The Role of Pre-trial Settlement in International Trade Disputes[1]

Jee-Hyeong Park

To analyze the role of pre-trial settlement in international trade dispute resolutions, this paper develops a simple model of trade and trade disputes in which a government is subject to private political pressure for protection, of which its trading partner receives imperfect private signal. As a way to enforce an optimal contingent protection agreement that maximizes the expected joint payoff of governments of trading countries, it considers and compares three alternative enforcement schemes, namely the automatic DSB-ruling scheme, the on-demand DSB-ruling scheme with pre-trial settlement possibility, and the on-demand DSB-ruling scheme without pre-trial settlement possibility. If the private signal of the political pressure for protection is accurate enough, allowing pre-trial settlements increases the expected joint payoff of governments that try to enforce the optimal contingent protection agreement.

1. Introduction

Trade disputes typically involve the World Trade Organization(WTO) as a third party that generates impartial opinions on potential violations of which governments in dispute present different opinions. Prior to generating rulings on disputed cases, the Dispute Settlement Body(DSB) of the WTO encourages settlements among disputing parties as a preferred way to address trade disputes. According to the official website of the WTO, "The priority is to settle disputes, through consultations if possible. By July 2005, only 130 of the nearly 332 WTO's dispute cases had reached the full panel process. Most of the rest have either been notified as settled "out of court" or remain in a prolonged consultation phase — some since 1995."[2]

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(2) This is quoted from the following website: http://www.wto.org/english/thewto_e/whatis_e/tif_e/disp1_e.htm.

Despite this seemingly important role that pre-trial settlement plays in international trade dispute resolutions, there is only a very limited number of theoretical studies that analyze pre-trial settlement in trade disputes. With regard to the possible role that the DSB of the WTO plays, a few recent studies analyze dispute settlement mechanism in the presence of imperfect information about potential violations from an international trade agreement. Maggi and Stagier (forthcoming) analyze the possible role that the DSB of the WTO plays in completing an incomplete contract and characterize the optimal choice of contractual incompleteness and the DSB design. Maggi and Staiger(2009) characterize optimal remedies for breaches of trade agreements in the presence of uncertain political pressure for protection, for which the DSB may generate noisy signals. Beshkar(2010) analyzes how the rulings of the DSB can affect renegotiation of trade agreements in the context of designing a direct revelation bargaining mechanism. In contrast to these studies in which each government has either no information or perfect information of its trading partner's potential violations, Park(2009) introduces imperfect private signals of potential deviations into the analysis of trade disputes, characterizing the DSB of the WTO as device to generate public signals of potential violations, which in turn enables countries to employ a more efficient enforcement punishment mechanism against violations.

Among these recent studies of international trade dispute resolutions, only Beshkar(2010) explicitly analyzes the role that pre-trial settlement may play in trade disputes, showing that pre-trial settlement improves the efficiency of the trade relationship by reducing the chance that a purely protectionist measure would be authorized by the DSB of the WTO. While Maggi and Staiger(2009) allow pre-trial settlement in their characterization of optimal remedies for breaches of trade agreements, they do not analyze the role of pre-trial settlement by simply ignoring the case without pre-trial settlement.

With regard to the role that pre-trial settlement plays in trade disputes, this paper emphasizes that pre-trial settlement may facilitate a more efficient use of imperfect private information of trading partners in restraining potential violations of trade agreements. Section 2 of this paper develops a simple model of trade and trade disputes in which a government is subject to private political pressure for protection, of which its trading partner receives imperfect private signal. After characterizing an optimal contingent protection agreement that maximizes the expected joint payoff of governments of trading countries in this simple model of trade, Section 3 considers and compares three alternative schemes to enforce the optimal contingent protection agreement; the automatic DSB-ruling scheme in Section 3.1, the on-demand DSB-ruling scheme with pre-trial settlement possibility in Section 3.2, and the on-demand DSB-ruling schemes without pre-trial settlement possibility in Section 3.3. The analysis shows that allowing pre-trial settlements increases the expected joint payoff of governments that try to enforce the optimal contingent protection agreement, as long as the private signal of the political pressure for protection is accurate enough. Section 4 concludes with a discussion of possible extensions of this paper's analysis.

