A Formal Haggling Theory of Firm Boundaries: The Tradeoff Between Bargaining Costs and Too Much Intervention*

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Abstract

This study aims to provide a formal haggling theory of firm boundaries. In the face of unforeseen disturbances in trade circumstances, trading parties engage in *ex post* contract renegotiation, which ends with agreement, disagreement, or third-party intervention. Given that third-party intervention under integration (i.e., fiat) is more efficient than that under non-integration (i.e., court ordering), we show that integration can economize bargaining costs but that it suffers from too much intervention. This tradeoff provides a formal explanation of why selective intervention fails.

Keywords: transaction cost; haggling; fiat; firm boundaries.

JEL Classification: D23, L22, M21.

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1 Introduction

One of the main topics in organizational economics is the issue of make-or-buy decisions or firm boundaries, namely whether trading parties should be integrated into a single firm. A number of approaches to this topic have been devised, such as transaction cost economics (hereafter TCE; e.g., Williamson, 1975, 1985, 1996), property-rights theory (hereafter PRT; e.g., Grossman and Hart, 1986; Hart and Moore, 1990), and incentive-system theory (e.g., Holmstrom and Milgrom, 1991, 1994).

TCE, the focus of this study, points out that *ex post* contract renegotiation/adaptation leads to two inefficiencies that motivate integration: haggling and maladaptation. Williamson (1975, p. 115) states that although "haggling is jointly (and socially) unproductive, it constitutes a source of private pecuniary gain." Haggling is then considered to include inefficient bargaining (e.g., Gibbons, 2010) and rent seeking (e.g., Gibbons, 2005). Maladaptation, on the other hand, means inefficient *ex post* decision making, including uncoordinated adaptation to disturbances, and the failure to realize efficient transactions. Such costly renegotiation/adaptation is caused by the combination of contract incompleteness and bilateral dependency between trading parties. TCE thus asserts that high relationship specificity and high complexity/uncertainty make market transactions costly. High relationship specificity results in a bilateral monopoly between trading parties, which provides each party high bargaining power with which to pursue his/her favorable terms of transaction and thus causes costly bargaining and uncoordinated adaptations. High complexity/uncertainty, on the other hand, makes *ex ante* contracts more incomplete, increasing the likelihood of inefficient renegotiation/adaptation.

TCE then asserts that haggling and maladaptation reduce if trading parties are integrated into a single firm because internal organizations can use fiat to settle conflict and encourage

coordinated adaptation. Thus, TCE's main hypothesis is that high relationship specificity and high complexity/uncertainty make integration more likely to be chosen. This hypothesis is strongly supported by the findings of a number of empirical studies (see Lafontaine and Slade, 2007 for a review of such studies).

Given the discussion above, more integration always seems to be better than less: a large integrated firm can never do worse than separation if each party behaves autonomously except when fiat is needed. However, TCE points out that such "selective intervention" cannot be realized because of the opportunistic use of fiat or owing to commitment reasons (e.g., top management's propensity to intervene).

Indeed, despite the empirical success of TCE, its argument is still relatively informal. More specifically, TCE suffers from the lack of a unified theory of the costs and benefits of integration. We thus contribute to the body of knowledge on this topic by providing a formal TCE model (i.e., a haggling model) in which both the benefits and the costs of integration are endogenously presented.

Our model combines the bargaining model developed in the literature on bargaining and reputation (e.g., Abreu and Gul, 2000; Compte and Jehiel, 2002) with Tullock's (1980) rent-seeking model. The timing of the model is as follows. First, a governance structure (either integration or non-integration) is chosen. Second, each party faces an unforeseen disturbance in trade circumstances with a positive probability (if no party faces a disturbance, the game ends). Third, *ex post* contract renegotiation (i.e., alternating-offer bargaining over how to split the trade value) takes place. The value split ends with agreement, perpetual disagreement, or third-party intervention (if either party calls for it). Lastly, if the value split is settled, trade is realized and the value is distributed.

