

**THE ECONOMICS OF COLLECTIVE NEGOTIATION
IN PRETRIAL BARGAINING***

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This article studies the strategic use of collective negotiation in multiplaintiff litigation. Compared with one-on-one negotiation, collective negotiation can change the distribution of per-plaintiff damages in a manner that influences the defendant's bargaining incentive. Informational asymmetry among the members of collective action and delegation of bargaining to a self-interested representative can yield a tougher bargaining position. A plaintiff's decision to join the collective action can signal his type, which in turn influences the defendant's bargaining behavior. In equilibrium, some plaintiffs join the action for fear of sending a bad signal.

1. INTRODUCTION

The use of collective negotiation is ubiquitous. Workers form labor unions to negotiate wage contracts for all union members. In trade disputes, trade associations negotiate on behalf of industries or sometimes of an entire nation. In multiplaintiff litigation, settlement can be collectively negotiated when plaintiffs join factually similar claims through consolidated actions or class actions. Even when consolidated actions are not formally sought, similarly situated plaintiffs often form "committees" to settle negotiation.

Two commonly recognized benefits of collective negotiation are (1) the economies of scale associated with negotiation and (2) the ability to make a joint bargaining decision. Economies of scale exist when individuals share fixed costs of negotiation. The ability to make a joint bargaining decision arises when a group of individuals can commit to a bargaining decision that binds all its members. While the economies of scale are clearly beneficial to the individual negotiators, it is less clear that the ability to make a joint bargaining decision can improve their bargaining positions. The following example illustrates this point:

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Consider a pretrial settlement negotiation where a “defendant” makes take-it-or-leave-it offers to two plaintiffs, each of whom can recover a *known* amount of, say, \$100 from trial. (Assume for simplicity that when the offers are not accepted, trial occurs, and each plaintiff recovers \$100 as damages net of trial costs.) If trial is costly to the defendant, then she will offer just \$100 to each plaintiff and the offer will be accepted. Clearly, the ability to make a joint bargaining decision has no impact in this example. If the two plaintiffs were to commit to a joint acceptance/rejection decision, the defendant would still make a per capita offer of \$100, and it would be accepted.

The primary objective of this article is to explore when and how the ability to make a joint bargaining decision can affect the bargaining positions of the negotiators. I find that informational asymmetry between bargaining opponents is an important condition for a joint bargaining decision to be strategically valuable. Second, this article examines the role of “asymmetric information” among the individuals who pursue collective negotiation. The lack of information about their reservation values often creates disagreement over how to divide bargaining surplus. In labor disputes, skilled workers and unskilled workers often have different opinions about how a wage agreement with the management should treat each group of workers. In a consolidated action, different subclasses of plaintiffs often have conflicting interests in dividing trial recoveries and settlement proceeds. This article will show that, contrary to conventional wisdom, asymmetric information among members of a joinder can actually serve their interests by improving their collective bargaining position.

Third, I investigate the implications of delegating bargaining decisions. In collective negotiation, bargaining is often delegated to a few representatives whose interests may not coincide with those of the parties they represent. I show that the presence of a self-interested representative leads to an increase in the amount that can be credibly demanded at the expense of risking a higher chance of settlement failure. I show a possibility that with an ex ante up-front fee charged against the representative, the members of collective negotiation may strictly prefer a self-interested representative over a benevolent one.

Finally, this article studies individuals’ equilibrium incentives to pursue collective negotiation. In many settings, organizing a collective negotiation is a choice available to the negotiators. For example, two separate labor unions may voluntarily merge into a single union. In many multiplaintiff cases, individual plaintiffs have a choice over joining a consolidated action and class action.² When individuals have private information about their reservation payoffs, participation in collective negotiation may have a signaling effect. In equilibrium, some individuals may participate for fear of sending an adverse signal.

The primary application of this article is multiplaintiff litigation, and all the analyses are carried out with that setting in mind. Multiplaintiff litigation is very common and

² Consolidation is permitted when there are common questions of law and facts, or when the claims are based on the same event. Consolidation can be mandated if courts find that absence of a certain party threatens undesirable consequences beyond merely impairing judicial efficiency. Similarly, most class actions for financial damages are brought under Rule 23(b)(3) of the Federal Rules of Civil Procedure, which permits plaintiffs to opt out.

increasingly significant. In many product liability, securities fraud, antitrust, and environmental cases, a defendant, typically a large corporation, is sued by numerous plaintiffs allegedly injured by the defendant. In these cases, plaintiffs are often able to (and sometimes mandated to) consolidate their claims through various joinder devices such as consolidated or class actions. I postulate that such consolidation entails collective negotiation and hereafter refer to consolidating members simply as a “joinder.”³ Most of the results in this article, however, are applicable to other settings of collective negotiations upon an appropriate reinterpretation of the model.

The key insight of this article rests on a simple point: Compared with one-on-one negotiation, collective negotiation changes the distribution of per-plaintiff damages, which can affect the defendant’s incentive for raising a settlement offer. When a defendant raises her offer, she balances the benefit from avoiding trial and the cost of giving away higher settlement to the types that would have accepted even without the raise. The benefit from raising the offer thus depends on the (per-plaintiff) distribution of damages the defendant faces. Because of the law of large numbers, the average distribution of (randomly drawn) damages of multiple plaintiffs is more bunched toward the mean than that of a plaintiff. Hence, if the defendant were currently making a below-mean offer in one-on-one negotiation, she will have a greater incentive for raising her offer when dealing with multiple plaintiffs in collective negotiation than with each plaintiff in one-on-one negotiation, because a given increase of (per-plaintiff) offer would result in a higher probability of acceptance in the former. By the same logic, if the defendant were making an above-mean offer in one-on-one negotiation, then collective negotiation will increase her incentive to lower the per capita offer.

This argument can be illustrated by the above example with a slight modification: Each of the two plaintiffs has now expected damages (net of trial costs) that are either \$100 damages (“high” type) or \$50 damages (“low” type) with probabilities $2/3$ and $1/3$, respectively, and the type is known only to the plaintiffs but it is revealed once the case goes to trial (as a result of settlement failure). As before, the defendant makes take-it-or-leave-it offers in pretrial bargaining.

Suppose first that a plaintiff litigates individually and pursues one-on-one negotiation. The solid line in Figure 1 describes the settlement probability associated with each offer that the defendant may make. If the defendant offers \$50, for instance, then the plaintiff will accept that offer with probability $1/3$. Suppose now that the two plaintiffs join their claims and negotiate collectively. This changes the per capita damage distribution facing the defendant. Now, she faces \$50, \$75, and \$100 per capita damages (or \$100, \$150, and \$200 in total damages) with probabilities $1/9$, $4/9$, and $4/9$, respectively. A per capita offer of \$50 will now be accepted with probability of only $1/9$, whereas raising it to \$75 can result in settlement with probability $5/9$. (The dotted line in Figure 1 describes the settlement probabilities

³ Although consolidation of claims is neither necessary nor sufficient for collective settlement negotiation to arise, consolidation is often followed by the appointment of an attorney or a group of attorneys as lead counsel, which makes collective negotiation a compelling possibility. This article uses the term consolidation synonymously with collective negotiation mainly for an expositional reason, but most of the results apply to any circumstances that entail collective negotiation.

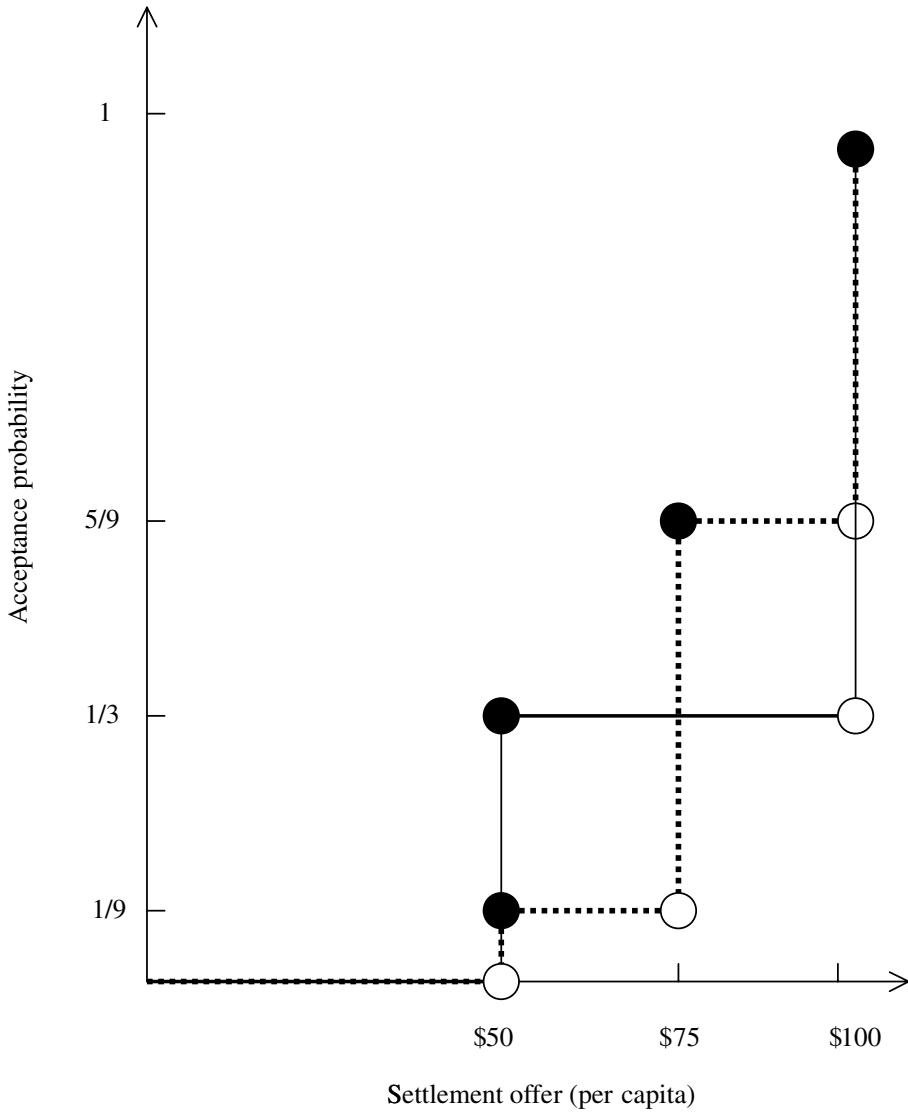


FIGURE 1

THE PROBABILITIES OF ACCEPTANCE WITH SYMMETRIC INFORMATION AMONG JOINDER MEMBERS

now.) Raising a per-plaintiff offer from \$50 to \$75 does not increase the probability of settlement in one-on-one negotiation, but it increases the settlement probability by 4/9 in collective negotiation. Hence, the defendant now has more incentives to raise her (per capita) offer from \$50 (to \$75). Likewise, the defendant has more incentive in collective negotiation to lower her per capita offer from \$100 to \$75. Raising the (per-plaintiff) offer from \$75 to \$100 will increase the settlement probability by 2/3 in one-on-one negotiation, whereas it would increase the

acceptance probability only by 4/9 in the case of collective negotiation. Hence, collective negotiation can be undesirable if the defendant would make an above-mean offer in one-on-one negotiation.