2. A Model of Trade with Private Political Pressure for Protection

This paper's model of trade with private political pressure for protection is based on a simple trade model that is frequently used in the literature. There exist two countries in the world, Home (H) and Foreign (F). Consider three goods x, y, and z, with demand functions in H and F being given by:

$$\begin{gathered} D_x(p_x) = 1 - p_x, \quad D_y(p_y) = 1 - p_y, \quad D_z(p_z) = 1 - p_z, \\ D_x^*(p_x^*) = 1 - p_x^*, \quad D_y^*(p_y^*) = 1 - p_y^*, \ \text{and} \ D_z^*(p_z^*) = 1 - p_z^*, \end{gathered} \tag{2.1}$$

where p_i^k represents the price of good i either in H (k = none) or in F (k = *) with $i = x$, y, or z, having F's variables being denoted by superscript *. Supply functions in H and F are given by:

$$\begin{gathered} S_x(p_x) = p_x, \quad S_y(p_y) = \beta p_y, \quad S_z(p_z) = 1 - p_z \\ S_x^*(p_x^*) = \beta p_x^*, \quad S_y^*(p_y^*) = p_y^*, \ \text{and} \ S_z^*(p_z^*) = \beta p_z^*, \end{gathered} \tag{2.2}$$

with $\beta > 1$, which implies that H will be an importer (exporter) of x and z (y). Note that demand and supply functions are defined to make trading good x and good y be symmetric across these countries. Also note that good z is practically identical to good x in terms of demand and supply functions.(3)

(3) This third good z is introduced to provide H a trade policy instrument to punish F's potential

I assume that each country can impose a specific tariff on its imports, denoted by τ_i^k, with k = * or none, and $i = x$, y, or z, creating a gap between its local and foreign prices: $p_x = p_x^* + \tau_x$, $p_y = p_y^* - \tau_y^*$, and $p_z = p_z^* + \tau_z$. Then, the market-clearing price of x, y, and z in H depends on τ_x, τ_y^*, and τ_z, respectively, being denoted by $p_x(\tau_x)$, $p_y(\tau_y^*)$, and $p_z(\tau_z)$. When import tariffs are not prohibitive, the consumer surpluses (ψ), the producer surpluses (π) and the government revenue (T) in H are given by:

$$\psi_x(\tau_x) \equiv \int_{p_x(\tau_x)}^{1} D_x(u)du, \quad \psi_y(\tau_y^*) \equiv \int_{p_y(\tau_y^*)}^{1} D_y(u)du, \quad \psi_z(\tau_z) \equiv \int_{p_z(\tau_z)}^{1} D_z(u)du,$$
$$\pi_x(\tau_x) \equiv \int_0^{p_x(\tau_x)} S_x(u)du, \quad \pi_y(\tau_y^*) \equiv \int_0^{p_y(\tau_y^*)} S_y(u)du, \quad \pi_z(\tau_z) \equiv \int_0^{p_z(\tau_z)} S_z(u)du,$$
$$T_x(\tau_x) \equiv \tau_x M_x(p_x(\tau_x)), \text{ and } T_z(\tau_z) \equiv \tau_z M_z(p_z(\tau_z)),$$

where $M_j(p_j) \equiv D_j(p_j) - S_j(p_j)$ denotes H's import demand for good j, with $j = x$ or z.

To represent political pressure for protection in H, I assume that H's government assigns a higher weight on the producer surplus of its import competing sector x, denoted by $\theta(\geq 1)$, following Baldwin(1987). H's government's objective function is then composed of three parts, one that depends on its tariff subject to political pressure for protection (u), other one that depends on its trading partner's tariff (v_s), and another one that depends on its tariff subject to no political pressure for protection (u_s):

$$u(\tau_x; \theta) \equiv \psi_x(\tau_x) + \theta\pi_x(\tau_x) + T_x(\tau_x),$$
$$v_s(\tau_y^*) \equiv \psi_y(\tau_y^*) + \pi_y(\tau_y^*), \text{ and}$$
$$u_s(\tau_z) \equiv \psi_z(\tau_z) + \pi_z(\tau_z) + T_z(\tau_z).$$

Note that only H's sector x, thus only τ_x is subject to its domestic political pressure for protection, making τ_x the only tariff that is potentially desirable to vary contingent upon the realized value of θ. It is also necessary to consider variations of other tariffs. As discussed later, F may need to raise τ_y^* against H's potential misrepresentation of its private political pressure for protection, and H may need to raise τ_z against F's potential misrepresentation of its imperfect private signal of H's political pressure for protection, denoted by $\tilde{\theta}$. To simplify

misrepresentation of its imperfect private signal of H's private political pressure for protection.