As in the literature on bargaining and reputation, we assume that asymmetric information

about each party's type may exist. That is, a party who faces a disturbance may be "inflexible" in the sense of not settling for any payoff smaller than a specific share of θ (greater than the equilibrium share of the complete-information, alternating-offer game). Examples of such inflexible parties include those who find out their favorable adaptive actions bring them a payoff θ or incur cost θ when adapting to a disturbance.

In this study, non-integration and integration differ only in third-party intervention: the third party under non-integration (resp. integration) is court (resp. a boss of the parties).[1] In third-party intervention, each party undertakes rent seeking (e.g., hiring lawyers under non-integration and buttering up the boss under integration) and the outcome is determined according to the relative rent-seeking effort (i.e., Tullock's success function). We assume that third-party intervention is inefficient regardless of the choice of the governance structure (e.g., the trade value shrinks due to time-consuming procedures). Furthermore, following TCE's arguments (e.g., Tadelis and Williamson, 2013), court ordering is less efficient than fiat because of the lack of technical knowledge or for other reasons.

We show that a tradeoff between bargaining costs under non-integration and too much intervention under integration exists. In bilateral bargaining, a party who is not of the inflexible type has an incentive to mimic the inflexible type in an attempt to obtain a larger share of the value, which delays bargaining. Since fiat is more efficient than court ordering, third-party intervention may be employed as an outside option to avoid such bargaining costs under integration but not under non-integration, which is a benefit of integration. However, the presence of better third-party intervention also leads to the cost of integration: even if agreement in the bargaining is expected to be reached without any friction, a party whose payoff in the

[1] Tadelis and Williamson (2013) point out that disputes between trading parties are dealt with by court (resp. a third-party interface coordinator) under non-integration (resp. integration).

agreement is small has an incentive to call for unnecessary intervention.

Our result provides a formal explanation of why selective intervention fails (i.e., why too much intervention occurs under integration). Our result also points out that too much intervention is caused by subordinates' payoff-maximizing behavior, which complements TCE's view: top management's lack of commitment (e.g., propensity to manage) causes inefficient intervention. As third-party intervention triggers rent seeking, we also find that rent seeking is more prevalent within firms than between firms, which is consistent with the literature on influence activities (e.g., Milgrom and Roberts, 1988; Powell, 2015). Furthermore, we show that if complexity/uncertainty is sufficiently high, integration should be chosen, which is consistent with the main hypothesis of TCE.

Our study is related to the body of research on *ex post* inefficiencies and firm boundaries (e.g., Bajari and Tadelis, 2001; Matouschek, 2004; Powell, 2015). While these studies mainly deal with maladaptation, we focus on haggling. Schmitz (2006) introduces inefficient bargaining into the PRT framework. Since he assumes a take-it-or-leave-it bargaining setting, bargaining inefficiency leads to inefficient trade realization (i.e., bargaining breakdown). Unlike his study, we employ an alternating-offer bargaining setting to analyze not only bargaining breakdown but also bargaining delay. Furthermore, we do not deal with holdup problems (i.e., *ex ante* underinvestment problems), which have been extensively analyzed in the literature on PRT. Hart and Moore (2008) develop a behavioral model in which the haggling cost is exogenously given. Our study, on the other hand, endogenously derives the haggling cost in the form of bargaining delay and breakdown.

Our analysis borrows extensively from the results of works on bargaining and reputation (e.g., Abreu and Gul, 2000; Compte and Jehiel, 2002).[2] Those studies assume the presence

[2]Nobelprize.org. (2009) points out that the bargaining and reputation approach might be useful for formalizing

of a commitment/obstinate type that has inflexible demand and endogenously derives bargaining delay. Our study introduces endogenous outside options into their framework, and hence is closely related to Atakan and Ekmekci (2014) in whose model search markets serve as an endogenous outside option. Unlike their study, we focus on the situation in which the trading parties are locked in because of relationship specificity: there is no other trading partner for which to search. We instead consider third-party intervention as an outside option.