The idea that asymmetric information among plaintiffs may improve their bargaining positions in collective negotiation can be explained in a similar way. When each member's damages are unknown to the other members, he has an incentive to exaggerate his damages since it will increase his share of settlement proceeds in the case of an out-of-court settlement. This exaggeration incentive leads the members of the joinder to reject some offers that they would have accepted had they known their types. This increased rejection probability allows the members of collective negotiation to credibly demand more than they otherwise would. In short, the informational asymmetry can yield a tougher bargaining stance.

Several strands of literature are related to this study. Jun (1989) studies an extensive form game of collective negotiation in the context of union formation. Unlike in this article, the players have complete information. Perry and Samuelson (1994) also study the behavior of a negotiator representing his constituents, but they focus on how "open-door bargaining" can credibly strengthen the bargaining position of the representative. Myerson and Satterthwaite (1983) and Mailath and Postlewaite (1990) identify trading inefficiencies resulting from incomplete information, which are closely related to a result in this article. Unlike these articles, the current article focuses on one party bargaining against multiple opponents and on the resulting inefficiencies within the latter group as a strategic commitment device. The commitment value of informational asymmetry has also been recognized by Dewatripont (1988) and Caillaud et al. (1995), but in the context of circumventing undesirable renegotiation possibilities. The structure of the model is also similar to those of Laffont and Martimort (1997, 2000) and McAfee and McMillan (1992), since the members of collective negotiation can be seen as *colluding* in their response to the defendant's offer.

The rest of the article is organized as follows: Section 2 sets up the model of collective negotiation in the context of multiplaintiff litigation. Sections 3–5 present the main ideas of this article and further examine the equilibrium incentives for plaintiffs to participate in collective negotiation and the welfare implications on the disputing parties. Section 6 concludes.

2. MODEL

There are N plaintiffs (victims) who have been harmed over a related incident by a single defendant (injurer). The plaintiffs have potentially heterogeneous stakes: Each plaintiff's expected damages in trial are either $\bar{\theta}$ ("high type") or $\underline{\theta}$ ("low-type"), $0 < \underline{\theta} < \bar{\theta}$, with probabilities p_0 and $1 - p_0$, respectively. The damages are independently drawn, so the number of high-type plaintiffs follows a binomial distribution, with probability of the defendant facing k high-damage plaintiffs:

$$f_N(k; p_0) = \binom{N}{k} p_0^k (1 - p_0)^{N-k}$$

and cumulative distribution function: $F_N(k; p_0) = \sum_{i=0}^k f_N(i; p_0)$.

Each plaintiff has two organizational choices in suing the defendant.⁴ At date 0, each plaintiff decides whether to sue individually (this will be referred to as “opting out”) or to register to become a member of a joinder that then sues on behalf of all its members. This membership decision is made simultaneously by all of the plaintiffs. A joinder (or consolidated action) is formed if more than one plaintiff registers.

Two assumptions are made about the rule of joinder membership. First, the membership of the joinder is voluntary and open. That is, the presence of a joinder does not legally compel plaintiffs to belong to the joinder, and no plaintiff is denied membership. Second, there can be at most one joinder. These assumptions largely reflect the institutional characteristics of consolidated actions.

At date 1 (after the membership decisions), pretrial settlement bargaining takes place: The defendant makes a take-it-or-leave-it settlement offer to each plaintiff party, which could be either a single plaintiff or a joinder of multiple plaintiffs.⁵

At date 2, each plaintiff party accepts or rejects the offer. If the party is a joinder of plaintiffs, the members decide to accept or to reject for all the members, along with how to divide the settlement shares among the members, in the case of accepting the offer. Hence, a collective action entails a commitment to making a joint acceptance decision.⁶ Note that this commitment power does not involve *how* it will decide on a specific offer. That is, the joinder cannot commit to a specific acceptance decision before the offer is received.⁷ This partial commitment assumption reflects the common observation that some agreements are easier to commit to than others. In particular, an agreement requiring all members’ approval on settlement appears much easier to commit to than an agreement specifying how they will react to each possible settlement offer.

⁴ Choices regarding litigation methods are not always available since the courts may not permit consolidation and some other times make joinder mandatory. Nonetheless, permissive joinders are expansively applied in many cases. Also, some results of this article are relevant even in the mandatory joinder context.

⁵ This bargaining rule gives all the initial bargaining power to the defendant. While this specification is special, it provides a simple model to study the impact on the plaintiffs’ bargaining power. See a remark in Section 6 on different specifications of the bargaining game.

⁶ A key ingredient of collective negotiation is the ability to make a joint bargaining decision. While the extent to which members of the joinder achieve such commitment varies case by case, such a commitment is quite plausible in many consolidated and class actions, because of the substantial litigation control a lead counsel has.

⁷ Committing to an acceptance decision before the defendant would effectively allow the plaintiffs to make an ultimatum demand, which would be equivalent to reversing the sequence of moves for the two parties. While collective negotiation may enable the parties to gain bargaining power in this fashion, I focus on the effects that are not related to a change in the move structure. Furthermore, the idea of attaining commitment through contracts is problematic for the following two reasons: First, there is an issue of consistency: If the members of a joinder can attain commitment power through a contract among themselves, why cannot a plaintiff in one-on-one negotiation achieve the same power through a contract with a third party? It seems that what makes the latter difficult also should make the former difficult. Second, a contract among plaintiffs can be subject to renegotiation. Suppose, for instance, that the members signed a contract not to accept any offer below S , for some high S , but that the defendant offered $S' < S$, which still exceeds the plaintiffs’ trial payoffs. The plaintiffs will then have the incentive to renegotiate to accept the latter offer, which will in turn destroy the commitment effect of the contract. Indeed, the analysis will not change if the plaintiffs sign a contract prior to the defendant’s offer but they can renegotiate their contract.

Alternatively, the members may sign such a detailed contract prior to the defendant's offer but can renegotiate the contract, which will be equivalent to the assumption. This assumption preserves the same bargaining power for the parties, regardless of the organizational governance.

At date 3, if the defendant's offer is accepted, then that case is settled and the offered amount is paid to the plaintiff party. In the case of a consolidated action, the settlement proceeds are distributed to the members according to the manner decided as part of the acceptance decision. If not, then the case goes to trial. In the latter event, compensatory damages are accurately verified (at least in expected value) and awarded to the plaintiffs, regardless of whether the suits are individual or consolidated. That is, in the case of a consolidated action, the members' cases are separately presented in the court, and the members receive their compensatory damages. This assumption is consistent with the feature that consolidated cases in general retain their separate identities (see Friedenthal et al., 1985). This assumption is not appropriate for a large class action in which a court cannot review all the cases separately. For this reason, the model is most appropriate for joinders with a small number of plaintiffs (see the remark in Section 6 on large class actions).

Trial is costly for all parties. Whether a suit is brought individually or not, trial costs c_p to a plaintiff and c_d to the defendant per plaintiff, respectively. For instance, if a consolidated case with n members goes to trial, each joinder member pays c_p and the defendant pays nc_d for litigation. That the per-plaintiff trial costs do not depend on the size of the joinder implies that no economies of scale arise from consolidating cases. It would be a straightforward extension, though, to allow for such scale economies. In summary, a plaintiff with type $\theta \in \{\underline{\theta}, \bar{\theta}\}$ recovers $\theta - c_p$ from trial, and the defendant incurs a loss of $\theta + c_d$ per plaintiff. I assume that $\underline{\theta} - c_p \geq 0$; that is, suits are nonfrivolous.

The parties' information is described as follows: Throughout, a plaintiff's damages are his private information with the defendant knowing only its distribution. Consider two scenarios regarding a member's knowledge about one another's type. In the first scenario, studied in Section 3, members of a joinder learn costlessly about the types of other members. Section 4 considers a more realistic situation where members of the joinder are uninformed (just like the defendant) about one another's type and therefore may have conflicting demands in the distribution of settlement proceeds. As will become clear, these two cases introduce distinct insights about collective negotiation.

Throughout, I focus on perfect Bayesian equilibria with certain restrictions. First, I focus on equilibria that involve symmetric membership decisions; that is, a given type of plaintiff makes the same membership decision. Second, I exclude a weakly dominated strategy in the membership decision. Specifically, I exclude an equilibrium that involves a membership decision that is *weakly* dominated, along the equilibrium path, for *all* beliefs of the defendant and *strictly* dominated for *some* belief of the defendant. The purpose of restricting players' strategies sets will become clear in later sections.

In the remainder of this section, I solve the case in which a plaintiff brings an individual action (i.e., opt out). This case will serve as a benchmark that can be compared to the consolidated action case. To describe a sequentially rational behavior,

I use backward induction. Suppose that the defendant makes an offer of S . The optimal response by each type of the plaintiff is then to accept the offer if and only if it is at least his trial payoff, $\theta - c_p$, $\theta \in \{\underline{\theta}, \bar{\theta}\}$. Anticipating this, the defendant picks an offer that minimizes her expected loss. Suppose the defendant has a (posterior) belief that the plaintiff has the high damages with probability q . This posterior belief q is determined by each plaintiff's date 0 membership decision.⁸ If every plaintiff opts out, then q will coincide with the prior p_0 .