notations, τ_x, τ_y^*, and τ_z, are respectively represented by τ, τ_s^*, and τ_s, hereafter. Similarly, F's government's objective function is composed of three parts as follows:

$$v^*(\tau) \equiv \psi_x^*(\tau) + \pi_x^*(\tau),$$
$$u_s^*(\tau_s^*) \equiv \psi_y^*(\tau_s^*) + \pi_y^*(\tau_s^*) + T_x^*(\tau_s^*), \text{ and}$$
$$v_s^*(\tau_s) \equiv \psi_z^*(\tau_s) + \pi_z^*(\tau_s),$$

with which I can represent the total payoff of each country as follows:

$$W(\tau, \tau_s, \tau_s^*; \theta) = u(\tau, \theta) + u_s(\tau_s) + v_s(\tau_s^*), \text{ and}$$
$$W^*(\tau, \tau_s, \tau_s^*) = v^*(\tau) + v_s^*(\tau_s) + u_s^*(\tau_s^*).$$

For analytical simplicity, I introduce two additional assumptions. First, I assume that there exist only two levels of political pressure for protection in H, denoted by $\underline{\theta}$ and $\overline{\theta}$, with $\overline{\theta} > \underline{\theta}$. Define $\tau_h \equiv \text{Augmax}_\tau\{W(\tau, \tau_s, \tau_s^*; \overline{\theta}) + W^*(\tau, \tau_s, \tau_s^*)\}$ and $\tau_l \equiv \underset{\tau}{\text{Augmax}}\{W(\tau, W(\tau, \tau_s, \tau_s^*; \underline{\theta}) + W^*(\tau, \tau_s, \tau_s^*)\}$, which in turn implies that $\tau_h > \tau_l \geq 0$.(4) Second, I assume that countries can set its tariffs only at these two levels of protection, with τ, τ_s, and $\tau_s^* \in \{\tau_h, \tau_l\}$. By drastically simplifying the analysis in Section 3, this last assumption facilitates this paper's focusing on the analysis of the role that pre-trial settlement may play in international trade dispute resolutions.

3. Alternative Enforcement Mechanisms for Contingent Protection

Given the trade model described in Section 2, the choice of τ, τ_s, and τ_s^* that maximizes the sum of two governments' objective functions, $W + W^*$, is the following contingent protection agreement: setting $\tau = \tau_l$, $\tau_s = \tau_l$, and $\tau_s^* = \tau_l$ if $\theta = \underline{\theta}$, and setting $\tau = \tau_h$, $\tau_s = \tau_l$, and $\tau_s^* = \tau_l$ if $\theta = \overline{\theta}$. With regard to the choice of τ_s (τ_s^*) that maximizes $W + W^*$, note that the corresponding maximization problem is identical to the maximization of $\text{Augmax}_\tau\ [W + W^*]$ with $\theta = 1$. Because $\partial\{\text{Augmax}_\tau\ [W(\tau, \tau_s, \tau_s^*; \theta) + W^*(\tau, \tau_s, \tau_s^*)]\}/\partial\theta > 0$ and $\underline{\theta} \geq 1$, $\tau_s = \tau_l$ ($\tau_s^* = \tau_l$) is

(4) As already shown in the previous studies, such as Bagwell and Stagier(2005), it is straightforward to establish that $\partial\{\text{Augmax}_\tau\ [W(\tau, \tau_s, \tau_s^*; \theta) + W^*(\tau, \tau_s, \tau_s^*)]\}/\partial\theta > 0$.

preferred over the choice of $\tau_s = \tau_h$ ($\tau_s^* = \tau_h$).

Enforcing the optimal contingent protection agreement described above may not be feasible because of H's incentive to misrepresent its private political pressure for protection by reporting $\theta = \overline{\theta}$ even when $\theta = \underline{\theta}$: $W(\tau_h, \tau_l, \tau_l; \underline{\theta}) > W(\tau_l, \tau_l, \tau_l; \underline{\theta})$ as long as $\overline{\theta}$ is not too large relative to $\underline{\theta}$. For example, consider the case in which $\underline{\theta} = 1$, thus $\tau_l = 0$. As long as $\overline{\theta}$ is not too large, it is straightforward to show that Augmax$_\tau$ $[W(\tau, \tau_s, \tau_s^*; \underline{\theta})] \geq \tau_h$, which in turn implies that $W(\tau_h, \tau_l, \tau_l; \underline{\theta}) > W(\tau_l, \tau_l, \tau_l; \underline{\theta})$.(5) To analyze the issue of enforcing a contingent protection agreement in the presence of private political pressure for protection, I assume that H has such an incentive to misrepresent its private political pressure for protection with $W(\tau_h, \tau_l, \tau_l; \underline{\theta}) > W(\tau_l, \tau_l, \tau_l; \underline{\theta})$. For simplicity, I also set $\underline{\theta} = 1$ henceforth.

