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Arbitrator's Reputation and PR Cost: A Signaling Approach

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We construct a signaling game model between the arbitrator and claimants, in which the arbitrator's marketing amount is adopted as the signaling device. Assuming that the parties to the dispute select an arbitrator, and if there is a difference in the arbitrator's fee depending on the arbitrator's reputation, the arbitrator will pay to further enhance his reputation. We would like to analyze the cost differences between arbitrators who already have a high reputation and arbitrators who strive to further enhance their reputation using the signal model. From the Analysis of our study, We derive perfect Bayesian equilibrium of the signaling game and refine the equilibrium into a unique equilibrium by invoking the Intuitive Criterion of Cho and Kreps (1987). Further, we characterize the refined equilibrium.

Key Words : arbitration, arbitrator, signaling game, Reputation, Arbitrator Fee

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Ⅰ. Introduction

Globalization has opened up significant opportunities for numerous companies to venture into foreign markets. Such overseas market entry can occur through involving direct or indirect exports such as intermediary trade or merchandising trade, as well as through joint ventures or Franchise contracts in the case of high contract amounts. However, with the rise in overseas market entry, there is an inevitable increase in related disputes, particularly witnessing a rise in more complex and larger disputes compared to the past.

In international trade contracts, the arbitration system has gained widespread recognition and adoption among global companies and foreign investors. To settle disputes, parties commonly include an arbitration agreement clause in their contracts, opting for arbitration as a preferred method of dispute resolution, extending its application beyond product transactions into various fields.

Arbitration is an important alternative settlement method to the court. As mentioned before, disputes parties can decide the procedure to their liking including appointing arbitrators for their case (Paul Pecorino et al. 2022, Nak Hyun Han, Doo won Choi, 2019). Arbitration is a method of resolving disputes outside of the traditional court system. It involves the parties to a dispute agreeing to submit their disagreement to a neutral third party, known as the arbitrator, who will make a binding decision on the matter (Oh, Chang Seog, 2016).

An essential aspect of international arbitration is the role of the arbitrator, vested with the authority to conduct fair proceedings and render arbitration awards. The parties expect the arbitrator to act independently and demonstrate impartiality while possessing a higher understanding compared to traditional judges in lawsuits. Consequently, arbitral awards made by arbitrators are often perceived as more reliable.

The arbitration system is categorized into institutional arbitration and ad-hoc arbitration. The former refers to arbitration conducted in accordance with the arbitration rules of a permanent arbitration institution, while the latter involves arbitration generally based on an agreement between the parties after a dispute arises, without the involvement of an arbitration institution.

In institutional arbitration, the role of the arbitrator is the most important. Institutions

appoint new arbitrators or reappoint previous arbitrators annually, constituting a pool of distinguished experts from various fields. Adequate compensation is provided to arbitrators commensurate with their abilities. Ad-hoc arbitration, on the other hand, entails a more private process, relying on the trust that both parties will conduct arbitration fairly, independently, and impartially. Regardless of the type of arbitration, the arbitrator's role remains one of the most crucial factors in arbitration procedures.

This study assumes that parties opting for arbitration will carefully review the list of arbitrators based on objective information, selecting an arbitrator who will impartially resolve their cases. The study also analyzes the efforts made by arbitrators to enhance their reputation and the associated costs incurred, as such factors contribute to building trust with the dispute parties. The analysis focuses on arbitrators in various fields and observes an increasing trend of arbitrators striving to attain higher levels of recognition, which might lead to associated costs and potential biases.

When dispute parties select arbitrators, both the claimant and respondent believe that the selected arbitrator is the most suitable for their case. This study focused on the arbitration applicant on the assumption that the best arbitrator was selected by the party, and to obtain the selection of the party it was assumed that different costs were spent between arbitrators to inform the general public of the same level of reputation.

The study primarily focuses on the claimant, assuming that the best suitable arbitrator is chosen by the party and investigates potential differences in costs between arbitrators to inform the public about arbitrators' reputations. Signaling approaches explore the impact on the other person when an informed individual takes certain actions to disclose private information. This is a significant cost to the receiving party, both in terms of effort and resources. We intend to apply the signaling approach to conduct a comprehensive study.

