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Stalling, Conflict, and Settlement

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Abstract

A widely-held assumption in the study of litigation and settlement is that if litigation is costly and settlement bargaining is costless, then in a complete-information setting, all disputes will settle with no need even for a lawsuit to be filed. This assumption is mistaken. Even with complete information, perfectly rational parties may fail to settle without the plaintiff first spending resources to file suit, only for the parties thereafter to settle the filed lawsuit. This inefficient outcome occurs because, outside of litigation, a strategy of stalling may be optimal for a defendant, and the plaintiff's only alternative is (costly) litigation. In this paper, I present a simple model demonstrating how the threat of stalling leads to costly lawsuits even in a complete-information environment, derive empirical predictions from the model, and discuss policy implications for case management, discovery, and the use of prejudgment interest as tools to encourage settlement.

1 Introduction

Consider a legal dispute between two parties who have an opportunity to negotiate a settlement before a lawsuit is filed. Does *costless* settlement bargaining and *no* private information make settlement without the (costly and inefficient) filing of a lawsuit inevitable? If you answered, “yes,” you’d be wrong.

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This paper explains why. As I will show, if pre-suit settlement bargaining is costless, then under fairly general, plausible conditions, bargaining failure is certain.

The claim that costly conflict will occur even between rational parties with complete information has broad applicability:

Imagine a legal claim raised by a potential plaintiff against a potential defendant. If the claimant were to file suit and take the case to trial, she would prevail with some probability and win a judgment. Both parties know the stakes, both know each parties' costs of litigating the claim, and both have the same estimate of the plaintiff's likelihood of winning. What will happen? They know what to expect from trial, and filing suit is costly. The conventional view is that, surely, they will settle.

Next, imagine a territorial claim raised an aggressor state against another state. If the aggressor were to invade and prosecute the war to its conclusion, it would capture the disputed territory with some probability. Both states know the stakes, both know each states' costs of fighting a war, and both have the same estimate of the aggressor's likelihood of winning. What will happen? They know what to expect from war, and fighting is costly. The conventional view is that, surely, they will settle.

Each of these scenarios describes a simple model of conflict and settlement. In each, the obvious problem is that these models fail to predict trials and wars, which for better or worse are empirical regularities. The political science literature on armed conflict has called this "the puzzle of war," and likewise the law-and-economics literature on litigation and settlement has long dealt with the puzzle of trial.¹

The intuition that settlement is inevitable in a full-information environment is elegantly captured by Rubinstein (1982), who shows that in a game where parties can alternate offers to split a surplus for an indefinite (even infinite) amount of time, the unique, subgame perfect equilibrium of the game is for the parties to settle immediately, splitting the surplus (approximately) evenly and incurring no real costs.² Given the generality of this result—there is no limit on the number of offers or counteroffers—any effort to explain litiga-

¹There is a meta-puzzle here, if you will, which is why these literatures are separate. It should be clear from the scenarios above that there is a single "puzzle of conflict" rather than separate puzzles of war and litigation. (Perhaps lawyers are uninterested in studying war and international relations scholars are uninterested in studying litigation.) Only recently have Levmore and Porat (2015) begun to apply a common conceptual framework to war and litigation. I also note that there is yet another separate literature on labor bargaining involving unions and strikes that presents a nearly isomorphic set of puzzles. The puzzle of strikes in a full-information, rational-actor setting is reviewed in Fernandez and Glazer (2001). Because bargaining failure in this setting has been more fully explored, I do not emphasize it here.

²A 50/50 split occurs only in the limit as the parties' discount factors approach 1. If this condition does not hold, the split is only approximately 50/50.

tion or other inefficiencies in a complete-information environment might seem futile.³

The seeming disconnect between these predictions and reality have led scholars to look for answers based on asymmetric information. Both the literature on litigation and settlement and the literature on war and peace have largely focused on private information or asymmetric beliefs to explain why parties to a dispute would fail to reach a settlement and avoid the costs of open conflict. The canonical divergent-expectations model in law and economics posits that mutual optimism of the parties may eliminate the range of mutually agreeable settlement values (see, e.g., Priest and Klein [1984]), and models on war and peace have turned to this device as well (see Slantchar and Tarar [2011]).⁴

In recent years, the prevailing approach has been to assume that asymmetric information generates conflict. In law and economics, models in which settlement offers are used by informed parties to signal private information (Reinganum and Wilde [1986]) or by uninformed parties to screen for private information (Bebchuk [1984]) are the workhorses of the theoretical study of litigation and settlement. Existing contributions that specifically study settlement delay, as I do below, also focus on private-information environments; Miceli (1999) presents a model in which settlement delay is costly to plaintiffs, and plaintiffs unobservably differ in their ability to tolerate delay. Likewise, seminal work on war emphasizes asymmetries of information as a basis for armed conflict (see, e.g., Fearon [1995]). Indeed, the view that war is impossible in a complete-information environment is summed up in the title of a famous paper, “War Is in the Error Term” (Gartzke [1999]).

As intuitive as asymmetric information is as an explanation for conflict—and it certainly *does* explain many conflicts, both legal and military—its ability to explain some types of conflict does not survive closer inspection. As Powell (2006) noted, “while asymmetric information may explain the early phases of some conflicts, it does not provide a convincing account of prolonged conflict,” because, as Fearon (2004) observed, “after a few years of war, fighters on both sides . . . typically develop accurate understandings of the other side’s capabilities, tactics, and resolve.” For this reason, scholars such as James Fearon (1995) and Robert Powell (2006) have developed symmetrical-information models in which bargaining failure leads to war, despite the par-

³This is not to say that generalizations of the Rubinstein (1982) model do not admit to inefficient, strategic delay. Perry and Reny (1993) provide an excellent discussion of this, much of which is relevant to the analysis below. I thank Scott Baker for bringing this paper to my attention.

⁴This view, however, has been criticized for lacking foundations in rational behavior—if parties share common information and know conflict is costly, then the fact of bargaining failure should lead parties to update their beliefs about their likelihood of winning, thereby eliminating the mutual optimism problem (see, e.g., Lee and Klerman [2015]; Slantchar and Tarar [2011]).

ties' common knowledge that war makes both sides worse off.