In the following analysis, I assume the existence of a dispute settlement body(DSB) that can enforce its ruling based on its imperfect (public) signal of θ, denoted by $\check{\theta}$, choosing the final values for τ, τ_s, and τ_s^*.(6) In addition, I assume that $\check{\theta} = \overline{\theta}$ ($\check{\theta} = \underline{\theta}$) if $\theta = \overline{\theta}$ ($\theta = \underline{\theta}$) with probability $\gamma_c \in [0, 1]$, thus γ_c representing the accuracy of $\check{\theta}$ as a signal of θ. I also assume that F receives an imperfect private (not known to H and DSB) signal of θ, denoted by $\tilde{\theta}$, of which the accuracy is represented by $\gamma \in [0, 1]$.

As a way to enforce the optimal contingent protection agreement subject to H's incentive constraint described above, this section considers and compares three types of enforcement schemes: (A) DSP Rulings without F's Petition (in which DSB generates its ruling without being requested to do so); (B) DSP Rulings after F's Petition (in which DSB generates its ruling only after being requested to do so by F) with pre-trial settlement possibility between H and F; (C) DSP Rulings after F's Petition without pre-trial settlement possibility. The full sequence of the game is as follows:

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(5) For a more detailed discussion of this incentive to misrepresent private political pressure for protection, see Bagwell and Staiger(2005) or Beshkar(2010).

(6) In practice, the WTO's DSB does not have the coercive power to make countries to choose certain protection levels based its rulings. One can justify this assumption of DSB's coercive enforcement power in a repeated game setup. In a repeated trade relationship, for example, countries may agree on a punishment scheme in which they employ a permanent Nash tariff war against any deviation from the rulings of DSB. Given that countries care enough about their future payoffs, then countries would follow the rulings of DSB as if it has the coercive power to choose the final protection levels based on its rulings.

(i) The nature selects the value of θ, yielding $\theta = \overline{\theta}$ with probability $\rho \in [0, 1]$.

(ii) After observing θ, H chooses the initial value for τ.

(iii) After observing $\tilde{\theta}$, F decides whether to challenge H's initial choice of τ or not, by filing a petition against $\tau = \tau_h$.

(iv) After being challenged by F, H decides whether it engages in a pre-trial settlement with F by changing τ from τ_h to τ_l.

(v) After observing $\check{\theta}$ (H's initial choice of τ, F's announcement of its $\tilde{\theta}$, and the pre-trial settlement result), DSB makes its ruling, choosing the final values for τ, τ_s, and τ_s^*.

The scheme (A) involves only (i) and (v), the scheme (B) involves all 5 stages, and the scheme (C) involves all stages, except (iv). In the following analysis, I employ the pure-strategy subgame perfect Nash equilibrium as a solution concept of the game described above.

3.1. DSB Rulings without Petition

First, consider the enforcement scheme A: DSB rulings without petition. There are two types of such schemes depending on whether or not the scheme induces H to set $\tau = \tau_h$ if $\theta = \overline{\theta}$ and $\tau = \tau_l$ if $\theta = \underline{\theta}$ as a pure-strategy Nash equilibrium strategy in the first stage of the game. More specifically, DSB (denoted by D from now on) can consider employing the following two alternative choices of τ, τ_s, and τ_s^* based on its signal $\check{\theta}$ and H's initial choice of τ in the first stage of the game:

Type-1 automatic DSB-ruling scheme (A1): If $\tau = \tau_l$ in the first stage of the game, then D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_l)$. Given that $\tau = \tau_h$ in the first stage of the game, D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_l, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_l)$ if $\check{\theta} = \underline{\theta}$.

Type-2 automatic DSB-ruling scheme (A2): If $\tau = \tau_l$ in the first stage of the game, then D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_l)$. Given that $\tau = \tau_h$ in the first stage of the game, D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_l, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_h)$ if $\check{\theta} = \underline{\theta}$.

