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Lobby Behavior and Neighbor-favored Fund under

Environmental Dispute Settlement System

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Abstract

Fifty percents of agreements made by mediated negotiation have required a polluting firm to pay monetary award including damage compensation and neighbor-favored fund to the victims whose health and property were damaged by its discharges since local mediation committees that were authorized on behalf of "Public Dispute Settlement Act" started tackling pollutant discharge disputes in 1993. The neighbor-favored fund doesn't depend on damages. Thus, a polluting firm that obeys emissions standards set by an environmental regulator may remit damage compensation and neighbor-favored fund to the victims. The latter payment varies with "political pressure" on bargainers. Political pressure means that the damage suffers as bargainers lobby administrative officials and local parliamentarians either to cut some forms of subsidies (or tax credits) or to take disturbing visits (legal) to a polluting firm. To study the problem, we built a dynamic model of game theory and first assumed that only the damage suffers can make lobbying efforts. Then, the model extends to the one with the assumption that the firm and the damage suffers can make lobbying efforts, which is close to reality. It is shown that the two disputants reach an agreement indicating a monetary award, although the compensation for damages also

could be used for other purposes.

Introduction

The Taiwan Environmental Protection Agency (TEPA) adopted mediation to settle pollutant discharge disputes.　The Public Dispute Settlement Act of 1992 stipulates that the victims whose human health and property value are damaged by pollution of the neighboring source can petition a mediation committee.　The committee invites the disputants to a meeting to bargain over the amount of compensation.　Based on its legal, political, and economic resources, a disputant seeks to influence the solution to the dispute.　In Taiwan, the victims want to use the dispute to acquire the liable firm's financial assistance in the community affairs and worry the firm may not negotiate.　They know that the local parliamentarians think about their constituency and sympathize with their view.　Consequently, they threaten the liable polluter by lobbying the local parliamentarians to put political pressure on it to negotiate.　Political pressure could include threats to cancel subsidies to the firm's investment and stopping tax incentives.

The victims' threats could cause the two disputants to reach an agreement indicating a monetary award that consists of compensation for damages and additional fund that can be used for the community affairs.　Thus, the TEPA's dispute settlement policy might generate a resolution that is irrelevant to damages.

Bingham (1986) and Gray (1997) are the only two studies to discuss cases of pollutant discharge disputes in detail.　They didn't use economic concepts and mathematical models to characterize a pollutant discharge dispute over compensation resolved by mediated negotiation. In the literature of application of bargaining theory to environmental regulation, Amacher and Malik (1996 and 1998) and Heyes (1997) have studied a two-stage game played by an environmental regulator and a firm without mediated negotiation.

The objective of this study is to examine the role the mediated negotiation plays in the polluter's and the victims' decision-making processes.　This study tries to find what factors determine a monetary award and to examine whether emissions and lobbying efforts decrease with the system of dispute settlement after these disputants make a pre-dispute contract.

Theoretical Model And Backward Induction

The Third Stage

Let T be the number of bargaining periods, δ_c be the community's discount factor and δ_f be the firm's discount factor.　Since a party's discount rates are invariant over time and all of a

party's time delays are equal during negotiation, δ_{c3}'s and δ_{f3}'s are invariant over bargaining periods. Suppose M_c denotes the payoff that the community offers to himself, and M_f denotes the payoff that the firm offers to the community. The community's offer in negotiation is denoted ϕ_c. Suppose a subgame-perfect equilibrium in the last period (t = 2) is for the community to O(x) - ϕ_c to the firm, where O(x) is denoted the firm's outlay within his budget. For the second period (i.e., t = 1), the share of O(x) that the last offer (i.e., the community) of the bargaining game obtains in any perfect equilibrium cannot be less than δ_c (1 – q) ϕ_c + q (H(x - θ) – G_1(y)), where H(·) is arbitrated compensation, F(·) is the community's cost of post-bargaining lobby, and H – G_1 is the community's payoff from disagreement (i.e., s_A on the diagram). So the share of O(x) the firm obtains in any perfect equilibrium is at most O(x) - δ_c (1 – q) ϕ_c - q (H(x - θ) – G_1(y)). In the initial period (t = 0), the share of O(x) that the second offer (i.e., the firm) of the bargaining game obtains in any perfect equilibrium cannot be less than δ_f (1 – q) (O(x) – (δ_c (1 – q) ϕ_c + q (H(x - θ) – G_1(y)))) + q (O(x) – H(x - θ) – K(x,y/v)), where O – H – K is the firm's payoff from disagreement. Hence, the share of O(x) that the community obtains in any perfect equilibrium is at most O(x) – (δ_f (1 – q) (O(x) – (δ_c (1 – q) ϕ_c + q (H(x - θ) – G_1(y)))) + q (O(x) – H(x - θ) – K(x,y/v))). We illustrate this in the third row of Table 1.