Regardless of the value of q , the defendant offers either $\bar{\theta} - c_p$ or $\underline{\theta} - c_p$, where the former is accepted by both types of plaintiffs, while the latter is accepted by only the low type (offering any other amount cannot be an equilibrium behavior). In particular, the defendant makes the high offer if and only if

$$\bar{\theta} - c_p \leq q(\bar{\theta} + c_d) + (1 - q)(\underline{\theta} - c_p)$$

Let $\Delta\theta \equiv \bar{\theta} - \underline{\theta}$ and $\phi \equiv c_p + c_d$. Then, there exists a threshold value $\hat{p} \equiv \Delta\theta / (\Delta\theta + \phi) \in (0, 1)$ such that the defendant offers

$$(1) \quad s_1^*(q) = \begin{cases} \bar{\theta} - c_p, & \text{if } q \geq \hat{p} \\ \underline{\theta} - c_p, & \text{if } q \leq \hat{p} \end{cases}$$

3. COLLECTIVE NEGOTIATION WHEN MEMBERS HAVE COMPLETE INFORMATION

Suppose that a joinder of n members has been formed, where $2 \leq n \leq N$. In this section, I assume that the members learn costlessly about the types of the other members after forming the joinder. (The defendant is still uninformed of each plaintiff's type.) Although this assumption may not be realistic for many situations, it helps us to focus on the effect of collective negotiation that is separate from the informational effect that will be introduced in the next section.

The problem facing the members of a joinder is to decide whether or not to accept the offer and, if they accept, how to divide the settlement proceeds. Rather than explicitly modeling the process by which the members reach a collective decision, I will simply focus on the Pareto-optimal acceptance decision. That is, an offer by the defendant is accepted if it can be divided among the members of the joinder so that each member can be better off from his share than from his trial payoff. This decision rule assumes that each member has the power to veto a settlement that would make him worse off relative to a trial.⁹ Such a unanimity rule is most realistic for small joinders or class actions in which each member (or his counsel) possesses the power to influence the joint decision and retains an option to

⁸ If the low type and the high type join the collective action with probability α and β , respectively, then

$$q = \frac{(1 - \beta)p_0}{(1 - \alpha)(1 - p_0) + (1 - \beta)p_0}$$

whenever the denominator is positive.

⁹ Given this veto power, no member of a joinder will be worse off from the joint settlement decision. For this reason, there will be no incentive for each member to voluntarily cut a separate deal with the defendant.

opt out ex post. In large class actions, not all members need to agree on the settlement, and the members cannot opt out ex post (although they can initially opt out), so the model does not apply to that setting (see a remark in Section 6 on large class actions).

With costless learning, the Pareto-optimal acceptance decision has a simple form: The joinder accepts an offer if it is greater than the total sum of trial payoffs of the members. Formally, letting $S_k \equiv k\bar{\theta} + (n - k)\underline{\theta} - nc_p$, a joinder with k high-type members (and $n - k$ low-type members) will accept any offer $S \geq S_k$ and reject any offer $S < S_k$. This Pareto-optimal decision rule can be implemented by a number of different sharing rules for dividing the settlement proceeds among members. Here, I simply assume that no plaintiff will receive a share less than his trial payoff, and every member receives a share strictly more than his trial payoff whenever the settlement offer exceeds total trial payoffs of the members.

Given this reaction from each type of joinder and the *posterior belief*, p , that a member is of high type,¹⁰ the defendant will, without any loss of generality, choose among $\{S_k\}_{k=0}^n$ to solve

$$(D) \quad \min_{k \in \{0, \dots, n\}} L_n(k; p) = S_k F_n(k; p) + \sum_{i=k+1}^n f_n(i; p)(i\bar{\theta} + (n - i)\underline{\theta} + nc_d)$$

To solve the problem, consider the defendant’s incremental loss from raising the settlement offer from S_{k-1} to S_k :

$$l_n(k; p) \equiv L_n(k; p) - L_n(k - 1; p) = \Delta\theta f_n(k; p) \left[\frac{F_n(k - 1; p)}{f_n(k; p)} - \frac{n\phi}{\Delta\theta} \right]$$

This expression clearly shows the trade-off facing the defendant. By raising the offer from S_{k-1} to S_k , the defendant pays an extra amount, $S_k - S_{k-1} = \Delta\theta$, when the joinder would have accepted even without the raise, but she increases the settlement probability by $f_n(k; p)$. The defendant’s optimal offer is characterized in the following proposition. Its proof as well as all subsequent ones are collected in the Appendix.

PROPOSITION 1. *It is optimal for the defendant to offer $S_n^*(p) = S_k$ if and only if $p \in [p_n^k, p_n^{k+1}]$, where p_n^k satisfies $l_n(k; p_n^k) = 0$ for $k \geq 1$.*

We are now in a position to characterize the outcome of collective negotiation vis-à-vis one-on-one negotiation. To this end, it is useful to fix the posterior p at the same level for both modes, even though p is eventually determined endogenously by each plaintiff’s equilibrium membership decision. The resulting comparison will reveal some insight about what collective negotiation does to the bargaining positions of the parties involved.

¹⁰ This posterior belief is formed according to the Bayes rule as before, whenever the rule is well-defined. That is, the posterior satisfies

$$p = \frac{\beta p_0}{\alpha(1 - p_0) + \beta p_0}$$

whenever the denominator is positive.

First note that for any $n \geq 2$, $\hat{p} \in (p_n^1, p_n^n)$.¹¹ Let $s_n^*(p) \equiv S_n^*(p)/n$ denote the optimal per capita offer made by the defendant. If $p \in (p_n^1, p_n^n)$, then there exists k , $1 \leq k < n$, such that

$$s_n^*(p) = S_k/n = \bar{\theta} \left(\frac{k}{n} \right) + \underline{\theta} \left(\frac{n-k}{n} \right) - c_p$$

which is strictly less than $\bar{\theta} - c_p$ but strictly greater than $\underline{\theta} - c_p$. Its comparison with (1) yields the following result:

PROPOSITION 2. For any n , $2 \leq n \leq N$,

$$\begin{aligned} s_n^*(p) &> s_1^*(p) && \text{if } p \in (p_n^1, \hat{p}) \\ s_n^*(p) &< s_1^*(p) && \text{if } p \in (\hat{p}, p_n^n) \\ s_n^*(p) &= s_1^*(p) && \text{if } p < p_n^1 \text{ or if } p > p_n^n \end{aligned}$$

This result reflects the bunching effect of collective negotiation on the (average) distribution of damages, mentioned in Section 1.¹² For a concrete example, assume $n = 2$, $\bar{\theta} = \$100$, $\underline{\theta} = \$50$, $c_p = \$0$, and $c_d = \$24$. If $p = q = 2/3$ (Figure 1 plots settlement probabilities for this case), then the defendant will offer \$50 to a plaintiff in one-on-one negotiation, whereas she will make a per capita offer of \$75 to a joinder with two plaintiffs. Hence, collective negotiation has a clear advantage in this case. By contrast, if $p = q = 3/4$, then the defendant will offer \$100 to a plaintiff in one-on-one negotiation, whereas she will make a per capita offer of \$75 to the joinder, so collective negotiation is disadvantageous in this case.

The result holds most clearly with the assumed stochastic independence across plaintiffs' expected damages. In practice, the commonality of the cases (which made collective action possible to begin with) may cause the expected damages to be positively correlated. The qualitative insight of these results carries through even in such an environment as long as the cases are sufficiently idiosyncratic.¹³ In Figure 1, as the degree of positive correlation increases from zero, the probability of accepting \$75 goes down from 5/9 while that of accepting \$50 goes up.¹⁴ Clearly, as long as the degree of correlation is sufficiently small, the former

¹¹ Straightforward computation yields that

$$p_n^1 = \frac{\Delta\theta}{n^2\phi + \Delta\theta} < \hat{p} = \frac{\Delta\theta}{\phi + \Delta\theta} < p_n^n = \left(\frac{\Delta\theta}{n\phi + \Delta\theta} \right)^{1/n}$$

¹² For this reason, the result does not rely on the two-point distribution of the model.

¹³ In practice, the idiosyncratic elements may come from differences in the extent of harm, economic losses, or the potential for mitigation.

¹⁴ In the limit, as the cases become perfectly correlated, those two levels coincide and equal 1/3, just as in one-on-one negotiation.

probability remains significantly bigger than the latter probability, so the mean-bunching argument still holds.¹⁵

Moving one step back, I next consider the first-period membership decision. The defendant's posterior belief is now determined through the first-period membership decisions of the plaintiffs. First note that there is always a perfect Bayesian equilibrium in which no plaintiff enters the joinder. This equilibrium is an artifact of the feature that a joinder requires at least two participants to form; so, if no other plaintiff participates, a plaintiff can never form a joinder. Our solution concept allows us to dismiss this equilibrium by restricting plaintiffs' strategies to ones that are not weakly dominated. Given the assumption that each member receives a share of slack surplus, it is weakly dominant for a high-type plaintiff to join the collective negotiation. This is because a high-type plaintiff receives at most $\bar{\theta} - c_p$ through one-on-one negotiation (see (1)), whereas he may receive strictly more than $\bar{\theta} - c_p$ whenever the offer exceeds the total trial payoffs. Given that all high-type plaintiffs join the consolidated action, it is an equilibrium decision for each low type to follow suit. This equilibrium is sustained by an out-of-equilibrium belief, $q < \hat{p}$, for an opt-out member. Indeed, all plaintiffs joining the collective action is the only pure-strategy equilibrium. This is because of the signaling effect that a membership decision has on ensuing negotiation. Suppose, to the contrary, that all low-type plaintiffs opt out in equilibrium (which is the only other possible pure-strategy equilibrium, given the symmetry restriction). Then, the defendant will make an offer of $\underline{\theta} - c_p$ in one-on-one negotiation and a per capita offer of $\bar{\theta} - c_p$ to a joinder, so it will strictly pay the low-type plaintiff to deviate.