Under *A1 (Type-1 automatic DSB-ruling scheme)*, note that H will set $\tau = \tau_h$ regardless of θ in the first stage of the game. This is because there is no cost (penalty) for H to set $\tau = \tau_h$

in the first stage of the game. Under *A2 (Type-2 automatic DSB ruling scheme)*, H will set $\tau = \tau_h$ if $\theta = \overline{\theta}$ and $\tau = \tau_l$ if $\theta = \underline{\theta}$ in the first stage of the game as long as the probability of D's making a wrong judgment, denoted by $(1 - \gamma_c)$, is small enough. This is because D penalizes H's behavior of setting $\tau = \tau_h$ in the first stage with $\theta = \underline{\theta}$ by setting $\tau_s^* = \tau_h$ if $\check{\theta} = \underline{\theta}$. Among these two alternative automatic DSB ruling schemes, the probability of $\theta = \overline{\theta}$, denoted by ρ, determines which scheme yields a higher expected joint payoff. Denote the expected joint payoff under the *A1* by EW^W_{A1} and the expected joint payoff under *A2* by EW^W_{A2}. Then, I can show that

$$(3.1) \qquad EW^W_{A1} - EW^W_{A2} = (2\rho - 1)(1 - \gamma_c)\{[u(\tau_l, \underline{\theta}) + v^*(\tau_l)\ ] - [u(\tau_h, \underline{\theta}) + v^*(\tau_h)]\}.$$

Because $[u(\tau_l, \underline{\theta}) + v^*(\tau_l)] - [u(\tau_h, \underline{\theta}) + v^*(\tau_h)] > 0$, the equality in (3.1) implies that $EW^W_{A1} - EW^W_{A2} > 0$ if and only if $\rho > 1/2$. Thus, I obtain the first result:

Proposition 1. If $\rho > 1/2$, the expected joint-payoff is higher under *A1* than under *A2*. The reverse is true if $\rho < 1/2$.

On the one hand, if ρ (the probability of $\theta = \overline{\theta}$) gets higher, then the likelihood of punishing H based on D's wrong judgment of θ increases under *A2* because H is more likely to set $\tau = \tau_h$ in the first stage of the game. Thus, $\partial EW^W_{A2}/\partial\rho < 0$. On the other hand, EW^W_{A1} is not affected by ρ because H will set will set $\tau = \tau_h$ regardless of θ in the first stage of the game and there is no penalty for doing so. Therefore, $EW^W_{A2} > EW^W_{A1}$ is true if ρ is small ($\rho < 1/2$), but the reverse is true if ρ is large ($\rho > 1/2$).

3.2. DSB Rulings with Petition: Private Monitoring with Pre-trial Settlement

Now, consider the enforcement scheme *B*: DSP rulings with petition in which pre-trial settlement between H and F is allowed. First, note that H would set $\tau = \tau_h$ regardless of θ in the first stage of the game because H always has the option of pre-trial settlement (changing τ from τ_h to τ_l) if F challenges its choice of τ_h. H's decision on whether to settle or to pursue D's rulings after F's challenge depends on what D would do based on its ruling. There exist following four different types of actions that D can choose to enforce based on its ruling under this enforcement scheme *B*:

Type-1 enforcement scheme B (B1): D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_l, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_l)$ if $\check{\theta} = \underline{\theta}$.

Type-2 enforcement scheme B (B2): D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_l, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_h)$ if $\check{\theta} = \underline{\theta}$.

Type-3 enforcement scheme B (B3): D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_h, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_l)$ if $\check{\theta} = \underline{\theta}$.

Type-4 enforcement scheme B (B4): D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_h, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_h)$ if $\check{\theta} = \underline{\theta}$.

Note that F would always challenge H's choice of τ_h given *B1* or *B2* because there is only a potential benefit (changing H's τ from τ_h to τ_l) and no cost in doing so for F. Also note that H would never settle under *B1*, but it would settle if and only if $\theta = \underline{\theta}$ under *B2* as long as D's judgment is accurate enough. Because H would always set $\tau = \tau_h$ regardless of θ in the first stage of the game and F would always challenges regardless of its private signal, $\tilde{\theta}$, under these two types of enforcement scheme *B*, *B1* is practically identical to *A1* (generating the same expected joint and individual payoffs) and *B2* is practically identical to *A2*. Under *B1* and *B2*, thus the (imperfect) private signal of F is not utilized, rendering such enforcement schemes to be identical to the enforcement schemes that rely only on D's signal.