The same pivot toward symmetrical-information models has not occurred in law and economics, although several papers (which I discuss below) make important contributions in this context. The relative inattention to this context should be surprising. While asymmetric information is undoubtedly an essential feature (perhaps *the* essential feature) of many litigation contexts, its role can be overstated; indeed, the hallmark of the Federal Rules of Civil Procedure is to create, through discovery, a symmetric-information litigation environment. And for many disputes, even at the time the case is filed, there is little private information. For example, in federal court alone, plaintiffs file thousands of cases seeking judgments to collect on defaulted debt. Neither liability nor damages is disputed, and as I will document below the cases often proceed swiftly to judgment without discovery.

Likewise, claims of frivolous and nuisance-value litigation abound. While the prevalence of such cases is hotly debated, there is no doubt that, to the extent such cases exist, they are driven by *common knowledge* that the plaintiff's claims do not have legal merit sufficient to justify a settlement, but the defendant's high litigation costs will induce a settlement regardless. Indeed, the notion that a lawsuit is "frivolous" only makes sense in a symmetric-information environment. If there is private information, then one can't know whether a lawsuit is frivolous or not.

Therein lies the puzzle: these debt collection actions and frivolous lawsuits are *lawsuits*. They weren't resolved out of court, before legal fees started piling up after the filing of a complaint. Most of these cases settle, of course, which is no surprise given the lack of asymmetric information. But they settle during, not before, litigation. The parties sign their peace treaty, so to speak, only after declaring war. Why?

This type of bargaining failure has been virtually unexplored in law and economics. Rather, symmetrical-information models in law and economics have mostly abstracted away from the bargaining process, instead focusing on the extent to which a negative-expected-value (NEV) claim can nonetheless induce a settlement for the plaintiff. See Rosenberg and Shavell (1985); Bebchuk (1996); Croson and Mnookin (1996); and Hubbard (2016). Consistent with the prevailing intuition about settlement in a symmetrical-information environment, in these models backwards induction leads to an efficient settlement in the first period of the game; no real resources are consumed due to delay or litigation activity.

Although most symmetric-information models of suit and settlement purport to describe the litigation process, this is only because the model imposes the assumption that a complaint is filed before anything else happens in the model. But the logic of these models predicts *settlements* but no *suits*. In a symmetrical-information environment, why would the parties wait for a filed complaint before settling, when they could settle the claim pre-complaint and

save the cost of filing? Yet millions of lawsuits are filed each year. Are every one of these plagued by asymmetric information or irrational parties?

Rather than imposing *a priori* an inability to bargain pre-suit, my model explicitly models the pre-suit negotiation process and derives conditions under which claims will or will not settle pre-suit. This model shows how a simple but under-studied negotiation tactic—stalling, by which I mean the strategy of continuing to negotiate not with the goal of reaching a settlement but the goal of delaying action by one’s adversary—affects behavior even in full information settings where the plaintiff is bringing a positive-expected value (PEV) claim.⁵ Although stalling does not occur in equilibrium in my model, it is the threat of stalling that induces perfectly rational actors in a symmetric-information context to resort to litigation (which is costly) rather than attempting to settle out of court for free. Contrary to intuition, the existence of a symmetric-information (or even full-information) environment does not guarantee pre-suit settlement. Instead, the costly and inefficient filing of suit is the equilibrium outcome in this model for a wide range of realistic parameter values.

This model also provides a theoretical foundation for simpler models of settlement used in many contexts, such as the single, take-it-or-leave-it settlement offer limited by an exogenous bargaining-power parameter. See, e.g., Hubbard (2016). And the fact that in many circumstances pre-suit settlement is impossible means that models that simply ignore the possibility of pre-suit settlement may not be so unrealistic after all. Further, I show that under conditions relevant to the modeling of litigation (i.e., finite-time bargaining with many opportunities for settlement), models with discounting of the future but without bargaining costs (such as the Rubinstein (1982) model), and models with no discounting but with bargaining costs (such as Bebchuk (1996)) are outcome-equivalent. Indeed, many important works on bargaining with repeated offers and counteroffers, including Rubinstein (1982), Binmore, Shaked, and Sutton (1989), Bebchuk (1996), and Schwartz and Wickelgren (2009) nest as special cases of the general model I describe herein.

I have found four papers that focus on settlement bargaining in complete information contexts in bilateral litigation.⁶ The results in this paper build upon and in some cases generalize these papers. Spier (1992) was the first to note the stalling phenomenon in the complete-information context. Further, Spier (1992) is one of the few papers to recognize that litigation is the outside

⁵The logic herein applies to NEV suits as well. But I focus on PEV claims because it is obvious why defendants might refuse to settle NEV claims, which by definition are claims such that the cost of going to trial exceeds plaintiff’s expected judgment at trial.

⁶A few other papers show how bargaining failure can arise when litigation involves multiple plaintiffs or multiple defendants. See Kornhauser and Revesz (1994a,b) and Spier (2002). A settlement with one party can have external effects on the other parties, which in a setting without coordination can lead to bargaining failure. The insights of these papers are crucial for understanding multiparty litigation but are distinct from the role of stalling discussed herein.

option to pre-suit bargaining and formally model this relationship, although her paper was focused on the incomplete-information setting and addressed the complete-information setting only briefly. Further, her model, which involved the plaintiff (only) making settlement offers over an infinite horizon, has many efficient equilibria (and inefficient equilibria).⁷ My model, which allows for offers and counteroffers by both parties, generates a unique (and often inefficient) equilibrium.