Ⅱ. Background

In this Study, we develop a signaling game model between an arbitrator and claimants, modifying the job marketing signaling game of Spence (1987). We allow for asymmetric information about the arbitrator's ability between the arbitrator and the

claimants, in which the arbitrator exactly knows its ability while claimants infer it after observing the arbitrator's signal. Regarded as the one with good ability to the claimants, the arbitrator has incentive to expend marketing or public relations costs. We call the arbitrator with good ability the high type and that without it the low type. Since the high type would have better reputation in the market compared to the low type's, the marginal marketing cost of high type is lower than that of the low type. Thus, the claimants could set a cutoff amount of marketing to separate the high type and the low type.

We derive the perfect Bayesian equilibria of the signaling game and refine them into a single equilibrium by invoking Intuitive Criterion of Cho and Kreps (1987). Then we characterize the refined equilibrium. We find that the amount of marketing chosen by the high type depends on the differences in arbitration fees and loss recovery rate between the high type and low type. Further, it is shown that the expected profit of low type is only affected by its arbitration fee since the low type does not spend money on marketing while the high type's expected profit is the function of both types' arbitration fees and marginal marketing costs.

Our signaling model is an indistinguishable from general study of arbitration. Some previous studies introduced the signaling model to the arbitration or dispute settlement. Famer and Pecorino (2005) conduct an examination of contingency fees using the Reinganum and Wilde (1986) signaling model of Litigation. The impact of contingency fees on settlement outcomes relies on the specific terms of the contingency fee contract and the underlying informational asymmetry assumed in the model. Contract where the contingency percentage is higher during the trial phase, alters the selection of disputes at trial. However, its overall effect on the dispute rate becomes ambiguous when an informed plaintiff makes the offer. Nevertheless, for reasonable parameter values, this arrangement tends to increase settlement in the model where an informed defendant makes the offer. On the other hand, introducing a unitary contingency fee, where the contingency percentage remains the same in both pretrial settlement and trial stages, consistently leads to a higher incidence of trials in both versions of the signaling model.

Famer and Pecorino (2021a) present a signaling model of Final offer Arbitration (FOA) where the party possessing more information makes the final settlement demand

to the uniformed party. In FOA, each party presents a proposal to an arbitrator, and if no agreement is reached, the arbitrator must choose one of the two submitted proposals as the final settlement. Within this model, they examine the implications of costly voluntary disclosure and costly discovery. In conventional litigation models, costly disclosure may occur in the signaling game, but costly discovery is not expected to take place. However, in the context of FOA, if information transmission occurs before submitting proposals to the arbitrator, there is a possibility of costly discovery. Nonetheless, the incentive for voluntary disclosure is relatively weakened compared to a standard litigation model. On the other hand, if information transmission occurs after the submission of proposals to the arbitrator, the outcomes align with those typically found in a standard litigation model, where costly voluntary disclosure may occur but costly discovery does not play a role

Famer and Pecorino (2021b) propose a signaling model of final offer arbitration (FOA) where the informed party makes the final settlement demand to the uninformed party. In FOA, both parties present their proposals to an arbitrator, and if no agreement is reached, the arbitrator must choose one of the two submitted proposals as the final settlement. They focus on a "before" model of FOA, where all settlement activity occurs prior to the exchange of proposals. In this setting, they analyze and characterize the pure strategy separating equilibrium associated with the game. Comparing it to a model of conventional arbitration (CA), they find that the pure strategy separating equilibrium in FOA is linked to a higher dispute rate. This is because weaker player types have a stronger incentive to bluff in this setup, leading to more disputes compared to CA. This result remains consistent even in semi-pooling equilibria, reinforcing the notion of a higher dispute rate in FOA compared to CA. And they compare the incentives for engaging in costly voluntary disclosure and costly discovery between the two models.