Under *B3* and *B4*, F has an incentive to truthfully report its private signal (thus, properly challenging H's choice of τ) because untruthful reporting will be penalized by H's setting τ_s at τ_h if $\check{\theta} = \overline{\theta}$. Under *B3*, however, note that H has no incentive for pre-trial settlement as it faces on penalty for not settling if $\check{\theta} = \underline{\theta}$. This makes *B3* an enforcement scheme under which no pre-trial settlement occurs. Thus, I will focus on the enforcement scheme *B4*. If the probability of F's making a wrong judgment, denoted by $(1 - \gamma)$, is small enough and $(1 - \gamma_c)$ is also small enough, F will challenge H's choice of τ_h only if $\tilde{\theta} = \underline{\theta}$ and H will settle by changing τ from τ_h to τ_l only if $\theta = \underline{\theta}$. Denote the expected joint payoff under *B4* by ED_B^W. Then, I can show that

$$ED_B^W - EW_{A2}^W =$$

$$\text{(3.2)} \quad \begin{aligned} &\rho(\gamma - \gamma_c)\{[\mathrm{u}(\tau_h, \overline{\theta}) + v^*(\tau_h)] - [u(\tau_l, \overline{\theta}) + v^*(\tau_l)]\} + \\ &\rho(1-\gamma)\,\gamma_c\,\{[\mathrm{u}(\tau_h, \overline{\theta}) + v^*(\tau_h)] - [u(\tau_l, \overline{\theta}) + v^*(\tau_l)]\} - \\ &(1-\rho)(1-\gamma)\{[\mathrm{u}(\tau_l, \underline{\theta}) + v^*(\tau_l)] - [u(\tau_h, \underline{\theta}) + v^*(\tau_h)]\}. \end{aligned}$$

With regard to the potential benefit or loss associated with switching from *A2* to *B4*, the expression in the first line on the right side of the equality in (3.2) represents the potential gain from the improved accuracy of judgment with $\gamma - \gamma_c > 0$. The second-line expression represents the benefit from using two independent judgments instead of one (so that D can correct the wrong judgment of F). The last-line expression represents the cost of punishing F's wrong judgment to induce F to challenge H's τ_h only if $\tilde{\theta} = \underline{\theta}$ under *B4*, which countries can avoid under *A2*. Note that $ED_B^W - EW_{A2}^W < 0$ for any $\rho \in (0, 1)$ and $\gamma \in (0, 1)$ if $\gamma = \gamma_c$ (F's judgment not being superior than D's) and $\rho(1-\gamma)\,\gamma_c\{[u(\tau_h, \overline{\theta}) + v^*(\tau_h)] - [u(\tau_l, \overline{\theta}) + v^*(\tau_l)]\} = 0$ (subtracting way the gain from using two independent judgments instead one). This observation leads to the following proposition:

Proposition 2. After controlling any informational advantage from using an additional and possibly superior judgment of F in addition to D's judgment, the expected joint payoff under *B4* is either identical to or strictly lower than the one attainable under *A2*.

This result is rather obvious because *B4* is subject to one more incentive constraint (providing F the incentive to truthfully reveal its private signal) than *A2*. This result emphasizes that the benefit of using the DSP rulings conditional on petition being filed with pre-trial settlement possibility comes from the informational advantage of utilizing F's private signal. If F's private signal gets very accurate with $\gamma \to 1$, then

$$\text{(3.3)} \quad \begin{aligned} &ED_B^W - EW_{A2}^W \to \rho(1-\gamma_c)\{[u(\tau_h, \overline{\theta}) + v^*(\tau_h)] - [u(\tau_l, \overline{\theta}) + v^*(\tau_l)]\} > 0 \text{ and} \\ &ED_B^W - EW_{A1}^W \to \rho(1-\gamma_c)\{[u(\tau_h, \overline{\theta}) + v^*(\tau_h)] - [u(\tau_l, \overline{\theta}) + v^*(\tau_l)]\} - \\ &\qquad (2\rho - 1)(1-\gamma_c)\{[u(\tau_l, \underline{\theta}) + v^*(\tau_l)] - [\mathrm{u}(\tau_h, \underline{\theta}) + v^*(\tau_h)]\}. \end{aligned}$$

This observation leads to the following result which demonstrates that countries may prefer the on-demand DSP-ruling scheme with pre-trial settlement (*B4*) over the automatic DSP-ruling schemes (*A1* and *A2*) with F's private signal being accurate enough.

Proposition 3.

a) If $\rho < 1/2$ and F's private signal is accurate enough, then the expected joint payoff under the on-demand DSP-ruling scheme with pre-trial settlement (*B4*) will be strictly higher than the one under the automatic DSB-ruling schemes (*A1* or *A2*).

b) If $\rho > 1/2$, $u(\tau_h, \overline{\theta}) + v^*(\tau_h) - [u(\tau_l, \overline{\theta}) + v^*(\tau_l)] > u(\tau_l, \underline{\theta}) + v^*(\tau_l) - [\mathrm{u}(\tau_h, \underline{\theta}) + v^*(\tau_h)]$ and F's private signal is accurate enough, then the expected joint payoff under the on-demand DSP-ruling scheme with pre-trial settlement (*B4*) will be strictly higher than the one under the automatic DSB-ruling schemes (*A1* or *A2*).