Schwartz and Wickelgren (2009) showed that even in a full-information environment, an optimal strategy of delay can prevent settlement of NEV claims. Schwartz and Wickelgren (2009) argue that NEV claims can never generate nuisance settlements for plaintiffs. In their model, an indefinite number of offers and counter-offers can be made costlessly during litigation. Because of this, they argue, the plaintiff will not be able to extract a settlement during litigation large enough to make the initial threat to sue credible. This result challenges the claim that nuisance litigation *exists at all*, let alone is a serious problem. While this model is internally valid, it has difficulty gaining traction as a model of *litigation* rather than a model of *negotiation*; it models costly litigation activity as the plaintiff’s *outside option*, but this may only be true before a suit is filed. Once litigation is filed, the parties may incur litigation costs regardless of the progress of negotiations, and the true “outside option” for the plaintiff is dropping the suit. For this reason, my model incorporates Schwartz and Wickelgren (2009) as a model of pre-suit negotiation, rather than as a model of litigation. As I will show, their basic insight remains, and in fact applies more broadly than their original model indicated.

The third paper is Anderlini, Felli, and Immordino (2017), which reaches a similar conclusion—settlement failure is possible even in a complete-information context—but via a different path that involves costly bargaining. Anderlini, Felli, and Immordino (2017) show that if bargaining costs for the parties are sufficiently high, and the distribution of costs between the parties does not correspond to their bargaining power in dividing the surplus from settlement, then they will not reach a settlement, and the plaintiff will file a lawsuit. Nonetheless, our models are complementary, in that my model nests their results by endogenizing bargaining power and allowing pre-suit bargaining to be costless. Finally, Shavell (1993) makes the observation that when parties dispute over an indivisible good and are liquidity constrained (thereby making side-payments impossible), bargaining failure is impossible. The insights of this paper are distinct from the concern with stalling raised here.

The remainder of this paper proceeds as follows: In Section 2, I describe the core components of a model game that captures the key elements of bargaining in the shadow of conflict. I show how the model maps cleanly onto

⁷Similarly, Fernandez and Glazer (1991) model a union striking under conditions of complete information. The model has multiple efficient equilibria, and inefficient equilibria are possible because the parties prefer different efficient equilibria.

litigation (and arguably conflict settings more generally), at least where complete information is a useful approximation of reality. In Section 3, I present results. I show how a simple, flexible model of multi-stage bargaining in and out of litigation can generate distinct and novel predictions that jibe with our intuitions about real-world litigation.

In Section 4, I discuss settings where this model might have particular descriptive or prescriptive bite. First, I note that routine debt-collection actions are a sizable portion of courts' dockets, even though such disputes often involve little or no private information. Stalling, however, easily explains why such cases, which otherwise seem like obvious candidates for settlement before suit is ever filed, end up being litigated. Using data from two very different court systems—courts of Taiwan and the US federal courts—I show how empirical patterns in these two jurisdictions are consistent with the predictions of my model. Second, I note an important legal mechanism for discouraging stalling: prejudgment interest. By ensuring that the present value of plaintiff's claim cannot be diminished by stalling, prejudgment interest is a potentially powerful tool for reducing stalling. Counterintuitively, however, I show that prejudgment interest cannot eliminate the threat of stalling that induces inefficient bargaining failure. Third, I note how the model can be applied to stalling during the course of litigation and identify policy implications for case management and discovery. Section 5 concludes.

2 The Model

In this section, I begin by describing the formal model. Then, in Sections 2.2 and 2.3, I identify how the model maps onto the basic structure of many legal (or military) conflicts. Section 2.4 describes in non-technical terms how the features of the model contribute to capture realistic features of real-world conflict in a simplified way.

2.1 Formal Model

The model is a bargaining game with two parts, Stage 1 (in the litigation context, pre-suit) and Stage 2 (post-filing), and two parties, P (i.e., plaintiff) and D (i.e., defendant). In each stage, the parties exchange settlement offers and counteroffers. If at any time a party accepts the other party's offer, the game ends and the parties' payoffs are determined by the terms of the settlement. Each stage of the game has finite duration.⁸

Because each stage has finite duration, it is possible for the stage to end with the parties having negotiated for the full duration without reaching a

⁸The results are unaffected if Stage 1 has infinite duration, but the notation and exposition would be made more complicated.

settlement. In this event, the game ends and there is a set of payoffs to the parties reflecting bargaining breakdown. I will call the payoffs when the game ends with no bargain being reached the “breakdown outcome.” Each stage has a breakdown outcome that triggers when the parties neither reach a settlement nor exercise an outside option before the end of the stage.

The game also allows for outside options. An outside option is an option that the option-holder can exercise at any time in lieu of making an offer or counteroffer.⁹

In Stage 1, bargaining may entail some cost to each party or may be costless. P holds the outside option and may exercise it instead of continuing to bargain whenever P has an opportunity to make a settlement offer. The outside option is to end Stage 1 and begin Stage 2. Exercising this option may be costly: P must pay a fee of $F \geq 0$ when exercising the option. The payoffs from P 's outside option will be endogenously determined, based on the equilibrium strategies in Stage 2. Call the equilibrium payment from D to P in the Stage 2 subgame W . Then the payoff to P from exercising the outside option is $W - F$, and the payoff to D is $-W$. If P does not exercise her outside option and the parties fail to reach a settlement, the breakdown outcome in this stage is for the game to end with no transfers.

Stage 2 of the game occurs if (and only if) P exercises her outside option. The parties engage in bargaining which entails some cost. If they fail to reach a settlement before the end of Stage 2, the breakdown outcome is an event (e.g., trial) that results in an expected transfer of πJ from D to P .

Stage 2 may have an outside option held by D . The outside option would be for D to transfer J to P , at which point the game ends. (Think of this as paying a default judgment to the plaintiff for the full value, J , of her claim.)¹⁰ For simplicity, I relegate further discussion of outside options in Stage 2 to the Appendix, because the central results in this paper do not depend on the presence or absence of the outside option in Stage 2. Nonetheless, I note the practical relevance of this outside option; as I will discuss in Section 4, default is an empirically relevant strategy for defendants in some litigation settings where stalling is a possibility.

I now describe the mechanics of bargaining in this game. I begin by describing the game as a discrete-time, alternating offer game in which each stage has a finite duration during which there is a finite number of turns for

⁹Note that for simplicity of notation, I assume that a party indifferent between exercising an outside option and not exercising it will not. I assume that a party indifferent between settling and not settling will settle. These assumptions dealing with knife-edge conditions allow me to define equilibrium conditions precisely (with equalities rather than inequalities), but otherwise do not affect the analysis.