Paul Pecorino and Mark Van (2018) present the results of an experimental analysis focusing on the signaling and screening models of Litigation, both driven by asymmetric information leading to bargaining failure. The key distinction between these models lies in their bargaining structures. In the signaling game, the informed party is responsible for making the final offer, while in the screening game, the uniformed party takes on this rile. To maintain consistency, they conduct experiments for both

models suing the same set of parameter values, with the only difference being the identity of the party making the final offer across games, in the later rounds of the experiment, more than 90% of the offers align with the theoretical predictions, demonstrating a convergence towards the expected outcomes. Furthermore, they find that having the right to make the final offer leads to increased expected payoffs for a player, but the actual improvement falls short of what the theory predicts.

Paul Pecorino and Mark Van (2019) experimented analysis of discovery in both the signaling and screening games, they explore scenarios where an uninformed defendant has the option to engage in costly discovery. According to theoretical predictions, the defendant should use the costly discovery procedure in the screening game but not in the signaling game. They observe that discovery is invoked in approximately 73% of all negotiations, aligning closely with the theoretical expectations. In the signaling game, they find a notable deviation from the theory. Discovery is invoked about 61% of the time, and this behavior persists throughout the later rounds of the experiment. Although invoking discovery is expected to reduce the defendant's payoff, they find that the effect on the defendant's cost is statistically insignificant or not significantly different from zero. They present that these deviations from the theoretical predictions in both games point to the importance of fairness considerations in the decision-making process. Participants seem to take into account notions of fairness, leading to behaviors that deviate from the pure theoretical outcomes.

Ⅲ. The Model

There are two types of risk-neutral agents: an arbitrator and claimants. The arbitrator (he) make a decision on disputed issues posed by claimants. Clearly, as the arbitrator has a higher reputation, he would make a contract at a higher fee with claimants. In order to signal the arbitrator's reputation, he would have incentive to expend marketing or public relations costs. If the arbitrator already have a good reputation and enough track records, he would convince customers at a lower marketing cost, and otherwise, he would spend more money to persuade his ability to customers. We assume two types of the arbitrator and his type space is given by $T \equiv \{H, L\}$. The

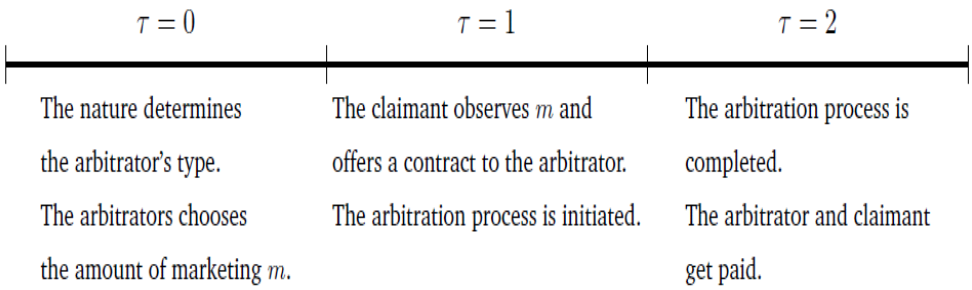
arbitrator with type H is called the high type and that with type L is called the low type. The high type implies the arbitrator with good reputation in the markets and the low type implies the arbitrator without it. The amount of marketing is denoted by m and the high type's unit cost of marketing is denoted by c_H and the low type's is denoted by c_L where $c_H < c_L$ and $c_H, c_L \in (0, \infty)$.

Claimants are looking for an arbitrator to settle some disputes. By arbitration processes, they hope to recover a fraction of losses they have incurred. We assume that their are lots of claimants in the market and they are under Bertrand competition so that their expected profit by arbitration is zero. Thus, henceforth, claimants are represented by a single claimant (she). The maximum value she could recover is A and she believes that the level of recovery depends on the ability of the arbitrator. Let θ_H be the expected recovery rate when the arbitration is taken by the high type and θ_L be that when it is taken by the low type where $\theta_L < \theta_H$ and $c_H, c_L \in (0,1)$. Thus, if the arbitration is processed with the high (low) type, the claimant would expect to get paid $A\theta_H$ ($A\theta_L$, respectively). If the claimant believes that the arbitrator is the high (low) type, she is willing to pay K_H (K_L, respectively).