We formalize third-party intervention by employing the contest success function. Despite the many success functions (e.g., all-pay auction), we employ Tullock's (1980) model for simplicity and tractability. Hence, another formalization does not affect our results qualitatively as long as each party's payoff in third-party intervention is larger under integration than under non-integration. It is also worth noting that existing studies of TCE have employed Tullock's model (e.g., Masten, 1986; Gibbons, 2005).

The rest of the paper is organized as follows. Sections 2 and 3 present our model and analysis, respectively. Section 4 analyzes the optimal governance structure and presents our main result. Section 5 concludes.

2 The Model

Suppose two risk-neutral parties 1 and 2 trade one unit of a good. We assume that they are locked in because of relationship specificity. Because of contract incompleteness, either or both parties may face unforeseen disturbances in trade circumstances (e.g., change in demand or input price). The probability of each party facing a disturbance, denoted by p, and whose contract requires an adaptation are both common knowledge. When disturbances occur, *ex post* renegotiation over the terms of the transaction, especially bargaining over how to split the trade

opportunistic bargaining in Williamson's theory.

value between the parties, takes place. If no disturbance occurs, no renegotiation takes place and the value of size 1 is created.

The bargaining over the value split proceeds as follows. In odd (resp. even) periods, party 1 (resp. party 2) becomes the proposer. In period t the proposer (say party i) either makes an offer x^t, which denotes his/her demanded share of the value of size 1, or calls for third-party intervention (i.e., court ordering under non-integration and fiat under integration). If the offer is made, the responder (party j) accepts, rejects, or calls for third-party intervention. If the offer is accepted, the transaction is realized and the value is distributed according to the accepted offer. If the offer is rejected, the bargaining proceeds to the next period where party j becomes the proposer. If third-party intervention is called for, the third party (i.e., court under non-integration and a boss under integration) determines the value split. As it will soon be clear, third-party intervention may serve as an outside option. Each party's common discount factor is denoted by δ, which is assumed to be sufficiently close to 1 for simplicity (i.e., $\delta \approx 1$).

We assume that those who face disturbances may be of the inflexible type with probability $\varepsilon \in (0,1)$: the inflexible type always demands $\theta > 1/(1+\delta)$ and never accepts any smaller proportion of the value in the bargaining. For example, those who face disturbances may find out their favorable adaptive actions that bring them a payoff θ. Each party's type is his/her private information. Given the uncertainty about each type, each party who faces a disturbance may have an incentive to build a reputation for the inflexible type in an attempt to improve his/her payoff. For convenience, we refer to the inflexible type as the I type and parties without inflexible demand as the F type. Note that a party who faces no disturbance cannot be of the I type.

If third-party intervention is called for, each party i makes his/her rent-seeking investment $r_i \in \Re_+$ (e.g., hiring lawyers under non-integration and buttering up the boss under integra-

tion), and then the third party distributes to party i a value according to Tullock's (1980) success function: $\{r_i/(r_i + r_j)\}\gamma_g$, where γ_g represents the aggregate payoff of third-party intervention under governance structure $g \in \{M, H\}$ (M and H stand for market/non-integration and hierarchy/integration, respectively). We assume that third-party intervention entails inefficiency (e.g., time-consuming procedures) and, as TCE (e.g., Tadelis and Williamson, 2013) points out, the limit of court ordering is severer than that of fiat: $\gamma_M < \gamma_H \leq 1$.

The game proceeds as follows. First, the governance structure (i.e., either non-integration or integration) is chosen. Second, each party faces a disturbance and then privately knows his/her own type. If neither party faces a disturbance, no contract renegotiation occurs, the value of size 1 is created, and the game ends (i.e., the value is distributed according to the *ex ante* contract, which is not modeled). If either or both parties face disturbances, on the other hand, the bargaining over the value split takes place. The bargaining ends with agreement, perpetual disagreement, or third-party intervention. When third-party intervention is called for, each party chooses his/her rent-seeking effort and then the third party determines the value split.[3] After the value split is settled (i.e., agreement is reached or third-party intervention takes place), the trade is realized and the value is distributed; otherwise, each party obtains a zero payoff.