¹⁰It is not relevant in the complete-information context, but in the incomplete information context it is worth noting that the plaintiff in litigation has an outside option as well, which is to drop the suit. This option is valuable if discovery reveals that the claim has negative settlement value. See Cornell (1992) and Grundfest and Huang (2006).

settlement offers and counteroffers. I note that after solving for equilibrium in this game, I will take limits as the number of turns (but not the total time duration) goes to infinity. This simplifies the exposition and interpretation of results.

To be precise, divide each stage j (for $j \in \{1, 2\}$) into $N_j + 1$ turns, numbered 0 through N_j . The total duration in years (not turns) of each stage j is T_j . Intuitively, T_j represents the total amount of time available for settlement bargaining (e.g., in Stage 1, T_j is the statute of limitations period for P 's legal claim), and $N_j + 1$ represents the number of offers that the parties can exchange before they run out of time. If the parties can exchange offers arbitrarily fast, we can approximate this by holding T_j fixed and taking the limit as N_j goes to infinity.

The parties may (or may not) discount future payoffs. Player i has a per-turn discount factor $\delta_i \in [0, 1]$, or equivalently a per-turn discount rate β_i such that $\delta_i = 1 - \beta_i$. By taking limits as $N_j \rightarrow \infty$, we can express results in continuous time. The discrete-time discount factor δ corresponds to the continuous time discount rate ρ , such that $\rho = -\ln(\delta)$. Thus ρ_i is the per-year discount rate for party i . For example, if a lawsuit will last T_2 years until trial, then at the time she files the lawsuit, the present value of trial for the plaintiff is $e^{-\rho_p T_2} \pi J$.

Note that holding T_j constant ensures that the model captures the fact that future payoffs may be discounted, even though δ_i goes to 1 as $N_j \rightarrow \infty$.¹¹ Further, note that even as $\delta_i \rightarrow 1$, it remains the case that one party's discount rate β_i may be higher, relatively speaking, than the other party's. To allow for this possibility even as $\delta_i \rightarrow 1$ for each party, I define $\alpha \equiv \frac{\beta_d}{\beta_p + \beta_d}$, which is the relative "impatience" of D compared to P . As we will see, P 's bargaining power—the share of the surplus from settlement that she captures—is endogenously determined and will be a function of α .

In each successive turn, the players alternate moving first. I assume that the party who may have an outside option moves first in each stage, so P moves first in Stage 1 and D moves first in Stage 2. (This assumption is not entirely innocuous, so I will discuss this assumption at greater length in Section 3.2.) In Stage 1, P makes a settlement offer or exercises her outside option (e.g., files suit). The offer to settle made in turn n is labeled S_n and proposes a payment from D to P of S_n . If P makes an offer, then D may accept or reject it. If the offer is accepted, the game ends and D pays S_n to P . If the offer is rejected, the next turn begins and the parties switch roles; D makes an offer, which P will either accept or reject. In Stage 2, the roles are reversed.¹² The exception is that if the offer in the final turn of a stage (turn N_j) is rejected,

¹¹Note that holding T_j fixed is equivalent to holding the present value of payoffs in the final turn of a stage fixed (i.e., $\delta_i^{N_j}$) fixed as N_j goes to infinity.

¹²If there is an outside option in Stage 2, D now has the outside option (i.e., D may elect to submit to a default judgment).

the game ends and the parties receive payoffs from the breakdown outcome for the relevant stage of the game. Players have an equal number of opportunities to make an offer; thus, $N_j + 1$ is even.¹³

In each stage, continuing to negotiate has non-negative cost. In the first stage, this bargaining cost is $b_{ni} \geq 0$ for turn n and party i . If the parties have neither settled nor triggered an outside option at the end of turn n , each party i pays the cost b_{ni} for continuing to bargaining in the next turn. For simplicity, the results below assume constant per-turn bargaining costs, such that costs for party i are $b_{ni} = b_i$ for all $n \in \{0, \dots, N_1\}$.

In the second stage, per-turn litigation costs are $c_{ni} \geq 0$ for turn n and party i .¹⁴ The total *remaining* cost to party i as of turn n is

$$C_{ni} = \sum_{k=n}^{N_2} \delta^{k-n} c_{ki} \quad (1)$$

Thus, the total cost of litigating through to trial (i.e., Stage 2 ends with no settlement) for party i is $C_i \equiv C_{0i}$. Thus, the cost parameters of this model can be made comparable to litigation costs in other models by noting that total litigation costs are $C \equiv C_p + C_d$, and C represents the maximum surplus from settlement during litigation. For simplicity, the results below assume constant per-turn litigation costs, such that costs for party i are $c_{ni} = c_i$ for all $n \in \{0, \dots, N_2\}$.

When $N_j \rightarrow \infty$, we express costs as a continuous function of time: rather than a per-turn litigation cost function of c_i , we define costs as a (constant) function of time $c_i(t)$, i.e., per-year litigation costs, such that total litigation costs do not change so long as total case duration T_2 does not change, even as the number of turns goes to infinity. We define $b_i(t)$ likewise for Stage 1 bargaining costs. Thus, we have $c_i(t)$ such that

$$C_i = \int_0^{T_2} e^{-\rho t} c_i(t) dt \quad (2)$$

and likewise for $b_i(t)$. Note that in continuous time, the parameters of the model (time in years T ; annual discount rate ρ , per-year bargaining costs ($b_i(t)$) and litigation costs ($c_i(t)$)) are expressed in quantities that can be empirically

¹³The structure of this sub-game reflects the logic of Schwartz and Wickelgren (2009). They argue that a plaintiff who has made a settlement demand cannot decide whether or not to invoke her outside option until she hears defendant's response, and in real life, defendant's response need not be limited to "I accept" or "I reject"; instead, the defendant's response could be a counteroffer. For this reason, I employ a version of an alternating offer game in which the plaintiff can only invoke the outside option in *every other* period—only after the periods in which the defendant has the right to make a settlement proposal.