PROPOSITION 3. *The unique pure-strategy equilibrium is for all plaintiffs to register for the joinder.*

Several observations can be made. First, the plaintiffs' ability to negotiate collectively does not necessarily benefit all types of plaintiffs. In fact, if $p_0 \in (\hat{p}, p_n^n)$, then the defendant would make a lower per capita offer when collective negotiation is available than when it is not. In particular, the defendant would offer $\bar{\theta} - c_p$ to each plaintiff when collective negotiation is not available. With the collective negotiation available, she makes a per capita offer less than $\bar{\theta} - c_p$ when the plaintiffs negotiate collectively, which is the equilibrium outcome. As a consequence, the low-type plaintiffs are worse off by the availability of the collective negotiation. This result is due to the signaling effect: When collective negotiation becomes available a

¹⁵ An example illustrates this point. Assume as before that $n=2$, $\bar{\theta}=\$100$, $\underline{\theta}=\$50$, and $c_p=\$0$. Suppose now that both plaintiffs have the high type with probability $(1+\rho)/4$, the low type with the same probability, and they have different types with probability $(1-\rho)/2$, where $\rho \in [0, 1]$ measures the degree of correlation with $\rho=0$ corresponding to no correlation and $\rho=1$ corresponding to perfect correlation. Given the symmetric structure, the (unconditional) probability for each plaintiff to be of low type is $1/2$, regardless of the value of ρ . If $c_d \leq 50$, then it is optimal for the defendant to offer $\$50$ in one-on-one negotiation (in a simultaneous offer setting). Facing a joinder of two, the defendant will raise its per capita offer to $\$75$ as long as $\rho \leq (2c_d - 25)/(2c_d + 25)$. For example, if $c_d=25$, then the per capita offer will rise to $\$75$ provided that $\rho < 1/3$.

low-type plaintiff essentially loses his chance to negotiate one-on-one without revealing his type. This signaling outcome stands in contrast to the Akerlof's lemons market equilibrium (Akerlof, 1970), in which a good type's nonparticipation results in complete unraveling of the market.¹⁶

Second, the defendant's welfare is also affected by the availability of collective negotiation. Collective negotiation makes the defendant better off if $p_0 \geq \hat{p}$. The defendant can offer $\bar{\theta} - c_p$ per capita and induce settlement with probability 1, just as in one-on-one negotiation, but she may do better by offering slightly less than $\bar{\theta} - c_p$ without lowering the settlement probability much. Since this option is not available in one-on-one negotiation, the defendant is (at least weakly) better off with plaintiffs negotiating collectively. If p_0 is sufficiently low, the opposite is likely to be true. Now, collective negotiation makes plaintiffs more likely to reject a low per capita offer. In particular, the per capita offer of $\underline{\theta} - c_p$ fails to induce settlement from the low-type plaintiffs whenever the latter are joined with some high-type plaintiffs. The defendant is worse off as a result, if p_0 is sufficiently low.¹⁷

4. COLLECTIVE NEGOTIATION WHEN MEMBERS HAVE ASYMMETRIC INFORMATION

In this section, I consider a more realistic situation where each plaintiff's expected damages are uncertain not only to the defendant but also to the other members of the joinder. This added layer of asymmetric information can create conflicts of interests among members of the joinder over how settlement proceeds should be divided. In particular, each member of the joinder, knowing that other members do not know his expected damages, will have an incentive to exaggerate his damages in an attempt to increase his settlement share. This incentive will, of course, affect the joinder's collective settlement decision, creating the possibility that the members will reject a settlement offer that they would accept had they known the members' types. Rather than harming plaintiffs, however, this possibility improves their collective bargaining position by allowing them to credibly demand more.

In order to study this case, I again work backward. Suppose that a joinder of n ($\leq N$) plaintiffs was already formed and that the defendant has made an offer of S . Again, the joinder must decide whether or not to accept it, along with how to divide the settlement proceeds in case of acceptance. Unlike the complete information case, the members' types are not known, so the acceptance decision is not trivial in this case. Rather, the members' types must be voluntarily revealed as part of the acceptance decision. To analyze the joinder's acceptance decision, I set up a mechanism design problem in which, given the offer of S , the joinder determines the rejection probability and expected settlement shares to the two types of members, all as functions of the announced "types" of the members. By the revelation principle, such an approach is without loss of generality. Since the type is binary, any given

¹⁶ The difference arises since, in the lemons market model, dropping out of the used-car market has no informational consequence, whereas opting out matters in the current model since the plaintiff still deals with the defendant on the one-on-one basis.

¹⁷ If $p_0 < p_N^0$, for instance, the defendant makes a per capita offer of $\underline{\theta} - c_p$, which will result in settlement with probability $F_N(0; p_0) = (1 - p_0)^N$. Without the availability of collective negotiation, the same offer would produce settlement with probability $1 - p_0$.

combination of report can be succinctly characterized by the number of members who report the high type. Formally, the mechanism determines

- $r_k \in [0, 1]$: the probability of rejection,
- $\bar{d}_k \in \mathfrak{R}$: a high-type plaintiff's expected settlement payout, and
- $\underline{d}_k \in \mathfrak{R}$: a low-type plaintiff's expected settlement payout,¹⁸

when k members report “high type.”

Given the posterior p and the defendant's offer S , the joinder's problem is characterized as

$$[\hat{P}(S)] \quad \max_{\{r_i \in [0, 1], \bar{d}_i, \underline{d}_i\}_0^n} \sum_{i=0}^n f_n(i; p)[i\bar{d}_i + (n - i)\underline{d}_i + r_i(i\bar{\theta} + (n - i)\underline{\theta} - nc_p)]$$

subject to

$$(BB) \quad (1 - r_i)S = i\bar{d}_i + (n - i)\underline{d}_i \quad \forall i = 0, \dots, n$$

$$(IR_L) \quad \sum_{i=0}^{n-1} f_{n-1}(i; p)[\underline{d}_i + r_i(\underline{\theta} - c_p)] \geq \underline{\theta} - c_p$$

$$(IR_H) \quad \sum_{i=0}^{n-1} f_{n-1}(i; p)[\bar{d}_{i+1} + r_{i+1}(\bar{\theta} - c_p)] \geq \bar{\theta} - c_p$$

$$(IC_L) \quad \sum_{i=0}^{n-1} f_{n-1}(i; p)[\underline{d}_i + r_i(\underline{\theta} - c_p)] \geq \sum_{i=0}^{n-1} f_{n-1}(i; p)[\bar{d}_{i+1} + r_{i+1}(\underline{\theta} - c_p)]$$

$$(IC_H) \quad \sum_{i=0}^{n-1} f_{n-1}(i; p)[\bar{d}_{i+1} + r_{i+1}(\bar{\theta} - c_p)] \geq \sum_{i=0}^{n-1} f_{n-1}(i; p)[\underline{d}_i + r_i(\bar{\theta} - c_p)]$$

This problem can be seen as that of an uninformed, but benevolent, representative who chooses the decision variables to maximize the joinder's total payoffs subject to several constraints. The budget-balancing constraint, (BB) , means that all settlement proceeds are distributed to the members. Individual rationality, (IR_i) , $i = L, H$, can be justified, for instance, as before by each member having a veto power in the acceptance decision (i.e., a unanimous decision rule). Such a veto power may be exercised either when the mechanism is offered (“interim” veto power) or when the decision is executed (“ex post” veto power). Depending upon the circumstances, either version will make more realistic sense. Although we adopt an interim version here (since this imposes a weaker constraint), this turns out to make no difference since, as I will show below, a solution to $[\hat{P}(s)]$ satisfies ex post individual rationality as well.¹⁹

¹⁸ We can rewrite the expected settlement share as $d_k = (1 - r_k)x_k$, where x_k is a share conditional on settlement. Although x_k is practically more intuitive, we use d_k to avoid multiplicity of the optimal decision rule (i.e., if $r_k = 1$, any x_k is optimal). Also note that we are implicitly assuming that a given type is treated equally according to this decision rule. Finally, these decision variables depend on the offer, S , which is suppressed here for simplicity.

¹⁹ I assume that vetoing results in trial, from which each plaintiff collects his trial payoff. But this treatment can also accommodate an interpretation that a vetoing party deals with the defendant in one-on-one renegotiation, as long as the defendant holds an (out-of-equilibrium) belief that the vetoing plaintiff is of low type.

The incentive constraints, (IC_L) and (IC_H) , are needed because of the asymmetric information within the members of the joinder. Suppose that there are i high-type plaintiffs in the joinder. A misrepresentation by a low-type member would result in $(r_{i+1}, \bar{d}_{i+1}, \underline{d}_{i+1})$ being applied instead of $(r_i, \bar{d}_i, \underline{d}_i)$. Likewise, a high-type plaintiff's lying will trigger $(r_{i-1}, \bar{d}_{i-1}, \underline{d}_{i-1})$ being applied instead of $(r_i, \bar{d}_i, \underline{d}_i)$. Conditions (IC_L) and (IC_H) , respectively, ensure that these kinds of misrepresentation are not profitable.

These two constraints crystallize the incentive problem mentioned at the beginning of this section. In particular, the efficient acceptance decision described in the earlier section is no longer feasible with these constraints. To see this, assume $n=2, \bar{\theta}=\$100, \underline{\theta}=\$50, c_p=\$0$, and $p=1/2$ and suppose that the defendant has made a total offer of \$150. An efficient decision here is "reject" only when both members report "high type." Clearly, such a decision rule is not incentive compatible, since a low-type plaintiff earns the expected payoff of \$62.50 by reporting truthfully, but he earns \$75 by misrepresenting as high type.²⁰ The basic intuition is reminiscent of Myerson and Satterthwaite (1983), which says that an efficient trade decision does not generate a sufficient amount of information rents to reveal private information.