3.3. DSB Rulings with Petition: Private Monitoring without Pre-trial Settlement

To understand the role that pre-trial settlement plays, it is necessary to analyze the enforcement scheme *C*, the on-demand DSP-ruling scheme without pre-trial settlement possibility. Similar to the enforcement scheme *B*, there exist four different types of actions that D can choose to enforce based its signal $\check{\theta}$ under the enforcement scheme *C*. In fact, the four different types of actions are identical to the four different actions considered under the enforcement scheme *B* in Section 3.2, except that the enforcement scheme *C* does not allow pre-trial settlement between H and F. Denote those four different actions under the enforcement scheme *C* by *C1*, *C2*, *C3*, and *C4*, respectively.

Once again, D's action at the final stage of the game is crucial for F to reveal its private signal truthfully. Similar to *B1* and *B2* in Section 3.2, *C1* and *C2* do not provide F the incentive for truthful reporting of its private signal, having F always challenging H's choice of τ_h. Also note that *C4* would also fail to provide F the incentive for truthful revelation of its private signal. To prove this claim by contradiction, let's first assume that F truthfully reports its private signal. Under *C4*, then H will set $\tau = \tau_h$ if $\theta = \overline{\theta}$ and $\tau = \tau_l$ if $\theta = \underline{\theta}$ in the first stage of the game as long as γ_c and γ are close enough to 1. However, this leads to contradiction because F would benefit from ignoring its private signal when $\tau = \tau_h$ and $\tilde{\theta} = \underline{\theta}$ because $\tau = \tau_h$ implies that $\theta = \overline{\theta}$. For truthful revelation of F's private signal, thus, D needs to employ the following enforcement scheme *C3*.

Type-3 enforcement scheme C (C3): D sets $(\tau, \tau_s, \tau_s^*) = (\tau_h, \tau_h, \tau_l)$ if $\check{\theta} = \overline{\theta}$, and D sets $(\tau, \tau_s, \tau_s^*) = (\tau_l, \tau_l, \tau_l)$ if $\check{\theta} = \underline{\theta}$.

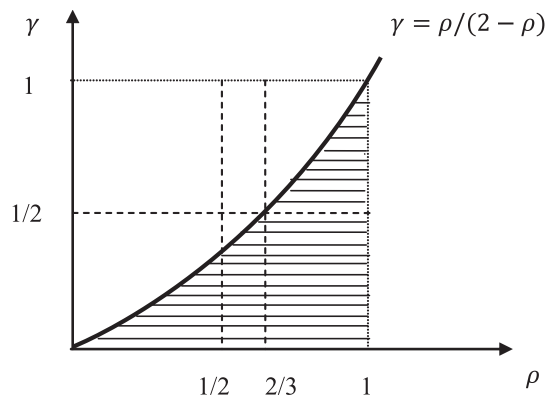
Note that D sets $\tau_s^* = \tau_l$ if $\check{\theta} = \underline{\theta}$, implying that H would set $\tau = \tau_h$ regardless of θ in the first stage of the game. This makes F's private signal be informative about θ. As long as γ_c and γ are close enough to 1, then F will challenge H's choice of τ_h only if $\tilde{\theta} = \underline{\theta}$ under *C3*. Denote the expected joint payoff under the on-demand DSB-ruling scheme without pre-trial settlement (*C3*) by ED_c^W. Then,

$$ED_B^W - ED_c^W = \tag{3.4}$$
$$(1-\gamma_c)[2(1-\rho)\gamma - \rho(1-\gamma)]\{[u_s(\tau_l) + v_s^*(\tau_l)] - [u_s(\tau_h) + v_s^*(\tau_h)]\}.$$

Because $[u_s(\tau_l) + v_s^*(\tau_l)] > [u_s(\tau_h) + v_s^*(\tau_h)]$, the sign of $ED_B^W - ED_c^W$ depends on $2(1-\rho)\gamma - \rho(1-\gamma)$. Under the on-demand DSB-ruling scheme, countries may or may not benefit from allowing pre-trial settlement depending on the relative magnitude of ρ and γ, which leads to the following proposition:

Proposition 4. If $\gamma > \rho/(2-\rho)$, the expected joint-payoff under the on-demand DSB-ruling scheme is higher with pre-trial settlement than without pre-trial settlement. The reverse is true if $\gamma < \rho/(2-\rho)$.