There exists asymmetric information about the type between the arbitrator and the claimant. The arbitrator acquires exact information about his type as soon as it is determined, while the claimant is not informed about the arbitrator's type. However, the clamant has exact information about the arbitrator's type set T. The claimant is only informed about the amount of marketing chosen by the arbitrator. She has prior belief μ about the arbitrator's type such that $\mu(H) = q$ and $\mu(L) = 1 - q$.

The game between the arbitrator and the claimant persists over three periods $\tau = 0, 1, 2$. In period $\tau = 0$, the nature determines the arbitrator's type $t \in T$ and he is informed about his type. Then the arbitrator decides the amount m of marketing and expend marketing cost. In period $\tau = 1$, the claimant offers the contract for the arbitration service after observing the amount of marketing and the arbitration process is initiated. In period $\tau = 2$, the arbitration process is completed and the arbitrator and claimant get paid. Figure 1 summarizes our sequence of events

<Figure 1> Sequence of events



Let $\hat{t} \in T$ denote the arbitrator's type perceived by the claimant. Then the expected profit of the claimant is given by

$$\pi_c(\hat{t}) = A\theta_{\hat{t}} - K_{\hat{t}},$$

which becomes zero under the Bertrand competition. The expected profit of the arbitrator is the function of m while t and $\hat{t}$ are given:

$$\pi_a(m;t,\hat{t}) = K_{\hat{t}} - c_t m.$$

Ⅳ. Perfect Bayesian Equilibria

We adopt perfect Bayesian equilibria (PBE) as a solution concept of the signaling game between the arbitrator and claimant. In this section, we derive separating and pooling equilibria of our signaling game.

1. Separating Equilibria

In separating equilibria, the claimant correctly perceive the arbitrator's type, and then we have $\hat{t} = t$. Under the Bertrand competition, her expected profit is zero and thus, in equilibria,

$$A\theta_t - K_t^* = 0 \quad \text{for} \quad t \in T,$$

holds. This implies that

$$K_L^* = A\theta_L \quad \text{and} \quad K_H^* = A\theta_H. \tag{1}$$

Given the fixed compensation $K_{\hat{t}}$, the low type has no incentive to spend marketing cost. Thus incentive compatibility constraints for the high type and low type are given by

$$\begin{aligned} K_H^* - c_H m &\geq K_L^*, \\ K_L^* &\geq K_H^* - c_L m \end{aligned} \tag{2}$$

Then we have the following separating equilibria.

Proposition 3.1 In separating equilibria, amounts of marketing chosen by the high type and the low type are given by, respectively,

$$m_L^* = 0 \quad \text{and} \quad m_H^* \in \left[\underline{m}_H, \overline{m}_H\right]$$

where

$$\underline{m}_H = \frac{K_H^* - K_L^*}{c_L},$$

$$\overline{m}_H = \frac{K_H^* - K_L^*}{c_H}$$

and the claimant's posterior belief is given by

$$\mu(L \mid m) = \begin{cases} 1 & \text{if } m < m_H^* \\ 0 & \text{if } m \geq m_H^* \end{cases}$$