To restore incentive compatibility, the decision rule must diverge from the efficient rule. This can be done in two ways. First, a higher rejection probability can be applied when more members report high damages. This will penalize a low-type plaintiff when masquerading as the high type. This method entails a cost since all the members, including those who report truthfully, will be penalized by an increased probability of trial. This is why the joinder must rely on the second method: a direct payment of informational rents to low-type members. This, however, will cause the joinder to reject some ex post acceptable offers, for the rents must be generated from the settlement proceeds.

With the rejection rule obtained from $[\hat{P}(S)]$, the defendant initially makes an offer by solving a problem similar to (D). The following proposition characterizes the optimal decisions for both the joinder and the defendant:

PROPOSITION 4. Let $\hat{S}_k \equiv S_k + (n - k) \frac{F_n(k-1; p)}{F_n(k; p)} \Delta\theta$ and $\hat{p}_n^k \equiv (k\Delta\theta)/(n\phi + k\Delta\theta)$.²¹ Then, a solution to $[P(S)]$ has, for each $k=0, \dots, n$,

$$r_k = \begin{cases} 0, & \text{if } S \geq \hat{S}_k \\ 1, & \text{if } S < \hat{S}_k \end{cases}$$

$$\bar{d}_k = \begin{cases} S/n, & \text{if } S \geq \hat{S}_n \\ \bar{\theta} - c_p, & \text{if } \hat{S}_k \leq S \leq \hat{S}_n \\ 0, & \text{if } S < \hat{S}_k \end{cases}$$

²⁰ When he reports truthfully, he splits \$150 equally when paired with another low-type plaintiff (which occurs with probability 1/2) and receives \$50 when paired with a high-type plaintiff. When he reports untruthfully, he gets \$100 when paired with a low-type plaintiff and receives \$50 (from trial) when paired with a high-type plaintiff.

²¹ For completeness, $F_n(-1; p) \equiv 0$ and $\hat{p}_n^{n+1} \equiv 1$.

and

$$d_k = \begin{cases} S/n, & \text{if } S \geq \hat{S}_n \\ \frac{S-k(\bar{\theta}-c_p)}{n-k}, & \text{if } \hat{S}_k \leq S \leq \hat{S}_n \\ 0, & \text{if } S < \hat{S}_k \end{cases}$$

Knowing this, the defendant picks

(2) $\hat{S}_n^*(p) = \hat{S}_k$ if and only if $\hat{p}_n^k \leq p \leq \hat{p}_n^{k+1}$

REMARK. The joinder’s optimal acceptance decision does not uniquely pin down the settlement shares for each type of member. In particular, one can choose settlement shares so as to satisfy ex post individual rationality at no cost, as is shown in Proposition 4.

Compared with the complete information case (Section 3), a given type of joinder can credibly demand an extra amount, $(n - k)(F_n(k - 1; p)/F_n(k; p))\Delta\theta$, from the defendant to settle. This extra amount is informational rents necessary for the joinder to induce revelation of its members’ private information. This inefficiency feature is very robust. In practice, the actual decision rule adopted by the joinder may differ from the direct revelation mechanism that we focus on. Nonetheless, any feasible decision rule must reject some ex post acceptable offers.²²

In principle, this increased demand may cause the defendant to either raise or lower her offer depending on her marginal incentive. As in the previous section, by comparing (1) and (2), we can determine how collective negotiation changes the defendant’s per capita offer relative to one-on-one negotiation, given the same posterior probability p . Letting $\hat{s}_n^*(p) \equiv \hat{S}_n^*(p)/n$ denote the equilibrium per capita offer by the defendant, Proposition 3 implies that $\hat{s}_n^*(p) = \bar{\theta} - c_p$ when $p \geq \hat{p}_n^1$, and $\hat{s}_n^*(p) > \underline{\theta} - c_p$ when $p \in (\hat{p}_n^1, \hat{p}_n^2]$. Since $\hat{p}_n^1 = \Delta\theta/(\phi + \Delta\theta) = \hat{p}$, the following result is immediate:

PROPOSITION 5. For any $n, 2 \leq n \leq N$,

$$\begin{aligned} \hat{s}_n^*(p) &= s_1^*(p) = \bar{\theta} - c_p & \text{if } p > \hat{p} \\ \hat{s}_n^*(p) &> s_1^*(p) = \underline{\theta} - c_p & \text{if } p \in (\hat{p}_n^1, \hat{p}) \\ \hat{s}_n^*(p) &= s_1^*(p) = \underline{\theta} - c_p & \text{if } p < \hat{p}_n^1 \end{aligned}$$

This proposition shows that collective negotiation can only induce the defendant to raise her per capita offer (relative to one-on-one negotiation). Moreover, with the joinder credibly making an additional demand, it is possible that the defendant becomes even softer than when they had perfect information about each other’s type. To see such a possibility, recall the example in the previous section. As before,

²² For example, the actual rule may involve a bidding arrangement where members of the joinder make bids on their individual demands. In this case, low-damage members bid more than their trial payoffs, which will entail the same kinds of inefficiencies.

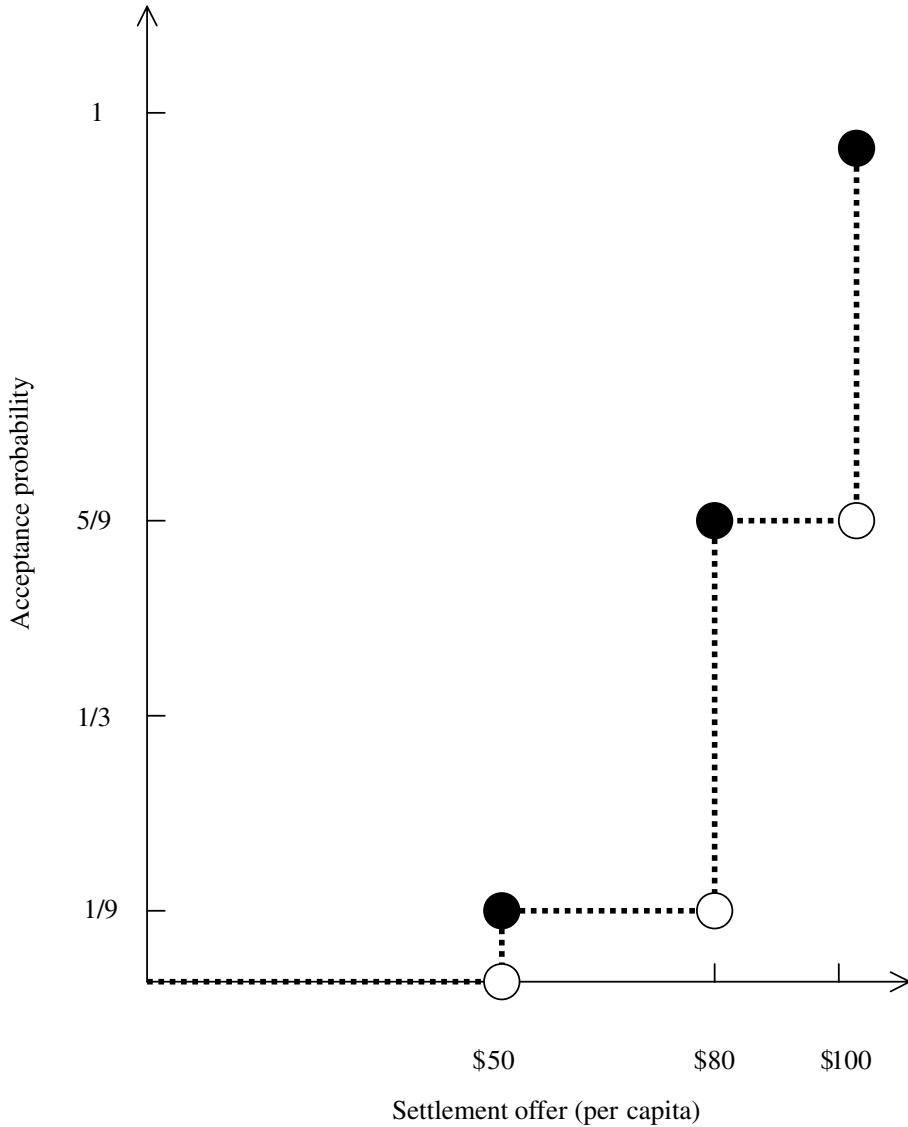


FIGURE 2

THE PROBABILITIES OF ACCEPTANCE WITH ASYMMETRIC INFORMATION AMONG JOINDER MEMBERS

we inspect the settlement probability the defendant can achieve with each per capita offer, which, like in Figure 1, is represented as a step function in Figure 2. In comparison with Figure 1, a higher per capita offer is required to achieve the same or even lower probability of settlement. To achieve $5/9$ settlement probability, the defendant must now make a per capita offer of \$80 instead of \$75. Given the

parameter values assumed in this example, the defendant indeed makes a per capita offer of \$80 in equilibrium.

The idea that informational asymmetry among members can actually strengthen their bargaining positions may seem paradoxical. But it conforms to a commonly adopted bargaining practice. Negotiators, when demanding a better deal than is currently offered by their opponents, often argue that the current offer *may* not be acceptable to their partners (although it is acceptable to them). The above proposition may explain why this kind of bargaining tactic carries a credible threat if the bargaining representative does not know the plaintiffs' true reservation payoffs.

Unlike the previous case with complete information, the settlement proceeds are uniquely divided between the two types. As can be seen in Proposition 4, each high-type member gets his reservation payoff $\bar{\theta} - c_p$ while the low-type members split all the surplus. This division rule is optimal because the joinder's rejection rule is ex post distorted toward trial. While informational rents must be given to the low-type plaintiffs, the same is not true for the high-type members. Therefore, any division rule that gives positive surplus (above and beyond the trial payoff) to the high-type members can be improved upon by the one that gives the entire surplus to the low-type members, since the trial bias will be reduced in the process.

It is rather surprising that if $p > \hat{p}$, the defendant makes an offer that all types of joinders (even the one consisting only of high-type plaintiffs) will accept, irrespective of n . This is surprising because the law of large numbers would normally suggest that for sufficiently large n , the defendant should not be afraid of going to trial with a joinder with an extremely large fraction of high-type plaintiffs, because the likelihood of encountering such types of joinders becomes negligible. Equivalently, the defendant should offer just enough so that a joinder with the population mean fraction of the high-type members will accept. This insight need not hold here because of the incentive problem facing the joinder. The defendant may already be paying substantial informational rents to settle with a joinder with a mean fraction of high types, so she may not find it too costly to induce additional settlement at an even higher offer.