3 The Analysis

We now proceed to the analysis. Subsection 3.1 focuses on each party's optimal rent-seeking effort in third-party intervention and Subsection 3.2 presents the bargaining outcome.

[3] Assuming rent seeking before bargaining does not affect our results qualitatively.

3.1 Rent-Seeking Effort in Third-Party Intervention

We first analyze third-party intervention under each governance structure. As mentioned, each party's share of the value is determined by Tullock's success function, and thus party i faces the following maximization problem with respect to his/her rent-seeking effort r_i:

$$\max_{r_i \in \Re_+} \frac{r_i}{r_i + r_j}\gamma_g - r_i.$$

Since the parties are symmetric, it is obvious that both choose the same rent-seeking effort. Let r_g denote each party's optimal rent-seeking effort under governance structure $g \in \{M, H\}$. The following lemma is then immediate.

LEMMA 1 *The optimal rent-seeking effort is higher under integration than under non-integration:* $r_M < r_H$ *where* $r_g \equiv \gamma_g/4$ *for all* $g \in \{M, H\}$.

We then find that each party's equilibrium payoff in third-party intervention under governance structure g is given by $\gamma_g/4 \equiv w_g$. Since $\gamma_M < \gamma_H$, it is obvious that $w_M < w_H$ holds.

3.2 Bilateral Bargaining

We next analyze our bargaining stage. If neither party faces a disturbance, no bargaining takes place. Hence, we here focus on the situations where either or both parties face disturbances. Before proceeding, it is worth noting that the results presented in this subsection are borrowed extensively from the literature on bargaining and reputation. For the proofs of those results, see Abreu and Gul (2000) and Compte and Jehiel (2002).

Given Lemma 1, there are three cases under each governance structure. First, $1-\theta > w_g$ and either party faces a disturbance. Second, $1-\theta > w_g$ and both parties face disturbances. Third, $1-\theta < w_g$ and either or both parties face disturbances. When $1-\theta > w_g$, each party prefers concession (i.e., let his/her partner obtain θ) to third-party intervention and thus our bargaining

game corresponds to that without outside options. $1-\theta<w_g$, on the other hand, represents the situation in which each party prefers third-party intervention to concession and hence our bargaining game can be interpreted as that with outside options. Furthermore, the cases in which either party faces a disturbance correspond to bargaining under one-sided uncertainty and those in which both parties face disturbances bargaining under two-sided uncertainty. We refer to those cases as Cases 1, 2, and 3, respectively. Existing studies of bargaining and reputation have already examined the outcomes in each case.

Lemma 2 focuses on Case 1 (i.e., $1-\theta>w_g$ and either party faces a disturbance) and shows that the party who may be of the I type (i.e., who faces a disturbance) approximately obtains θ as δ approaches 1.

LEMMA 2 (Compte and Jehiel's (2002) Proposition 2): *Consider the case in which only party i faces a disturbance and each party prefers concession to third-party intervention (i.e., $1-\theta>w_g$). Then, for any perfect Bayesian equilibrium, as δ approaches 1, parties i and j obtain approximately θ and $1-\theta$, respectively.*

Lemma 3 points out that in Case 2 (i.e., $1-\theta>w_g$ and both parties face disturbances) bargaining delay occurs in equilibrium. Each party (if the F type) tries to build a reputation for the I type because if his/her partner (F type) concedes, he/she can obtain a large share θ. However, he/she prefers concession if his/her partner never concedes (namely, if his/her partner is of the I type). He/she then concedes only at the constant rate that keeps his/her partner indifferent between revealing him/herself as the F type and mimicking the I type, which causes a costly delay.

LEMMA 3 (Abreu and Gul's (2000) Proposition 4 and Compte and Jehiel's (2002) Proposition 3): *Consider the case in which both parties face disturbances and each party (if the F type) prefers*

concession to third-party intervention (i.e., $w_g<1-\theta$). As δ approaches 1, each party (if the F type) obtains approximately $1-\theta$ for any perfect Bayesian equilibrium of the game.