The benefit of allowing pre-trial settlement comes from avoiding a costly contingency that may occur without pre-trial settlement: under *C3*, D may make misjudgment of $\underline{\theta}$ by having $\check{\theta} = \overline{\theta}$, which then would lead to setting $\tau = \tau_h$ and $\tau_s = \tau_h$. Note that the benefit of avoiding this costly contingency is $(1-\rho)\gamma(1-\gamma_c)\{[u(\tau_l, \underline{\theta}) + v^*(\tau_l)] - [u(\tau_h, \underline{\theta}) + v^*(\tau_h)] + [u_s(\tau_l) + v_s^*(\tau_l)] - [u_s(\tau_h) + v_s^*(\tau_h)]\} = 2(1-\rho)\gamma(1-\gamma_c)\{[u_s(\tau_l) + v_s^*(\tau_l)] - [u_s(\tau_h) + v_s^*(\tau_h)]\}$. The cost associated with allowing pre-trial settlement comes from creating a costly contingent that would not occur without pre-trial settlement: under *B4*, D may make misjudgment of $\overline{\theta}$ by having $\check{\theta} = \underline{\theta}$, which then would lead to setting $\tau_s^* = \tau_h$. This cost is $\rho(1-\gamma)(1-\gamma_c)\{[u_s(\tau_l) + v_s^*(\tau_l)] - [u_s(\tau_h) + v_s^*(\tau_h)]\}$. The difference between the benefit and cost associated with allowing pre-trial settlement generates the expression for $ED_B^W - ED_c^W$ in (3.4).



<Figure 1> The Case against Allowing Pre-trial Settlement

According to Proposition 4, the shaded (non-shaded) area in <Figure 1> represents the combination of ρ and γ with which prohibiting (allowing) pre-trial settlement is beneficial. Note that countries would benefit from allowing pre-trial settlement if the probability of being subject to high political pressure is not too high ($\rho < 2/3$) and F's private signal is informative about H's private political pressure ($\gamma > 1/2$). Also note that an improvement in the accuracy of F's private signal makes pre-trial settlement be a desirable dispute settlement option even for higher values of ρ. As long as F's private signal is accurate enough, countries would benefit from allowing pre-trial settlement.

4. Concluding Remarks

To analyze the role of pre-trial settlement in international trade dispute resolutions, this paper develops a simple model of trade and trade disputes in which a government is subject to private political pressure for protection, of which its trading partner receives imperfect private signal. As a way to enforce an optimal contingent protection agreement that maximizes the expected joint payoff of governments of trading countries, it considers and compares three alternative enforcement schemes, namely the automatic DSB-ruling scheme, the on-demand DSB-ruling scheme with pre-trial settlement possibility, and the on-demand DSB-ruling schemes without pre-trial settlement possibility. The analysis shows that allowing pre-trial settlements increases the expected joint payoff of governments that try to enforce the optimal contingent protection agreement, as long as the private signal of the political pressure for protection is accurate enough.

Pre-trial settlement may facilitate a more efficient use of imperfect private information of trading partners in restraining the potential abuse of contingent protection often allowed in international trade agreements. When a government tries to abuse the contingent protection by misrepresenting its low political pressure for protection, allowing pre-trial settlement induces the government to withdraw such a claim in the face of its trading partner's petition against the claim. There is also a cost associated with allowing pre-trail settlement because it requires governments to choose costly punishment actions against no settlement in the case that DSB wrongly judges against the presence of high political pressure for protection. If trading partners' private signals of the political pressure for protection is accurate enough, such a cost associated with misjudgment will be dominated by the gain from restraining the potential abuse of contingent protection.

There are several ways to extend the analysis of this paper. Recall that this paper introduces simplifying assumptions, such as the existence of only two types (high or low) of political pressure for protection and only two levels of protection that each government can choose to impose. For example, expanding the set of protection levels that governments can select will create more complex settlement options for governments. Multiple types of political pressure for protection will require the enforcement mechanism to satisfy multiple incentive constraints for truthful revelation of private political pressure for protection. Thus, relaxing these assumptions is far from being a trivial extension of this paper, which may generate useful new insights of the optimal dispute settlement mechanism for enforcing international trade agreement.

Professor, Department of Economics, Seoul National University
599 Gwanak-ro, Gwanak-gu, Seoul, 151-746, Korea
Phone: 82-2-880-6329
Fax: 82-2-886-4231
E-mail: j-hpark@snu.ac.kr

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