Thus far, I have only focused on the bargaining subgame. As in the previous section, whether a plaintiff joins a consolidated action or not is determined in the first period of the game. Not surprisingly, the aforementioned signaling problem produces the same pooling equilibrium in which all plaintiffs join collective negotiation.²³

²³ The optimal bargaining decision makes the high-type plaintiff just indifferent to joining collective negotiation. This indifference and the desire by the low type to mimic the high type's membership decision yield an array of pooling equilibria, including the one in which no plaintiff joins collective negotiation. But these other equilibria may not be robust. If, in fact, the joinder's decision rule provides positive shares of bargaining surplus to both types of members (as would happen in the bidding arrangement discussed in Footnote 22), then the result of Proposition 3 reemerges: In equilibrium, every plaintiff participates in the joinder.

5. COLLECTIVE NEGOTIATION BY A SELF-INTERESTED REPRESENTATIVE

In Sections 3 and 4, I have assumed that the joinder's acceptance decision is made in the best interests of its members. This assumption is sensible if the bargaining representative is either benevolent or has no bargaining power relative to the members he represents. Often, neither is the case. In multiplaintiff litigation or in many other cases involving collective negotiation, lead counsels who negotiate on behalf of their members often enjoy substantial discretion in making negotiation decisions, and they command some extra fees (or bonus) in the event of successful settlement. For example, contingent fees (often proportional to the settlement amounts) are very common in the multiplaintiff litigation. For this reason, this section postulates a self-interested representative who maximizes his own payoff in the event of a successful settlement.

If the joinder members and their representative can credibly commit to a compensation scheme for the latter, then it can influence the defendant's offer to the advantage of the members.²⁴ Such a commitment is difficult to achieve, however, since it is susceptible to *ex post* renegotiation. For example, suppose there are two members with *commonly known* total damages (net of trial costs) equal to \$200 and the defendant's costs of trial (with the joinder) are \$100. Suppose that the members agree to pay some positive bonus to a representative *only when* the defendant offers no less than \$300. If such a compensation scheme can be credibly enforced, then the defendant will offer \$300. But commitment to such a scheme is often not credible. Suppose that the defendant offers \$201 instead of \$300. The representative will not reject such an offer. He will instead renegotiate with the members to accept the offer (and, for example, to pay the members \$200, which still leaves \$1 to the representative).

To allow for such a renegotiation possibility, assume that the representative's compensation from settlement is determined only *after* the defendant makes her offer. More specifically, assume that once the defendant makes an offer, the representative decides whether or not to accept the offer and, in the event of acceptance, he receives a residual surplus after distributing settlement shares to the members.

As for the information of the representative, there are three possibilities: (1) the representative knows the types of its members; (2) the representative does not know the types, but the members know one another's types; and (3) neither the representative nor each member knows the types of the other members. It turns out that (1) and (2) are essentially the same and produce precisely the same outcome as reported in Section 3. When the members have the knowledge of one another's type, the representative can costlessly reveal the members' types. Since the types are revealed costlessly, the representative's rejection decision will be *ex post* Pareto efficient for the members. No distortion occurs in the rejection decision, since the representative accepts whenever he receives a positive surplus after paying the trial payoffs to the members.²⁵ Consequently, we focus on the last scenario, (3).

²⁴ Fershtman and Judd (1987) and Sklivas (1987) develop similar ideas that oligopoly firms can commit to a strategically favorable position through a compensation scheme for their managers.

²⁵ Hence, the defendant makes an offer according to the rule described in Proposition 1, and the representative receives rents only for *inframarginal* joinder types.

To solve for an equilibrium in this case, I work backward again. Suppose that an offer S has been made by the defendant. The representative's rejection decision is then characterized, without loss of generality, as a direct revelation mechanism that solves the following program:

$$[\tilde{P}(S)] \quad \max_{\{r_i \in [0, 1, \bar{d}_i, \underline{d}_i]\}_0^n} \sum_{i=0}^n f_n(i; p)[(1 - r_i)S - i\bar{d}_i - (n - i)\underline{d}_i]$$

subject to

$$(IR_L), (IR_H), (IC_L), \text{ and } (IC_H)$$

This program is similar to $[\hat{P}(S)]$ except that the representative maximizes the settlement residual after distributing the joinder members' shares. Also, (BB) is no longer required, since the representative serves as a budget breaker. The following proposition presents the solution of $[\tilde{P}(S)]$ together with the defendant's equilibrium offer:

PROPOSITION 6. *Given a joinder with $n \leq N$ members and the posterior p , it is optimal for the representative to choose, for each $k = 0, \dots, n$,*

$$r_k = \begin{cases} 0, & \text{if } S \geq \tilde{S}_k \\ 1, & \text{if } S < \tilde{S}_k \end{cases}$$

where $\tilde{S}_k \equiv S_k + (n - k + 1) \frac{f_n(k-1; p)}{f_n(k; p)} \Delta\theta$,²⁶

$$\bar{d}_k = (1 - r_k)(\bar{\theta} - c_p) \quad \text{and} \quad \underline{d}_k = (1 - r_k) \frac{S_{k^*} - k(\bar{\theta} - c_p)}{n - k}$$

where k^* satisfies $\tilde{S}_{k^*} \leq S < \tilde{S}_{k^*+1}$.²⁷

Knowing this, the defendant picks

$$(3) \quad \tilde{S}^*(p) = \tilde{S}_k \quad \text{if and only if } \tilde{p}_n^k \leq p \leq \tilde{p}_n^{k+1},$$

where \tilde{p}_n^k solves $[k(1 - p)/p + F_n(k - 1; p)]/pf_n(k; p) = n\phi/\Delta\theta$.

As in Proposition 4, the representative is biased in favor of rejection; that is, some ex post acceptable offers are rejected. This can be explained in two ways. First, as before, the asymmetric information and the resulting need to induce truthful reporting require that some informational rents be given to the low-type members; and, since the rents must be raised from the settlement proceeds, the rejection decision is biased toward rejection. Second, and more important for this case, the representative decision creates a "monopoly effect," which further biases the decision toward rejecting the offer. To see this, suppose that the defendant has offered \tilde{S}_k —the amount that would be sufficient to induce settlement from a joinder with k high-type plaintiffs with a benevolent representative. If the

²⁶ By convention, $f_n(-1; p) \equiv 0$. As in Section 4, whether individual rationality is imposed in the ex post or interim version does not affect the result here.

²⁷ I define $S_{n+1} \equiv \infty$.

representative were to accept that offer whenever there are fewer than k (reported) high-type plaintiffs (the equilibrium behavior in Proposition 4), then all settlement surplus must be used as informational rents to the low-type members, leaving no surplus to the representative. The representative can do strictly better by distorting the decision rule in favor of trial. Hence, the representative forgoes additional settlement probability (relative to the rejection decision described in Proposition 4) in order to extract positive surplus. This result is verified in the next proposition.

PROPOSITION 7. *With a self-interested representative, (i) each type of joinder demands more from the defendant to settle (i.e., $\tilde{S}_k > \hat{S}_k$ for all $k \in \{1, \dots, n-1\}$), and (ii) the equilibrium settlement probability is lower than it is with a benevolent representative described in Proposition 4 (i.e., $\tilde{p}_k < \hat{p}_k, \forall k$).*

Clearly, the joinder as a whole becomes tougher in its bargaining stance due to the self-interested representative. Since the equilibrium settlement rate is actually lower, it is not clear that this will result in the joinder extracting more from the defendant. Credibly demanding too much may cause the defendant to become too pessimistic about settlement and lower her offer. Nevertheless, we can easily construct an example where the joinder as a whole benefits from such a representation (provided that there is prior redistribution of the expected surplus).

Recall again the example with $n=2$, $\bar{\theta}=\$100$, $\underline{\theta}=\$50$, $c_d=\$24$, $c_p=\$0$, and $p=q=2/3$. Without a self-interested representative, the joinder's bargaining position is described in Figure 2, and the defendant makes a per capita offer of \$80 in equilibrium. With a self-interested representative, the credible settlement demands are $\tilde{S}_0=100$, $\tilde{S}_1=175$, and $\tilde{S}_2=250$, so the settlement probability for each per capita offer is as graphed in Figure 3. Compared with Figure 2, a higher offer is necessary to achieve a given settlement probability. The defendant's equilibrium offer turns out to be \$87.50 in this case. This shows the possibility that collective negotiation is better than one-on-one negotiation, even with a self-interested representative with a strong bargaining power. In this example, the joinder members remain as well off as in the case of a benevolent representative. Consequently, if some portion of the representative's surplus is transferred ex ante to the joinder members through an up-front fee, the joinder members may strictly prefer to have a self-interested representative.²⁸

The first-period membership decision in this case is similar to those in the previous sections and thus omitted. As before, there is an equilibrium in which all plaintiffs join the collective action. Further, if an up-front fee can be charged to the representative, then, as the above example shows, the incentive to join a collective action may be strict for all plaintiffs.

²⁸ The up-front fee may take the form of the representative expending initial expenditures associated with the lawsuits, which often occurs under contingent fee arrangements.