Lemma 4 suggests that in Case 3 (i.e., $1-\theta<w_g$ and either or both parties face disturbances) each party (if the F type) reveals him/herself as the F type immediately. In equilibrium, if a party demands θ, his/her partner (if the F type) believes that he/she is of the I type with probability 1 and thus calls for third-party intervention because $1-\theta<w_g$ holds. This means that mimicking the I type yields party i (if the F type) a payoff w_g that is smaller than $1/(1+\delta)$ (i.e., i's share if both parties are known to be of the F type) and hence he/she has no incentive to build a reputation for the I type.

LEMMA 4 (Compte and Jehiel's (2002) Propositions 4 and 5): *Suppose either or both parties face disturbances and $1-\theta<w_g$ holds. Then, there is a unique perfect Bayesian equilibrium where each party reveals him/herself to be the F type as soon as possible. Let μ_i^h denote the equilibrium probability that i is of the I type given history h ($\mu_i^h \in \{0, \varepsilon, 1\}$ for any h).*

(i) If party i is known to be of the F type (i.e., if $\mu_i^h = 0$), party j (if the F type) behaves as in the complete-information, alternating-offer game: j offers $x_j^t = 1/(1+\delta)$ and accepts any offer smaller than or equal to $x_i^t = 1/(1+\delta)$.

(ii) Suppose party j is the proposer. If $\mu_i^h = \varepsilon$ holds, party j (if the F type) offers $x_j^t = 1/(1+\delta)$ to i. If $\mu_i^h = 1$, he/she calls for third-party intervention.

(iii) Suppose party i is the proposer. If $\mu_i^h \in \{\varepsilon, 1\}$, party j (if the F type) accepts any offer smaller than or equal to $x_i^t = 1/(1+\delta)$; he/she calls for third-party intervention when he/she receives the offer $x_i^t = \theta$ and rejects any other offer larger than $x_i^t = 1/(1+\delta)$.

4 The Optimal Governance Structure: Welfare Analysis

We are now ready to examine which governance structure should be chosen. This section shows that integration economizes bargaining costs but suffers from too much intervention, which captures the major tradeoff informally pointed out by TCE. We also find that if complexity/uncertainty is high enough, integration becomes optimal, which is consistent with the main assertion of TCE.

First, we categorize the situation into three cases. The first case is $w_M<w_H<1-\theta$: third-party intervention does not take place in equilibrium regardless of the choice of governance structure. The second case is $1-\theta<w_M<w_H$: third-party intervention may occur in equilibrium under both governance structures. The third case is $w_M<1-\theta<w_H$: while third-party intervention never takes place under non-integration, it may do under integration. We refer to these as Cases I, II, and III, respectively.

4.1 Case I: $w_M<w_H<1-\theta$

In this case, under both governance structures, each party prefers concession to third-party intervention and hence no third-party intervention takes place in equilibrium. Since the bargaining procedure is symmetric between the governance structures, the approximate aggregate payoff under each structure is the same:

$$(1-p)^2+2p(1-p)+2p^2(1-\varepsilon^2)(1-\theta).$$

If no party faces a disturbance, which occurs with probability $(1-p)^2$, the value of size 1 is created without any friction. If either party faces a disturbance, which occurs with probability $2p(1-p)$, we can apply Lemma 2: the party who faces the disturbance (i.e., who may be of the I type) obtains θ and the other $1-\theta$, and hence the aggregate payoff is approximately 1 as δ

approaches 1. If both parties face disturbances, which occurs with probability p^2, the aggregate expected payoff is approximately given by $2(1-\varepsilon^2)(1-\theta)$. If either or both parties are of the F type, a party (if the F type) randomizes his/her behavior to make his/her partner indifferent about whether to concede in the bargaining, and thus each party's expected payoff is $1-\theta$ (see Lemma 3). If both parties are of the I type, which occurs with probability $p^2\varepsilon^2$, on the other hand, perpetual disagreement occurs (i.e., each party obtains a zero payoff).

