.117	0.238	0.155	0.166	0.12		
	(0.041)***	(0.041)***	(0.081)***	(0.021)***	(0.022)***	(0.026)***		
Litigation costs of the complaining party	0.063	0.072	0.1	0.138	0.137	0.062		
	(0.038)*	(0.038)*	(0.058)*	(0.022)***	(0.022)***	(0.026)**		
Total exports from Complainants to Defendant in the disputed sector			-0.04			-0.034	-0.039	-0.035
			(0.015)***			(0.014)**	(0.015)***	(0.015)**
Defendant's imports from the ROW in the disputed sector			0.036			0.027	0.019	0.018
			(0.010)***			(0.009)***	(0.009)**	(0.009)**
Total exports from Defendant to the Complainants			0.028			0.021	-0.013	-0.017
			-0.021			(0.009)**	-0.012	-0.012
Multiple Complainant Dummy		-0.159	-0.153		-0.14	-0.179		-0.131
		(0.058)***	(0.061)**		(0.043)***	(0.060)***		(0.059)**
Third-party Dummy		0.068	0.051		0.148	0.102		
		-0.07	-0.073		(0.051)***	-0.072		
Constant	-0.627	-0.691	-2.151				0.965	1.023
	(0.312)**	(0.326)**	(1.140)*				(0.145)***	(0.151)***
Observations	174	174	173	174	174	173	173	173
log likelihood	-111.34	-107.65	-100.69	-133.98	-127.35	-104.53	-108.13	-105.64
Probability of the rejection of Hypothesis 3	0.224	0.24	0.029	0.337	0.245	0.1	N/A	N/A

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4:Probit Estimation Results

Probit	1	2	3	4	5	6	7	8
	GDP used to construct a measure of litigation costs			Mission-size dummy used to construct a measure of litigation costs			No cost measure included	
Litigation costs of the defending party	0.454	0.941	0.968	0.306	0.251	0.294		
	(0.170)***	(0.331)***	(0.338)***	(0.111)***	(0.101)**	(0.145)**		
Litigation costs of the complaining party	0.274	0.426	0.411	0.192	0.079	0.067		
	(0.160)*	(0.246)*	(0.249)*	(0.111)*	-0.106	-0.152		
Total exports from Complainants to Defendant in the disputed sector		-0.167	-0.159		-0.151	-0.138	-0.147	-0.136
		(0.061)***	(0.062)**		(0.058)***	(0.060)**	(0.059)**	(0.060)**
Defendant's imports from the ROW in the disputed sector		0.14	0.145		0.088	0.09	0.07	0.071
		(0.044)***	(0.046)***		(0.035)**	(0.039)**	(0.035)**	(0.036)**
Total exports from Defendant to the Complainants		0.129	0.118		0.016	-0.009	-0.051	-0.065
		-0.082	-0.084		-0.036	-0.066	-0.047	-0.048
Multiple Complainant Dummy			-0.533	-0.71		-0.674		-0.514
			(0.237)**	(0.235)***		(0.245)***		(0.231)**
Third-party Dummy				0.385		0.366		
				-0.281		-0.287		
Constant	-4.708	-10.969	-10.898	-0.466		0.305	1.804	2.017
	(1.440)***	(4.703)**	(4.805)**	(0.259)*		-1.296	(0.598)***	(0.614)***
Observations	174	173	173	174	173	173	173	173
log likelihood	-111.2	-103.91	-101.36	-108.13	-107.28	-103.13	-108.33	-105.83
Probability of the rejection of Hypothesis 3	0.239	0.038	0.029	0.25	0.166	0.107	N/A	N/A

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Logit Estimation Results

Logit	1	2	3	4	5	6	7	8
	GDP used to construct a measure of litigation costs			Mission-size dummy used to construct a measure of litigation costs			No cost measure included	
Litigation costs of the defending party	0.749	1.568	1.527	0.495	0.407	0.463		
	(0.285)***	(0.562)***	(0.574)***	(0.186)***	(0.168)**	(0.169)***		
Litigation costs of the complaining party	0.462	0.738	0.72	0.312	0.124	0.282		
	(0.269)*	(0.421)*	(0.428)*	(0.185)*	-0.175	(0.169)*		
Total exports from Complainants to Defendant in the disputed sector		-0.275	-0.262		-0.243	-0.062	-0.236	-0.222
		(0.102)***	(0.104)**		(0.096)**	(0.027)**	(0.096)**	(0.099)**
Defendant's imports from the ROW in the disputed sector		0.233	0.234		0.142		0.113	0.117
		(0.077)***	(0.081)***		(0.059)**		(0.058)*	(0.061)*
Total exports from Defendant to the Complainants		0.216	0.184		0.026		-0.084	-0.105
		-0.136	-0.14		-0.059		-0.077	-0.079
Multiple Complainant Dummy			-0.917	-1.154		-1.104		-0.841
			(0.403)**	(0.390)***		(0.393)***		(0.378)**
Third-party Dummy			0.398	0.638		0.669		
			-0.487	-0.464		-0.46		
Constant	-7.841	-18.527	-17.616	-0.758			2.92	3.273
	(2.476)***	(7.994)**	(8.114)**	(0.424)*			(0.995)***	(1.022)***
Observations	174	173	173	174	173	174	173	173
log likelihood	-111.17	-103.97	-101.24	-113.09	-107.42	-107.23	-108.43	-105.91
Probability of the rejection of Hypothesis 3	0.244	0.043	0.056	0.342	0.169	0.261	N/A	N/A

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%