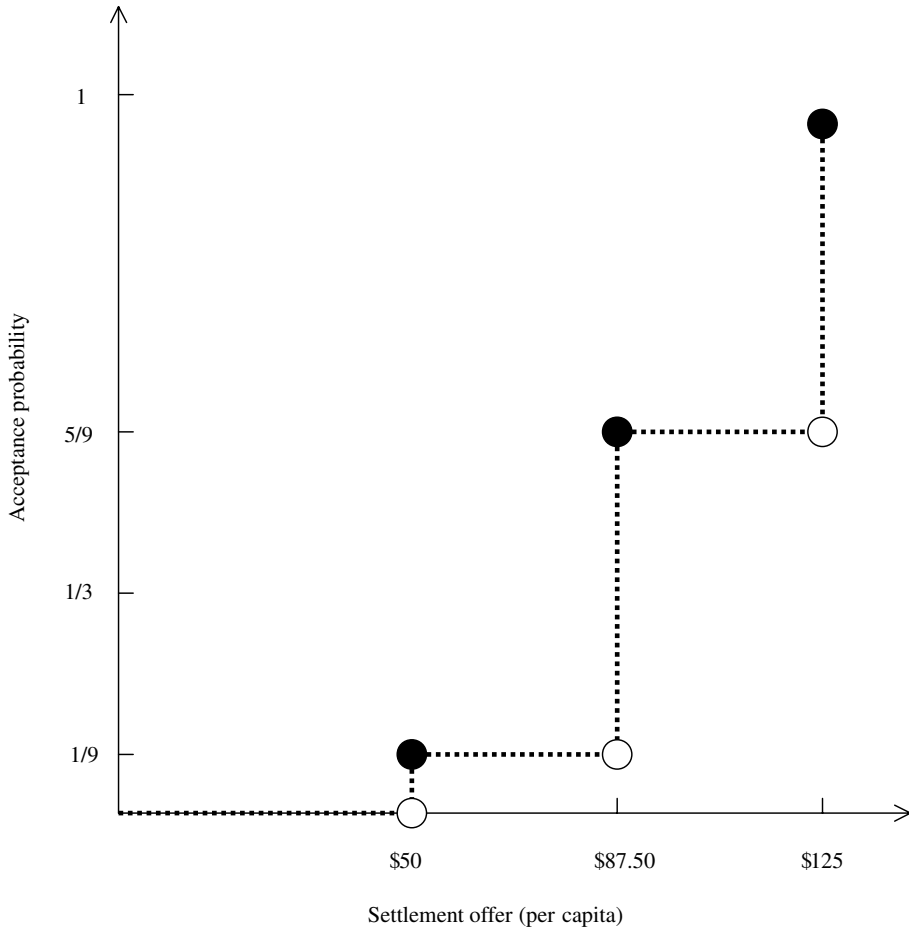


FIGURE 3

THE PROBABILITIES OF ACCEPTANCE WITH DELEGATED COLLECTIVE NEGOTIATION

6. CONCLUDING REMARKS

This article has explored how plaintiffs can improve their bargaining positions by committing to collectively negotiate the pretrial settlement of their claims, and studied equilibrium formation of a collective negotiation unit. To a limited extent, the findings of this article can be applied to nonlitigation settings. For example, one can reinterpret the model as that of several labor unions forming a joint bargaining unit against a common employer, by appropriately relabeling variables.²⁹ Some elements of the model are specific to the setting that we considered and may not be

²⁹ One may rename θ as the reservation value of each union, and c_p and c_d as the costs of strikes borne by each union and the management, respectively.

appropriate for other situations where collective negotiation is relevant. The following are some remarks on these situations:

- (i) *Large class action suits*: The model does not reflect several features of large class action suits. First, a large class size makes it difficult for a court to review individual cases separately in trial. Typically, a court selects a few of what it deems as representative cases, and binds the judgments from these cases to the rest of the cases. Such a process effectively averages damages awarded to individual members. Second, in large class action suits, decision power is concentrated on the majority or even a smaller dominant subgroup of the class. Finally, members of large class actions cannot opt out ex post and seek individual trial, while they can do so ex ante. The veto power assumption is unrealistic, given these latter two features. While a complete analysis of the implications of these features is beyond the scope of this article, one can see that they imply a strong tendency for adverse selection in the membership decision. Clearly, damage averaging would make high-type plaintiffs worse off from joining a class action. Likewise, a majority decision rule would have a similar effect since low-type members can form a winning coalition by themselves or by including a small fraction of high-type members and accept a bad offer.³⁰ Either way, the high-type plaintiffs would be reluctant to join a class action suit. Given the signaling effect, then the low-type plaintiffs will opt out too, for fear of sending an adverse signal. Consequently, no class action will be formed in equilibrium if there are no economies-of-scale benefits associated with class action (in terms of reduced litigation costs). If class action provides some scale benefits, however, a more realistic pooling equilibrium would arise, wherein both types of plaintiffs join the class action with positive probabilities (see Che, 1996).
- (ii) *Alternative specifications of bargaining games*: The central insights of this article seem valid with other specifications of the bargaining game, as long as the plaintiffs do not have the complete bargaining advantage. The main insights rest on the impacts that collective negotiation has on the per capita distribution of types. These effects would be in force as long as the bargaining game involves “screening” of the plaintiffs’ types. This latter feature is present in a couple of multistage pretrial bargaining models analyzed by previous authors. Wang et al. (1994) analyze an infinite-horizon alternating-offer game in which a defendant moves first and a privately informed plaintiff can trigger trial as an outside option. They find that this model yields precisely the static screening equilibrium derived in this article. Spier (1992) analyzes a finite-horizon model in which an uninformed party makes one-sided offers to a privately informed party until the latter accepts the former’s

³⁰ To see this, assume $n=3$, $\bar{\theta}=\$100$, $\underline{\theta}=\$50$, $c_d=\$25$, $c_p=\$0$, and $p=q=1/2$. Suppose that the members of the joinder have complete information about one another. One can check that, under the majority decision rule, it is optimal for the defendant to offer \$150 as a total settlement. Such an offer will be accepted if there is at least one low-type member: A low-type member will form a majority coalition with another low-type or a high-type member and accept that offer. Given this equilibrium offer, a high-type plaintiff will be worse off from joining the class.

offer or else trial occurs at the end of the (finite) bargaining horizon. In this model, a bulk of screening is found to occur at the last bargaining round (the “deadline effect”), which resembles the static screening outcome studied here. Hence, the insights presented here appear to work in these models. If the plaintiffs had complete bargaining advantage relative to the defendant, however, then collective negotiation may not be appealing. If a plaintiff (or a joinder of plaintiffs) makes a take-it-or-leave-it offer instead (as in Reinganum and Wilde, 1986), the screening feature disappears and collective negotiation may simply increase the probability of trial without increasing the expected bargaining surplus for the plaintiffs.

APPENDIX

PROOF OF PROPOSITION 1. For each $k \geq 1$,

$$\frac{F_n(k-1; p)}{f_n(k; p)} = \frac{1}{\binom{n}{k}} \sum_{i=0}^{k-1} \binom{n}{i} \left(\frac{1-p}{p}\right)^{k-i}$$

is strictly decreasing in p , and it goes to ∞ as $p \rightarrow 0$ and it goes to zero as $p \rightarrow 1$. Hence, p_n^k is well defined.

I now prove the main statement. The “only if” part follows since if $p \notin [p_n^k, p_n^{k+1}]$, then either $l_n(k; p) > 0$ or $l_n(k+1; p) < 0$, in which case it pays to lower or raise the offer from S_k .

The “if” part follows because if $p \in [p_n^k, p_n^{k+1}]$, then $l_n(k; p) \leq 0$ and $l_n(k+1; p) \geq 0$, and because $L_n(\cdot; p)$ is strictly quasi-convex. The latter can be proven by noting that

$$\begin{aligned} \frac{F_n(k; p)}{f_n(k+1; p)} &= \frac{f_n(0; p) + \sum_{i=1}^k f_n(i; p)}{f_n(k+1; p)} \\ &= \frac{f_n(0; p)}{f_n(k+1; p)} + \sum_{i=1}^k \left(\frac{(n-i+1)(k+1)}{(n-k)i}\right) \left(\frac{f_n(i-1; p)}{f_n(k; p)}\right) \\ &> \frac{\sum_{i=1}^k f_n(i-1; p)}{f_n(k; p)} \\ &= \frac{F_n(k-1; p)}{f_n(k; p)} \end{aligned}$$

which implies that

$$l_n(l; p) > 0 \text{ whenever } l_n(k; p) \geq 0, \text{ for } l > k \quad \blacksquare$$

PROOF OF PROPOSITION 4. I first analyze the solution to $[\hat{P}(S)]$ for any S . First, observe that if $S > \hat{S}_n = n\theta - nc_p$, then the described decision rule clearly solves $[\hat{P}(S)]$, since it is Pareto efficient to accept it, and sharing it equally among the members clearly satisfies both incentive constraints and individual rationality constraints. Hence, assume that $S \leq \hat{S}_n$. I first ignore (IR_L) and (IC_H) , focusing on

the remaining constraints. Later, I shall show that the solution to the relaxed problem indeed satisfies the two neglected constraints.

I first observe that (IR_H) binds (since otherwise lowering \bar{d}_i 's can only relax (IC_H) and can increase the value of the objective function, while satisfying (BB)). Rewrite the binding (IR_H) as

$$\sum_{i=0}^{n-1} f_{n-1}(i; p) \frac{i}{n-i} [\bar{d}_i - (1-r_i)(\bar{\theta} - c_p)] = 0$$

Meanwhile, (BB) yields $\underline{d}_i = ((1-r_i)S - i\bar{d}_i)/(n-i)$. Substituting these two equations into (IC_L) gives

$$\sum_{i=0}^{n-1} f_{n-1}(i) \left[(r_i - r_{i+1})(\underline{\theta} - c_p) + (1-r_i) \frac{S - i(\bar{\theta} - c_p)}{n-i} - (1-r_{i+1})(\bar{\theta} - c_p) \right] \geq 0$$

Using this new version of (IC_L) and substituting (BB) into the objective function, I now set up a Lagrangian equation for the relaxed problem:

$$\begin{aligned} L(\{r_i\}_0^n, \lambda, \{\mu_i\}_0^n, \{\zeta_i\}_0^n) &= \sum_{i=0}^n f_n(i; p) [(1-r_i)S + r_i(i\bar{\theta} + (n-i)\underline{\theta} - nc_p)] \\ &+ \lambda \left\{ \sum_{i=0}^{n-1} f_{n-1}(i; p) \left[(r_i - r_{i+1})(\underline{\theta} - c_p) \right. \right. \\ &+ \left. \left. (1-r_i) \frac{S - i(\bar{\theta} - c_p)}{n-i} - (1-r_{i+1})(\bar{\theta} - c_p) \right] \right\} \\ &+ \sum_{i=0}^n \mu_i r_i + \sum_{i=0}^n \zeta_i (1-r_i) \end{aligned}$$

where λ , μ_i , and ζ_i are multipliers associated respectively with (IC_L) , $r_i \geq 0$, and $r_i \leq 1$.