¹⁴We might assume that in the second stage, costs are strictly positive because the parties bear the ongoing costs of litigation, but this is not necessary for the model.

measured.¹⁵

A comparison of the parties' outside options and the breakdown outcomes in the two stages of the game appears in Table 1. A simplified representation of the game tree appears in Figure 2.¹⁶

2.2 The Game as Litigation

This structure has a natural interpretation in the context of litigation. The first stage of the game is the pre-litigation environment. The (potential) plaintiff P and (potential) defendant D have a finite amount of time ($N_1 + 1$ turns) in which to reach a settlement before the statute of limitation period for plaintiff's claim expires. During this time, the parties may settle, or plaintiff may exercise her outside option, which is to initiate a lawsuit by filing a civil action (which entails costs F associated with initiating suit and filing a complaint). If neither of these outcomes occurs before the expiration of the limitations period, plaintiff's claim is extinguished, and the game ends.

The filing of the complaint triggers the second stage of the game. During this stage, the parties continue to bargain, but bargaining is more costly because litigation costs accrue as long as bargaining continues. At any time, the defendant can exercise her outside option, which is to default and pay the plaintiff the entire judgment demand J . If neither settlement nor default occurs, the breakdown outcome of trial occurs. With some probability π , plaintiff wins and the defendant pays the judgment demand. Thus, the parties know that the expected judgment at trial is πJ .

2.3 The Game as International Conflict

Although the discussion throughout this paper focuses on the setting of litigation and settlement, the structure of the model also has a natural interpretation in the context of international conflict. The first stage of the game is the period without open war. The powerful aggressor state P and the defending state D have a period of time in which to settle ($N_1 + 1$ turns). During this period, the parties may reach a settlement, or the aggressor state may exercise its outside option, which is to invade. An invasion requires costly mobilization efforts (F) by the aggressor. If neither of these outcomes occurs and the game

¹⁵Continuous time also permits solving for interior solutions for the timing of the exercise of outside options in the midst of, rather than the outset of, Stage 1 or Stage 2, which may arise in equilibrium if one were to allow bargaining or litigation costs to vary over time for the parties.

¹⁶One can easily generalize this model to a game in which both parties have outside options in both stages, and all costs and payoffs can take any values. Such a generalized version of the model would allow one to represent any bargaining environment with repeated offers and counteroffers in the presence of inside and outside options.

has finite duration, the game ends without conflict.

An invasion triggers the second stage of the game. During this stage, the parties continue to bargain, but bargaining is more costly because costs of armed conflict accrue as long as the war continues. At any time, the defender can exercise its outside option, which is to capitulate and transfer to the aggressor its entire territorial claim (J). If neither settlement nor capitulation occurs, the breakdown outcome, a military victory by one side or the other, occurs. With some probability (π), the aggressor wins the war and the defender cedes the territorial claim.

2.4 Key Features of the Model

This model captures key elements of the process of bargaining in the shadow of conflict and incorporates fundamental concepts of multi-period games, including alternating offers, outside options, and outcomes triggered by bargaining failure. Combining these characteristics allows me to capture several real-world features of bargaining in the shadow conflict:

First, the model allows for parties to exchange offers. Each party in the model has an opportunity to make a settlement offer, and the other party has the opportunity to accept the offer or reject it and make a counteroffer. The number of opportunities to make and respond to offers may not be unlimited, but this model allows for many—possibly indefinitely many—settlement offers. The mechanics of offer and counteroffer in the game above are identical to the canonical alternating-offer game in Rubinstein (1982), in which parties negotiate to split a bargaining surplus between them.

Second, settlement negotiation may occur inside or outside of litigation. The model’s structure is sufficiently flexible to account for key differences in the two settings.

Third, each party is free to exercise whatever alternatives to negotiation are available. In other words, the model accounts for outside options, or what is often referred to in the negotiation literature as each party’s BATNA (best alternative to negotiated agreement). In the pre-suit setting, the defendant has no meaningful outside option, but the plaintiff has one: initiating litigation (although filing suit may itself be costly).¹⁷ Indeed, it is the threat to invoke this outside option that often frames real-life attempts at pre-suit settlement.¹⁸

¹⁷It may be possible to treat capitulation—paying the entire J to P —as D ’s outside option in Stage 1, but note that outside of litigation, D has no way to force P accept. Thus, while a pre-suit settlement for the full J is possible, there is no outside option for D in this context.

¹⁸For simplicity, Stage 2 of my model ignores the plaintiff’s outside option to abandon the action, given that under complete information this option is never exercised. But in a richer model with incomplete information, the existence of this option affects the settlement value of the plaintiff’s claim. See Cornell (1992) and Grundfest and Huang (2006) for

Fourth, bargaining failure triggers outcomes distinct from the parties' outside options. In the pre-suit negotiation context, if the parties neither settle nor invoke an outside option, the result (upon the expiration of the statute of limitations) is an effective settlement of zero. In the post-filing context, however, the outcome is trial. Notably, this structure reveals that pre-suit, conflict is an alternative to bargaining, but in litigation, conflict is the outcome from attempted (but failed) bargaining. This difference is subtle—but as I will show, it is why stalling can prevent settlement in the pre-suit context but not in the post-filing context.

Finally, and crucially, negotiations may be protracted but cannot go on forever. Pre-suit negotiations, for example, must lead to settlement or a lawsuit before the statute of limitations period for the plaintiff's claim expires. Post-filing negotiations are bounded by deadlines for dispositive motions or trial (although of course such deadlines are, in practice, themselves movable based on the progress of negotiations).

My model allows me to capture both the extensive back-and-forth of bargaining and the time-constrained nature of “bargaining on the courthouse steps” in a simple way, something that existing approaches do not do. Existing approaches present a dilemma. On the one hand, it seems natural to employ a bargaining model that allows an arbitrarily large number of offers and counteroffers. Elegant limiting results (as the number of turns goes to infinity), such as the equilibrium division of surplus in Rubinstein (1982), are well established.