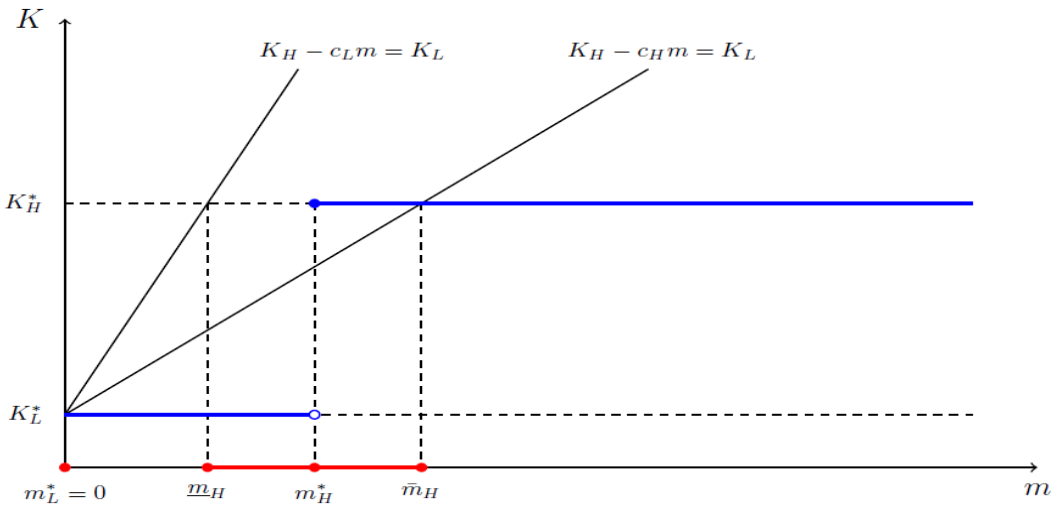
By (1), $\underline{m}_H$ and $\overline{m}_H$ are rewritten as

$$\underline{m}_H = \frac{A(\theta_H - \theta_L)}{c_L} \quad \text{and} \quad \underline{m}_H = \frac{A(\theta_H - \theta_L)}{c_H},$$

respectively.

Figure 2 illustrates a separating equilibrium of Proposition 3.1. The claimant sets a cutoff amount $m^* \in [\underline{m}_H, \overline{m}_H]$ of marketing. That is, if the arbitrator chooses the amount m of marketing greater than or equal to m^*, the claimant regards him as the high type. Otherwise, the arbitrator is regarded as the low type. The high type arbitrator chooses amount m of marketing since if he is considered to be the high type, he obtain a higher profit than otherwise. On the other hand, the low type would not expend marketing cost to maximize his profit.

<Figure 2> Amount of marketing in the separating equilibria



2. Pooling Equilibria

In pooling equilibria, the claimant could not distinguish between the high type and the low type. While the clamant's prior belief μ is given, the claimant offers arbitration fee K_P to the arbitrator. Under the Bertrand competition, the claimant expects zero profit and then we have

$$[\mu(L)\theta_L + \mu(H)\theta_H]A - K_P^* = 0.$$

In equilibria, therefore, expected fee for both types is given by

$$K_P^* = [\mu(L)\theta_L + \mu(H)\theta_H]A = [(1-q)\theta_L + q\theta_H]A \quad (3)$$

We suppose that $K_P^* \in (K_L, K_H)$.

To pool both types, the arbitrator sets the following incentive compatibility constraints:

$$\begin{aligned} K_P^* - c_H m &\geq K_L, \\ K_P^* - c_L m &\geq K_L \end{aligned} \quad (4)$$

Then we have the following pooling equilibria.

Proposition 3.2 In pooling perfect Bayesian equilibria, the low type and the high type choose the amount of marketing satisfying

$m_P^* \in [0, \overline{m}_P]$

where

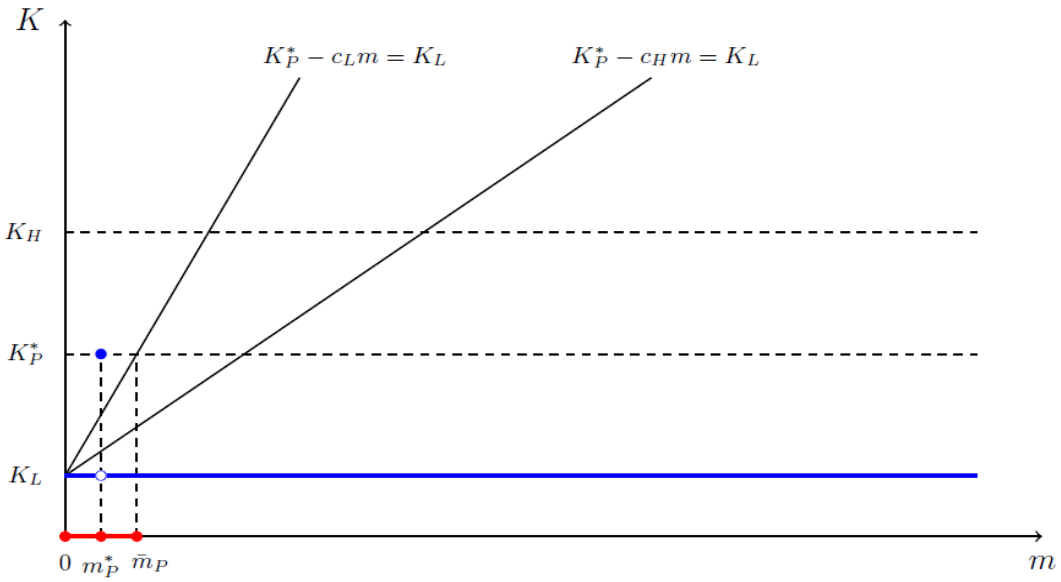
$$\overline{m}_P = \frac{K_P^* - K_L}{c_L}$$