The associated first-order conditions are

$$\begin{aligned} \text{(A.1)} \quad 0 &= \frac{\partial L}{\partial r_i} = f_n(i; p)[i\bar{\theta} + (n-i)\underline{\theta} - nc_p - S] \\ &+ \lambda \left\{ f_{n-1}(i; p) \left(\frac{1}{n-i} \right) [n(\underline{\theta} - c_p) - S] + f_{n-1}(i-1)\Delta\theta \right\} + \mu_i - \zeta_i \\ &= f_n n(i; p) \left[i\bar{\theta} + (n-i)\underline{\theta} - nc_p - S + \frac{\lambda}{n} \left\{ \frac{n(\underline{\theta} - c_p) - S}{(1-p)} + \frac{i\Delta\theta}{p} \right\} + \frac{\mu_i - \zeta_i}{f_n(i; p)} \right] \\ &= f_n(i; p) \left[A(i) + \frac{\mu_i - \zeta_i}{f_n(i; p)} \right] \end{aligned}$$

where $A(i) \equiv i\bar{\theta} + (n-i)\underline{\theta} - nc_p - S + \frac{\lambda}{n} \{ ((n(\underline{\theta} - c_p) - s)/(1-p)) + (i\Delta\theta/p) \}$, and the complementary slackness conditions are

$$(A.2) \quad \lambda \geq 0 \text{ and } \lambda \left\{ f_{n-1}(i) \left(\frac{1}{n-i} \right) [n(\underline{\theta} - c_p) - s] + f_{n-1}(i-1)\Delta\theta \right\} = 0$$

$$(A.3) \quad \mu_i \geq 0 \quad \text{and} \quad \mu_i r_i = 0$$

$$(A.4) \quad \zeta_i \geq 0 \quad \text{and} \quad \zeta_i(1 - r_i) = 0$$

First of all, because of the linearity of the problem, we have a bang–bang solution. Therefore, without any loss of generality, $r_i = 0$ or 1 .

Next, I show that if $r_i < 1$, then $r_j = 0$ for all $j < i$. To see this, suppose that $r_i < 1$. Then, (A.4) implies that $\zeta_i = 0$. Since $A(\cdot)$ is strictly increasing, for any $j < i$, $A(j) < A(i)$. It then follows from (A.1) that

$$\frac{\mu_j - \zeta_j}{f_n(j; p)} > \frac{\mu_i - \zeta_i}{f_n(i; p)} = \frac{\mu_i}{f_n(i; p)} \geq 0$$

This inequality implies that $\mu_j > 0$, which in turn implies, via (A.3), that $r_j = 0$. I thus conclude that if $r_i < 1$, then $r_j = 0$ for all $j < i$. A symmetric argument proves that if $r_i > 0$, then $r_l = 1$ for all $l > i$.

Given this structure of the optimal rejection strategy, the specific rejection strategy described in Proposition 4 is optimal. If $r_k = 0$ (and hence $r_j = 0$ for all $j < k$), then (after some algebra), (IC_L) implies $S \geq \hat{S}_k$. Hence, $r_k = 0$ only if $S \geq \hat{S}_k$. Conversely, suppose $S \geq \hat{S}_k$. If $r_k \neq 0$, then $r_j = 1$ for all $j > k$. Now, consider an alternative strategy where $r_i = 0$, $\bar{d}_i = (1 - r_i)(\bar{\theta} - c_p)$, and $\underline{d}_i = (1 - r_i)(S - i(\bar{\theta} - c_p)/(n - i))$ for all $i \leq k$; and $r_l = 1$ for $l > k$. This alternative strategy satisfies all the constraints and (at least weakly) increases the value of the objective function since $\hat{S}_k > k\bar{\theta} + (n - k)\underline{\theta} - nc_p$. Therefore, it is optimal to set $r_k = 0$.

Finally, given the rejection strategy, expected settlement shares $\bar{d}_i, \underline{d}_i, \forall i$ described in Proposition 4 satisfy all constraints of $[\hat{P}(s)]$. Hence, the first part of the proposition is proven.

I now analyze the equilibrium behavior of the defendant. To this end, again define the defendant’s incremental loss from raising her offer from \hat{S}_{k-1} to \hat{S}_k :

$$(A.5) \quad \hat{l}_n(k; p) = f_n(k - 1)(n - k + 1)k\Delta\theta \left(\frac{p}{1 - p} \right) \left[\frac{k(1 - p)}{p} - \frac{n\phi}{\Delta\theta} \right]$$

For any k ,

$$\hat{l}_n(k; p) < 0 \quad \text{whenever } l_n(k; p') \leq 0, \quad \text{for any } p > p'$$

Hence, if $p \notin [\hat{p}_n^k, \hat{p}_n^{k+1}]$, then either $\hat{l}_n(k; p) > 0$ or $\hat{l}_n(k + 1; p) < 0$, in which case it pays to deviate from \hat{S}_k . So, the “only if” part of (2) is proven. The “if” part of (2) follows since if $p \in [\hat{p}_n^k, \hat{p}_n^{k+1}]$, then $\hat{l}_n(k; p) \leq 0 \leq \hat{l}_n(k + 1; p)$, and since

$$\hat{l}_n(l; p) > 0 \quad \text{whenever } \hat{l}_n(k; p) \geq 0, \quad \text{for any } l > k$$

that is, the defendant’s loss function is strictly quasi-convex. ■

PROOF OF PROPOSITION 6. As before, I consider a relaxed program where (IR_L) and (IC_H) are absent. (Later, I show that these constraints are satisfied at a solution to the relaxed program.) As in the proof of Proposition 4, I substitute (IR_H) (in its binding version) into (IC_L) to obtain

$$\sum_{i=0}^{n-1} f_{n-1}(i; p) [\underline{d}_i + r_i(\underline{\theta} - c_p)] \geq \sum_{i=0}^{n-1} f_{n-1}(i; p) [(1 - r_{i+1})\bar{\theta} + r_{i+1}\underline{\theta} - c_p]$$

It is clear from the objective function that the representative cares only about the expected payment that he makes to the low-type members. This, together with the above expression (IC_L) , implies that (IR_L) will be satisfied for all k once (IC_L) is satisfied.

Now, after rewriting the above (IC_L) using $f_{n-1}(i; p) = [(n - i)/n(1 - p)]f_n(i; p)$, substitute it into the objective function, which then becomes

$$\begin{aligned} & \sum_{i=0}^{n-1} f_n(i; p) [(1 - r_i)(S - i\bar{\theta} - nc_p) - (n - i)\{(1 - r_{i+1})\bar{\theta} + (r_{i+1} - r_i)\underline{\theta}\}] \\ & + f_n(n; p)(1 - r_n)(S - n(\bar{\theta} - c_p)) \end{aligned}$$

Differentiating this with respect to r_k yields

$$-f_n(k; p) \left[S - S_k - (n - k + 1) \frac{f_n(k - 1; p)}{f_n(k; p)} \Delta\theta \right] = -f_n(k; p)[S - \tilde{S}_k]$$

The rejection decision of Proposition 6 clearly follows from this. Given the rejection decision, \bar{d}_k and \underline{d}_k described in Proposition 6 satisfy (IC_L) (with equality) and satisfy $(IR_k), \forall k$, and (IC_H) . The last point justifies the restricted attention to the relaxed program earlier.

To analyze the defendant's optimal-offer decision, consider the incremental loss from raising the offer from \tilde{S}_{k-1} to \tilde{S}_k :

$$(A.6) \quad \tilde{l}_n(k; p) = f_n(k; p) \left[\frac{k(1 - p)}{p} + \frac{F_n(k - 1; p)}{pf_n(k; p)} - \frac{n\phi}{\Delta\theta} \right]$$

First, the terms inside the brackets are continuous and strictly decreasing in p , and are strictly positive for p close to 0 and negative for p close to 1. Hence, $\tilde{p}_k, \forall k$ is well defined and increases with k . Next, the terms inside the brackets are strictly increasing in k , which means that

$$\tilde{l}_n(l; p) > 0 \quad \text{whenever } \tilde{l}_n(k; p) \geq 0, \text{ for any } l > k$$

that is, the defendant's loss function is strictly quasi-convex. Hence, the solution is characterized by the local condition:

$$\tilde{l}_n(k; p) \leq 0 \leq \tilde{l}_n(k + 1; p) \Leftrightarrow p \in [\tilde{p}_k, \tilde{p}_{k+1}]$$

which is also necessary. The stated result thus follows. ■

PROOF OF PROPOSITION 7. To prove the first part, it suffices to show $\tilde{S}_k > \hat{S}_k$, which is equivalent to showing $(n - k + 1)[f_n(k - 1)/f_n(k)] > (n - k)[F_n(k - 1)/F_n(k)]$. This latter inequality holds since

$$\begin{aligned}
(n-k+1)\frac{F_n(k)}{f_n(k)} &= (n-k+1)\frac{\sum_{i=0}^k f_n(i)}{f_n(k)} \\
&> (n-k+1)\frac{\sum_{i=1}^k [(n-i+1)/i]f_n(i-1)}{[(n-k+1)/k]f_n(k-1)} \\
&> \frac{\sum_{j=0}^{k-1} (n-j)[k/(j+1)]f_n(j)}{f_n(k-1)} \\
&> \frac{\sum_{j=0}^{k-1} (n-j)f_n(j)}{f_n(k-1)} \\
&> (n-k)\frac{\sum_{j=0}^{k-1} f_n(j)}{f_n(k-1)} \\
&= (n-k)\frac{F_n(k-1)}{f_n(k-1)}
\end{aligned}$$

The second statement holds since it follows from inspecting (A.5) and (A.6) that

$$\tilde{l}_n(k; p) > 0 \quad \text{whenever } \hat{l}_n(k; p) \geq 0 \quad \blacksquare$$

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