It is obvious that in Case I the choice of governance structure does not matter. In other words, if we employ the assumption that "in the beginning, there were the markets" (Williamson, 1975, p. 20), there is no reason to choose integration.

4.2 Case II: $1-\theta<w_M<w_H$

In this case, under both governance structures, each party prefers third-party intervention to concession and hence, as Lemma 4 points out, a party (if the F type) calls for third-party intervention if his/her partner is believed to be of the I type. The aggregate payoff under governance structure g is then approximately given by

$$(1-p)^2+2p(1-p)\left\{(1-\varepsilon)+2\varepsilon w_g\right\}+p^2\left\{(1-\varepsilon)^2+4\varepsilon(1-\varepsilon)w_g\right\}.$$

When no party is of the I type, which occurs with probability $(1-p)^2+2p(1-p)(1-\varepsilon)+p^2(1-\varepsilon)^2$, the value of (approximately) size 1 is created. When either party is of the I type, which occurs with probability $2p(1-p)\varepsilon+2p^2\varepsilon(1-\varepsilon)$, on the other hand, third-party intervention is called for and this results in the aggregate payoff $2w_g$.

Since $w_M<w_H$ holds, integration dominates non-integration.

4.3 Case III: $w_M<1-\theta<w_H$

In this case, each party prefers third-party intervention to concession under integration but not under non-integration. Suppose first that non-integration has been chosen. Since no one calls for third-party intervention (i.e., $w_M<1-\theta$), the same aggregate payoff as in Case I is obtained:

$$(1-p)^2+2p(1-p)+2p^2(1-\varepsilon^2)(1-\theta).$$

Suppose next that integration has been chosen. Since $1-\theta<w_H$ holds, the aggregate payoff is the same as in Case II:

$$(1-p)^2+2p(1-p)\left\{(1-\varepsilon)+2\varepsilon w_H\right\}+p^2\left\{(1-\varepsilon)^2+4\varepsilon(1-\varepsilon)w_H\right\}.$$

Comparing these aggregate payoffs yields the following result.

PROPOSITION 1 *Suppose $w_M<1-\theta<w_H$ and $\delta\approx 1$ hold, integration should be chosen when*

$$2p(1-p)\varepsilon\left(1-2w_H\right)<p^2(1-\varepsilon)^2\{1-2(1-\theta)\}+2p^2\varepsilon(1-\varepsilon)\left\{2w_H-2(1-\theta)\right\}. \qquad (1)$$

Condition (1) implies a tradeoff between bargaining costs and too much third-party intervention. In Case III (i.e., $w_M<1-\theta<w_H$), as third-party intervention does not serve as an outside option under non-integration, costly reputation building is inevitable, which is described in the RHS of Condition (1). Under integration, on the other hand, third-party intervention is called for too often. Suppose either party faces a disturbance. As Lemma 2 points out, if no outside option is available, the party who does not face any disturbance (i.e., the party with a certain type) then expects to obtain approximately $1-\theta$ in the bargaining. Since $1-\theta<w_H$ holds, however, such a party has an incentive to call for inefficient intervention to improve his/her payoff, which is represented in the LHS of Condition (1).

Our tradeoff provides not only a formal justification for the failure in selective intervention (Williamson, 1985, Chapter 6) but also an alternative explanation of why too much intervention

occurs, which complements TCE's view. That is, while the literature on TCE (e.g., Tadelis and Williamson, 2013) asserts that the lack of top management's commitment (e.g., propensity to manage) causes too much intervention, our result points out that subordinates' pursuit of a larger payoff in contract renegotiation does.

The analysis above yields the following corollary.