and the claimant's posterior belief is given by

$$\mu(L|m) = \begin{cases} 1 & \text{if} \quad m \neq m_P^*, \\ \mu(L) & \text{if} \quad m = m_P^*. \end{cases}$$

We illustrate a pooling equilibrium of Proposition 3.2 in Figure 3. The claimant sets a threshold amount $m_P^* \in [0, \overline{m}_P]$ of marketing. If the arbitrators chooses m_p^* as the amount of marketing, she regards him as the high type with probability $q \in (0,1)$. Otherwise, the arbitrator is considered as the low type with probability 1. Thus, both types choose m_p^* to maximize their profit.

<Figure 3> Amount of marketing in the pooling equilibria



V. Refinement of Separating Equilibria

In this section, we refine the separating Bayesian equilibria by imposing the Intuitive Criterion of Cho and Kreps (1987). As is well known, all the pooling equilibria cannot survive the Intuitive Criterion. For a given equilibrium amount m_P^* of marketing, both types have incentive to deviate to off-the-equilibrium marketing amount in order to increase the expected profit. Thus, the claimant cannot classify the type which deviate from the equilibrium marketing amount. In the separating equilibria, only equilibrium with $m_H^* = \underline{m}_H$ survives the Intuitive Criterion. For a given equilibrium amount $m_H^* \rangle \underline{m}_H$ of marketing, only the high type can beat the expected profit by deviating to off-the-equilibrium marketing amount $m_{H'}$ less than m_H^*. Observing $m_{H'}$, the claimant would regard the arbitrator as the high type and thus the original separating equilibrium cannot survive the Intuitive Criterion. However, for the separating equilibrium with $m_H^* = \underline{m}_H$, the high type has no incentive to deviate to the off-the-equilibrium marketing amount and thus this separating equilibrium is stable and

survives the Intuitive Criterion.

We present the refined perfect Bayesian equilibrium in Theorem 4.1. We find that, among separating equilibria in Proposition 3.1, only equilibrium with $m_H^* = \underline{m}_H$ survives the Intuitive Criterion and the other equilibria are eliminated. Further, all the pooling equilibria in Proposition 3.2 fail to survive the Intuitive Criterion.

Theorem 4.1 There is a unique perfect Bayesian equilibrium surviving Intuitive Criterion in which amounts of marketing chosen by the high type and the low type are given by, respectively,

$$m_L^* = 0 \qquad \text{and} \qquad m_H^* = \underline{m}_H$$

and the investors' prior belief is given by

$$\mu(L \mid m) = \begin{cases} 1 & \text{if } m < m_H^* \\ 0 & \text{if } m \geq m_H^* \end{cases}$$

Ⅵ. Comparative Statics

Now we characterize the refined perfect Bayesian equilibrium in Theorem 4.1.

Proposition 5.1 In the refined equilibrium, the amount of marketing chosen by the high type satisfy the following.

1. As the difference between arbitration fees for the high type and low type increases, the high type chooses a higher amount of marketing to signal his type.
2. As the difference between recovery rates for the high type and low type increases, the high type chooses a higher amount of marketing to signal his type.
3. As the low type's unit cost of marketing increases, the high type chooses a lower amount of marketing to signal his type.