On the other hand, these limiting cases imply that the parties have infinite time during which to bargain, which is clearly unrealistic. *Jarndyce v. Jarndyce*¹⁹ aside, most legal disputes must end in finite time; an unfiled legal claim expires when the statute of limitation period runs, while a filed lawsuit is subject to all manner of deadlines. Further, infinite time to negotiate implies that trial (or war) never comes! In short, understanding bargaining outcomes—and bargaining failure—in realistic settings requires a more realistic time horizon for bargaining.

To escape this dilemma, I offer a small but consequential innovation in my modeling. As the length of the game in *turns* goes to infinity, I hold the length of the game in *time* constant, so that even with an infinite number of turns, the game ends in finite time. This allows for a potentially unlimited amount of bargaining back-and-forth to occur while also maintaining the realistic constraint that there is a deadline for bargaining.

discussion. And as noted above, during litigation, the defendant has the outside option to pay a default judgment. This may be preferable to settlement in contexts where litigation costs affect settlement values; see Hubbard (2016) for a discussion and formal treatment of this phenomenon.

¹⁹Charles Dickens, *Bleak House* (1853).

3 Results

3.1 Primary Results

The intuitions for the solutions to the model are simple, while the formal proofs are uninteresting, so I present intuitions here and relegate proofs to the Appendix. The solution concept is subgame perfect sequential equilibrium, and the game is solved by backwards induction. As noted in Binmore, Shaked, and Sutton (1989), a key result in alternating-offer games is that outside options do not affect equilibrium settlements unless the option-holder prefers the outside option to the equilibrium that would exist in the absence of the option. Thus, our first step is to examine post-filing (Stage 2) settlement negotiations in the absence of an outside option.

Our first result is that if we ignore Stage 1 and the outside option of default by D , the model replicates standard results in the bargaining literature.

Proposition 1: Equilibrium of Stage 2 subgame in continuous time (with no outside option). *Let $W_i = (0, 0)$ for $i \in \{p, d\}$; i.e., ignore outside options. Let the number of turns N_2 go to infinity, but hold constant the amount of time T_2 that elapses between turn 0 and turn N_2 . In the unique subgame perfect equilibrium, P offers and D accepts settlement S_0 in turn 0, such that:*

$$S_0 = e^{-\rho T_2} \pi J + \frac{1}{2}(c_d - c_p) \left(\frac{1 - e^{\rho T_2}}{\rho} \right) \quad (3)$$

where $\rho \equiv \frac{\rho_p + \rho_d}{2}$ and c_d and c_p are the per-year litigation costs of the parties.²⁰ For small ρ , this is approximately $S_0 = (1 - \rho T_2) \pi J + \frac{1}{2}(c_d - c_p) T_2$.

If $\rho = \rho_p = \rho_d$, The unique subgame perfect equilibrium is that P offers and D accepts S_0 such that:

$$S_0 = \frac{1}{2}(C_d - C_p) + e^{-\rho T_2} \pi J \quad (4)$$

Remark. Here we see the expected result: the parties split the discounted present value of the surplus, and party D transfers the present value of P 's breakdown outcome to P .

²⁰A fully specified equilibrium includes strategies $\psi_i = \{a_{i,2,0}, \dots, a_{i,j,n}, \dots, a_{i,2,N_2}\}$ where $a_{i,2,n}$ is the equilibrium action taken by party $i \in \{p, d\}$ in Stage 2 in turn $n \in \{0, 1, \dots, N_j\}$, the actions for the player moving first on a given are to exercise the outside option (if available) or offer a settlement, and the actions for the player moving second are given by a function mapping all possible settlement offers (i.e., all real numbers) to acceptance or rejection. There is no action when the first player exercises the outside option rather than making a settlement offer. The proof of Proposition 1 in the Appendix details all equilibrium actions.

Corollary 1.1: Shares of surplus when parties' discount rates differ.
If the parties' discount rates differ, the split of the surplus favors the more patient party. Plaintiff's share σ_p of the surplus can be expressed as

$$\sigma_p = \left(\frac{\rho_d}{\rho_p + \rho_d} \right) \left(1 + \frac{\rho_p (c_d e^{-\frac{\rho_d T_2}{2}} + c_p e^{-\frac{\rho_p T_2}{2}}) (e^{-\frac{\rho_d T_2}{2}} - e^{-\frac{\rho_p T_2}{2}})}{c_p \rho_p (1 - e^{-\frac{\rho_p T_2}{2}}) + c_d \rho_p (1 - e^{-\frac{\rho_d T_2}{2}})} \right) \quad (5)$$

The limit as $T_2 \rightarrow \infty$ is

$$\lim_{T_2 \rightarrow \infty} \sigma_p = \frac{\rho_d}{\rho_p + \rho_d} \approx \alpha \quad (6)$$

which is the limiting result for surplus shares in Rubinstein (1982). The limit as $T_2 \rightarrow 0$ is

$$\lim_{T_2 \rightarrow 0} \sigma_p = \frac{1}{2} \quad (7)$$

which is the result for games, such as Bebchuk (1996), where the parties alternate making offers and there is no time discounting. The general case of positive discount rates and finite time, therefore, nests these existing results as limiting cases.

Remark. One can interpret α to be the equilibrium or “observed” bargaining power of Player P . Although the alternating offer game in some sense gives equal bargaining power to each player—each player has an equal number of opportunities to make offers—the relative impatience of the parties has the effect of endogenously determining what can be interpreted as the relative bargaining power of the parties.

* * *

The post-filing subgame looks very much like familiar models of settlement. The parties avoid litigation costs and settle at the earliest opportunity. The pre-suit portion of the game (Stage 1), while very similar in structure, has entirely different equilibrium behavior. This is because litigation and trial are no longer the breakdown outcome, but an outside option triggered by the plaintiff.²¹

Proposition 2: Pre-suit no-settlement conditions in continuous time.
Assume that the outside option is sufficiently valuable to the plaintiff that the plaintiff is willing to invoke it if bargaining fails. There will be no settlement in Stage 1, and plaintiff will immediately file suit without attempting to settle, if

$$\rho(W - F) + \left(\frac{1}{2} \right) b_p > \left(\frac{1}{2} \right) b_d \quad (8)$$

²¹[Note to readers: the next version of this paper will include a proposition clarifying equilibrium strategies in Stage 1, which are currently implicit in Proposition 2 but nowhere fully specified.]