COROLLARY 1 *A higher θ makes integration more likely to be chosen.*

As mentioned, there is no reason to choose integration in Case 1 (i.e., the case in which θ is sufficiently low) and integration should be chosen in Case 2 (i.e., the case in which θ is sufficiently high). In Case 3 (i.e., the case in which θ is medium), we can easily check that a higher θ makes Condition (1) more likely to hold (i.e., the RHS of Condition (1) is increasing in θ). θ represents a prize that each party (if the F type) can enjoy if he/she succeeds in opportunistic reputation building, and hence can be considered to be the incentive for opportunistic behavior in the *ex post* value split. Corollary 1 thus implies that the more likely each party is to exhibit opportunistic behavior in contract renegotiation, the more likely integration is to be optimal.

Furthermore, from Lemma 1 and Proposition 1, we have the following corollary.

COROLLARY 2 *Rent seeking is more prevalent within firms than between firms.*

Corollary 2 follows because the optimal rent-seeking effort under integration is higher than that under non-integration (see Lemma 1) and such effort is more likely to be undertaken under integration than under non-integration because there is too much intervention under integration (see Proposition 1). This finding is consistent with the literature on influence activities (e.g., Milgrom and Roberts, 1988; Powell, 2015).

The literature on TCE asserts that high complexity/uncertainty makes integration more

likely to be chosen. In our model, p (i.e., the probability with which each party faces a disturbance) can be interpreted as the level of complexity/uncertainty. The following corollary suggests that our result is consistent with the main assertion of TCE.

COROLLARY 3 *There is* $p^*(<1)$ *such that integration should be chosen for all* $p \in (p^*, 1]$.

PROOF: Condition (1) (i.e., the condition in which integration should be chosen) can be rewritten as

$$0>2p(1-p)\varepsilon\,(1-2w_H) - p^2(1-\varepsilon)^2\{1-2(1-\theta)\} - 2p^2\varepsilon(1-\varepsilon)\,\{2w_H - 2(1-\theta)\}\,.$$

This implies that integration should be chosen when

$$p>\frac{2\varepsilon(1-2w_H)}{(1-\varepsilon)^2\{1-2(1-\theta)\} + 2\varepsilon(1-\varepsilon)\{2w_H - 2(1-\theta)\} + 2\varepsilon(1-2w_H)} \equiv p^*<1.$$

In concluding this section, we conduct comparative statics with respect to ε (the probability of being the I type). We can easily check that as ε approaches 1, Condition (1) is less likely to hold. We then have the following result.

COROLLARY 4 *The higher* ε *becomes, the more likely non-integration is to be chosen.*

Suppose each party is likely to be of the I type (i.e., ε is high). The likelihood of the F type reputation building, which is a primary source of bargaining costs under non-integration, then lowers. Too much third-party intervention under integration, on the other hand, is more likely because each party with a certain type is more likely to face an I type partner and call for third-party intervention. This corollary implies that if your partner is likely to be of the I type, it is socially optimal for you to give in to him/her. In other words, it is optimal to keep your partner at arm's length in order not to take the outside option (i.e., third-party intervention).

5 Conclusion

This study provides a formal haggling model of firm boundaries and shows the tradeoff between bargaining costs and too much intervention. Our result provides a formal explanation of why selective intervention fails and why rent seeking is more prevalent within firms than between firms. We also show that if complexity/uncertainty is sufficiently high, integration should be chosen, which is consistent with the main assertion of TCE.

The approach proposed herein has some limitations. First, the level of relationship specificity is exogenously given in our model and hence we cannot examine another of the main assertions of TCE, namely that high relationship specificity makes integration more likely to be chosen. Second, *ex ante* problems (e.g., underinvestment problems) are ignored in this study. Third, we do not deal with the case in which either trading party becomes a boss, which is familiar in the literature on PRT. Fourth, this study does not focus on hybrid governance structures located between hierarchies and spot market transactions. Fifth, as the literature on influence activities points out, the presence of rent seeking within firms may affect organizational practices and policies (e.g., Milgrom and Roberts, 1988; Powell, 2015); however, the boss in our model does not undertake any action to reduce such costly rent seeking. These points should aim to be addressed in future research.

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