Table 1
Three-period bargaining game when the community moves first

Period	Offer made by	An offer
2	The community	$M_c^2 = \phi_c$
1	The firm	$M_f^1 = \delta_c$ (1 – q) ϕ_c + q (H(x - θ) – G_1(y))
0	The community	$M_c^0 = $ O(x) – (δ_f (1 – q) (O(x) – (δ_c (1 – q) ϕ_c + q (H(x - θ) – G_1(y)))) + q (O(x) – H(x - θ) – K(x, y/v)))

The same procedure is used to construct Table 2. M_f^0 of Table 2 represents the community's perfect equilibrium payoff when the firm moves first and agreement is reached at t = 0. M_f^0 is positive and unique.

Table 2
Three-period bargaining game when the firm moves first

Period	Offer made by	An offer
2	The firm	$M_f^2 = \phi_f$
1	The community	$M_c^1 = $ O(x) – (δ_f (1 – q) (O(x) - ϕ_f) + q (O(x) - H(x - θ) – K(x, y/v)))

0	The firm	$M_f^0 = \delta_c (1 - q) (O(x) - (\delta_f (1 - q) (O(x) - \phi_f) + q (O(x)$
		$- H(x - \theta) - K(x,y/v)))) + q (H(x - \theta) - G_1(y))$

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The Second Stage

There is a variable y representing the community's lobbying effort. The value of y is non-negative. Variable costs of the community's lobbying effort are denoted $G_1 = G_1(y)$, where $G_1(0) = 0$, $G_{1y} > 0$, $G_{1yy} > 0$, and $G_1(0) = G_{1y}(0) = 0$. The community's objective is to minimize its total costs V that consists of G_0, $G_1(y)$, and $D(x + w - \theta)$ but minus $M^{op}(x, y; \alpha, \theta, v)$, where M^{op}, which is identical to $H + \alpha K$, represents an agreed-upon amount of monetary award that is obtained from a way that backward induction is applied to mediated negotiation at the third stage.

The First Stage

The firm's abatement costs and outlay are $A = A(x)$ and $O = O(x)$, x is the level of emissions, A is a convex function ($A_x < 0$ and $A_{xx} > 0$), and O is a linear function ($O_x > 0$ and $O_{xx} = 0$). When the level of emissions is zero, the cost function has the following characteristics: $A(0) < \infty$, and $A_x(0) > -\infty$. The agency can impose a fine on the firm that has violated the emissions standard x^*. The fine is based on the level of violation, denoted $z = x - x^* \geq 0$. When $x \leq x^*$, the value of z is zero. The firm's fine is $F = F(z)$, where $F_z > 0$, $F_{zz} > 0$, $F_z (0) = F(0) = 0$. The firm's objective is to minimize its total costs C that consists of $A(x)$, $F(z)$, and $M^{op}(x, y^{op}(x; \alpha, v); \alpha, \theta, v)$ but minus $O(x)$, where y^{op} represents the level of the community's lobbying effort that reacts to the firm's emissions and is obtained from a way that backward induction is applied to the community's decision at the second stage, M^{op} represents an agreed-upon amount of monetary award that is obtained from a way that backward induction is applied to mediated negotiation at the third stage, and $O - M^{op}$ is positive and represents the firm's cost from agreement.

By using backward induction, we solve for the sequentially rational equilibrium emissions, the sequentially rational equilibrium lobbying effort, and the equilibrium monetary award that consists of damage-relevant compensation and neighbor-favored fund.

Results And Conclusion

Results

It is shown that a monetary award does consist of damage-relevant compensation and neighbor-favored fund.   The former decreases with greater natural dilution of emissions.   The latter is positively related to political pressure made by the local parliamentarians and the community's relative bargaining power but is negatively related to the firm's relative bargaining power.   The community won't undertake petition activity and make lobbying effort because of the greater natural dilution of emissions and the larger fixed cost of petition activity.   It is also shown that the firm improves abatement technology or curtails the amount of outlay per emission prior to operation of the factory so that decreased emissions prevent the community's petition and lobbying.

Conclusion

The mediated agreement derived from the model implies that the TEPA (Taiwan Environmental Protection Agency))'s dispute settlement policy might generate neighbor-favored fund that is irrelevant to damages when the structure of mediated negotiation is for two bargainers to move sequentially.   This makes compensation in agreement unfair to the liable firm.   Especially, the firm that discharges concentration-high pollutants of outflow pays more. However, the amount of neighbor-favored fund in agreement will be smaller when the firm improves abatement technology or curtails the amount of outlay per emission.   If the firm and the community simultaneously lobby the local parliamentarians after a negotiation is broken, the neighbor-favored fund will decrease but emissions will increase.

The pre-dispute contract states that, before generating pollution, the firm commits to reducing emissions and, simultaneously, assures that the community also reduces lobbying efforts. Our result supports the fact that the TEPA that pursues better environmental quality and less disputes has encouraged two disputants to make this type of contract in addition to the system of dispute settlement.

Self Evaluation

We recognized that the model still couldn't depict the entire context of the dispute because the game used here is assumed to have complete and perfect information.   Actually, the game must be associated with incomplete information because, in many circumstances, the firm and the community don't know all relevant information about each other, e.g., abatement costs, petition costs, lobby costs, and political pressure made by the local parliamentarians.   In a mediated negotiation with two-sided asymmetric information, the firm and the community don't know the parliamentarians' attitude.   However, if a new model includes these conditions the reality has, the analysis of the dispute will be hard to make clear.   More revisions on the model are required for a complete study.

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