Expressed as a relationship between the discount rate ρ and the relative bargaining costs of the parties, this condition is

$$\rho > \left(\frac{1}{2}\right) \frac{b_d - b_p}{W - F} \quad (9)$$

The relationship between ρ , $\frac{b_d - b_p}{W - F}$, and bargaining failure is illustrated in Figure 3.

Remark. The left side of Expression (8) represents the cost to P (and the benefit to D) of delay, in terms of diminished present value of the outside option, plus P 's cost of continuing to negotiate. (Note that the bargaining cost is halved because settlement means that the parties split their cost savings.) The right side of Expression (8) represents the benefit to P (and the cost to D) of delay, in terms of D 's cost of continuing to negotiate.

Remark In this game, the surplus from settlement in Stage 1 is the savings from plaintiff avoiding the fee F for filing suit. Nonetheless, if negotiation costs are zero and the parties discount the future ($b_i = 0$ and $\rho_i > 0$ for $i \in \{p, d\}$), the subgame perfect equilibrium is for plaintiff to exercise the outside option immediately at a cost of F , at which point D pays W to P . In other words, the intuition that costless bargaining necessarily facilitates an immediate, efficient settlement is wrong.

If bargaining is costless, then delay cannot hurt the defendant, and if the parties discount the future, delay reduces the value of the plaintiff's outside option. The smallest settlement P is willing to offer in turn 0 is $S_0^{pre-suit} = W - F$, which is equal to her payoff from filing suit immediately. But in response to this offer, the defendant would be strictly better off refusing settlement, and then in turn 1 counteroffering $S_1^{pre-suit} = \delta(W - F)$, which is the present value of plaintiff invoking her outside option in turn 2. Given that plaintiff can do no better than this, she will accept. But this, of course, is worse than if she simply exercised her outside option in turn 0. For this reason, pre-suit settlement is impossible. Instead, P undertakes the costly action of filing suit. After suit is filed, the timing of trial is fixed, and neither party can gain from stalling. Thus, the parties settle at the beginning of Stage 2.

Remark. This model generates several clear, empirical predictions. The first and most fundamental prediction of this model is that filed lawsuits will arise even in disputes between rational parties in an environment of complete information. In other words, war is *not* always in the "error term." In addition, we can draw from Expression (8) the following predictions:

- *Bargaining Costs.* If the parties' costs of continuing to bargain are symmetrical ($b_p(t) = b_d(t)$), and discount rates are positive, settlement never occurs in Stage 1. P files suit immediately. In practice, if there are no penalties (reputational or otherwise) to stalling, such that the bargaining costs of defendants do not exceed the bargaining costs of plaintiffs,

then settlements should occur in the context of filed litigation only. A lack of reputational penalties to stalling is likely to exist in “one-shot” interactions between parties. Conversely, the presence of reputational and repeat-play factors should predict pre-filing settlement.

- *Discount rates and settlement value.* Because ρ and W are sources of the benefit from stalling, as ρ or W rise, the equilibrium may shift from pre-suit settlement to stalling. Thus, high-expected-settlement-value claims and high discount rates should be associated with immediate filing rather than pre-suit settlement. For example, if liquidity constrained parties have higher effective discount rates, then liquidity constraints would (counterintuitively) predict litigation.
- *Filing Costs.* A higher F makes it more likely that the parties will reach a settlement in Stage 1. Thus, higher filing fees have a double effect on litigation rates: first, the effect of discouraging plaintiff with low-settlement value claims from asserting those claims at all, and second, the effect of shifting settlements from litigation to pre-litigation. Nonetheless, a rise in F means that pre-suit settlements have lower payoffs for plaintiffs than they would have received in litigation with a lower F .

3.2 Effect on Results of Variations in Strategic Environment

The model above demonstrates that even in a complete information environment with costless bargaining, parties may fail to reach an efficient settlement but instead settle only after the costly filing of a lawsuit. This result is noteworthy because it flies in the face of prevailing intuitions about the necessary conditions for bargaining failure. Nonetheless, I hasten to add that this is not a claim that bargaining failure is inevitable. As the remarks following Proposition 2 note, in real-world situations, pre-suit bargaining for defendants may be sufficiently costly (in terms of money or reputation) to induce pre-suit settlement.

In addition, the inefficient bargaining failure that arises in this model is sensitive to the sequencing of offers and counteroffers. If the sequence of turns in Stage 1 is reversed, such that D makes the first offer, pre-suit settlement inevitably occurs. In turn 0, D offers $S_0 = \delta(W - F)$ to P , which P accepts.²² Thus, the identity of the “first mover” affects the ability of the parties to reach an efficient settlement.

As a practical matter, it seems natural for P to move first. The claim for relief only exists (or only matters) if P asserts it, and one might assume that

²²Proof of this claim is straightforward. The subgame beginning on turn 1 is identical to the model in Section 2 above. Backwards induction from the turn 1 subgame equilibrium given in Proposition 2 immediately yields the equilibrium outcome in turn 0.

in most cases the injury that forms the basis for the claim is first discovered by the plaintiff rather than the defendant. Fundamentally, though, so long as the first mover is not invariably D , then the central claim of this paper remains: it is possible (though not certain) for parties to fail to reach an efficient pre-suit settlement in a symmetrical-information litigation game with costless pre-suit bargaining.²³

4 Applications

The results in this paper have several potential empirical and normative applications.