Proof : The proof is obvious.

The high type's amount marketing depends on the differences in arbitration fees and recovery rate between the high type and low type. If the arbitrator can obtain more compensation when the arbitrator is perceived as the high type by the claimants, the claimants set a higher cutoff marketing amount and the high type arbitrator should pay more money in marketing. Further, the claimants ask for a higher amount of marketing to be convinced that the arbitrator is high type as the difference in recovery rates increases. Note that the amount of marketing chosen by the high type does not depend on the high type's marginal marketing cost, but depends on the low type's marginal cost. It is because only the high type's minimum amount of marketing remains in the refined equilibrium. As the low type's marginal marketing cost increases, the high type signal his type with a lower marketing amount.

In the refined equilibrium, the expected profit of the high type and low type are

$$\begin{aligned} \pi_L &= K_L^*, \\ \pi_H &= K_H^* - \frac{c_H}{c_L}\left(K_H^* - K_L^*\right) = \left(1 - \frac{c_H}{c_L}\right)K_H^* + \frac{c_H}{c_L}K_L^*, \end{aligned} \tag{5}$$

respectively. Since $c_H/c_L \in (0,1)$, the high type's expected profit could be expressed as the weighted average of low type's arbitration fee K_L and the high type's one K_H.

Proposition 5.2 In the refined equilibrium, the expected profits of the low type and the high type satisfy the following.

1. The low type's expected profit increases in the low type's arbitration fee.
2. The high type's expected profit increases in the low type's arbitration fee.
3. The high type's expected profit increases in the high type's arbitration fee.
4. The high type's expected profit decreases in the ratio of the high type's unit cost of marketing to that of the low type.

Proof : The proof is obvious.

Since the low type does not spend money on marketing to maximize the expected profit, it only depends on the low type's arbitration fee. On the other hand, the high type's expected profit is affected by both type's arbitration fees and marginal marketing costs. The high type's expected profit depends on his marketing cost, which is affected by the low type's arbitration fee and marginal marketing cost. As the high type's arbitration fee increases, both the high type's revenue and marketing cost increases. However, since the former effect dominates the latter one, the high type's expected profit increases. If the low type's arbitration fee increases, the high type spend less money on marketing, and then the high type's expected profit increases. Since

$$\frac{\partial \pi}{\partial (c_H/c_L)} = -K_H^* + K_L^* < 0,$$

an increase in the ratio c_H/c_L decreases the high type's expected profit. When other variables remain constant, the high type's expected profit is not determined by the absolute amounts of arbitration fees c_H and c_L, but determined by the relative ratio c_H/c_L.

Ⅶ. Conclusion

In the signal model of arbitration, when there is a difference in the arbitrator's fee based on their reputation, arbitrators who have already established a high reputation and those striving to enhance their reputation will incur different costs.

Arbitrators with a high reputation will likely have a strong track record of making fair and accurate decisions. Their established reputation signals to the disputing parties that they are competent and reliable, which can lead to a higher allowance for their services. These arbitrators may not need to invest significant additional efforts or expenses to further enhance their reputation since their past performance already speaks for their capabilities.

On the other hand, arbitrators who are aiming to improve their reputation might need to invest more resources in their decision-making process to ensure fairness and accuracy. They may incur additional costs to conduct thorough research, gather more

evidence, or implement innovative approaches to dispute resolution. By delivering consistently fair and favorable outcomes, they aim to build a strong reputation, leading to higher expenses for their services in dispute cases.

Therefore, the cost differences between arbitrators with high reputations and those striving to enhance their reputation will largely depend on how much additional effort and resources the latter group is willing to invest for marketing cost in delivering exceptional arbitration decisions.

We construct a signaling game model between the arbitrator and the claimant in which the amount of marketing chosen by the arbitrator is used as the signaling device. Further, we derive perfect Bayesian equilibrium of the signaling game and refine them into a unique equilibrium which survives Intuitive Criterion of Cho and Krep (1987). Then we characterize the single equilibrium.

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