4.1 Debt Collection

Stalling may explain an otherwise puzzling pattern in court data. A substantial share of courts' civil dockets is composed of debt collection actions. Many debt collection actions involve situations where there is a debt of (usually) undisputed amount that the debtor has failed to pay. Thus, these cases are good candidates for a category of litigation involving little private information. To be sure, many contract actions may involve information asymmetries for which litigation and discovery are a predictable outcome. But this possibility is undermined by the fact that for some categories of debt collection cases, rates of default judgment are sky-high—and recall that default judgment is a final judgment in favor of the plaintiff that the court enters when the defendant fails to respond to the complaint or otherwise defend the case *at all*.²⁴

This pattern appears in US federal court data on cases brought by the US government to collect defaulted student loans and to recover overpayments of government benefits—two categories of cases that are separately designated in administrative data provided by the Administrative Office of the US Courts. (See Hubbard [2017] for details on this data set.) Among these cases, thousands of which are filed per year, 48% end in a default judgment (compared

²³I also note that the basic claims of this paper hold for complications including factors such as risk aversion, non-monetary litigation costs, and hyperbolic discounting. The value of non-monetary litigation costs, such as reputational harms or bad publicity during litigation or anxiety over appearing in court, can be incorporated into C_p and C_d . Conversely, benefits from the process of litigation itself, such as the utility a plaintiff receives from having her day in court, can be incorporated as negative litigation costs. Risk aversion is simply a species of litigation cost, given that litigation is risky and settlement eliminates the risk. Formally, the difference between the expected judgment and the certainty equivalent of a future judgment for each party can be incorporated into each party's litigation costs. Finally, the central claim of the paper holds if discounting is hyperbolic rather than exponential; the logic of stalling depends only on the fact that the present value of P 's outside option shrinks as bargaining in Stage 1 progresses.

²⁴See, e.g., Federal Rule of Civil Procedure 55.

to 3% of other cases). To reiterate, *half* of all filed cases in these categories end with the defendant contesting neither liability nor damages. Why didn't they simply settle out of court?

Nor is this phenomenon unique to the US. For example, administrative data from the courts of Taiwan (described in detail in Chang and Hubbard [2018]) replicates this pattern: loan contract and debt payment dispute categories comprise a surprisingly large set of cases and have extremely high rates of default judgments (about 41% of all actions end in default judgment, four times the rate for other actions). See Figure 4. Thus, it is unlikely that particular features of US law or legal practice explain what we see in the US data.

These facts don't fit existing explanations. If these disputes are becoming filed lawsuits, it is not because they are "close" cases, as we might expect from divergent expectations models. Indeed, they are not even contested cases! Nor are they filed lawsuits because discovery is necessary to reveal private information. No discovery occurs. The juxtaposition of routine litigation *and* routine default means that debt collection cases provide a context where the usual explanations for settlement failure in US litigation don't apply.

But the logic of the model above explains this pattern easily. In a case where a debt is owed and it's undisputed—*especially* when it's undisputed—the defendant can benefit from delay: the outcome is certain to be unfavorable, and anything that delays the inevitable allows the defendant to retain use of whatever assets are in jeopardy of being used to satisfy the debt. Attempts by the plaintiff to negotiate an out-of-court settlement simply play into the defendant's strategy of delay. So the plaintiff must sue and expend real resources. Once haled into court, the defendant no longer benefits from delay; answering the complaint and responding to discovery or a motion for summary judgment is costly. And since the facts are undisputed, default is cheaper even than negotiating a settlement (and may buy the defendant a few more months time).²⁵

4.2 Prejudgment Interest

Prejudgment interest is a potential component of a damages award that compensates the plaintiff for the loss of the time value of money due to the delay between the plaintiff's injury and the award of damages. If it works perfectly to compensate the plaintiff in this way, it should eliminate any discounting of

²⁵To be sure, stalling is not the only explanation for this pattern in the data. In real-world litigation, there may be asymmetric information about opponent's willingness to fight in court or their resources for litigating or paying a judgment. But these explanations apply to all categories of litigation, and they do not provide an obvious answer to the question of why we see filing and default rather than pre-suit settlement.

the expected trial award πJ by the parties.²⁶ This poses the question: Doesn't the existence of prejudgment interest render concerns about stalling moot?

The answer is a resounding “sometimes.” This is a function of both legal doctrine and the implications of the model above.

As a matter of doctrine, rules governing the award of prejudgment interest vary dramatically from jurisdiction to jurisdiction, with only certain categories of cases, involving certain circumstances, brought under the law of certain states, being subject to fully compensatory prejudgment interest. In some states, not all categories of claims are eligible for prejudgment interest. For example, in Illinois, only breach of contract claims involving liquidated damages are entitled to prejudgment interest. And in some states, prejudgment interest does not accrue during periods in which stalling might occur. For example, in California, prejudgment interest for unliquidated damages in contract actions accrues only *after* suit is filed.²⁷

Thus, as an empirical matter, we might expect that pre-suit settlement is less likely in disputes governed by law that either does not provide for prejudgment interest or does not provide for prejudgment interest during the pre-suit stage. As a prescriptive matter, if we deem pre-suit settlement desirable, one tool for promoting it is to apply prejudgment interest to the entire pre-suit period.

But an important implication of the model is that even if prejudgment interest perfectly counteracts parties' discounting of a future judgment, prejudgment interest may not eliminate bargaining failure due to stalling. This is because the settlement value of a filed action (W) is not solely a function of the expected judgment when the parties' litigation costs are asymmetrical. Prejudgment interest eliminates discounting of the expected judgment but not litigation costs. If we take this into account and substitute Expression (4) into Expression (8), we obtain the following condition for bargaining failure:

$$\rho > \frac{b_d - b_p}{C_d - C_p} \quad (10)$$

Take a plausible scenario, where bargaining costs are equal ($b_d = b_p$) but litigation cost asymmetries favor the plaintiff ($C_d > C_p$). Under these conditions, even with prejudgment interest, the plaintiff will file suit in equilibrium. Thus, even perfectly compensatory prejudgment interest cannot eliminate the effect that the threat of stalling has on pre-suit bargaining failure.²⁸

²⁶It should also eliminate the possibility of the defendant strategically delaying default during litigation. If prejudgment interest perfectly preserves the present value of the judgment, default occurs immediately or never. See the Appendix for a discussion of default.

²⁷For discussion, see *Business & Commercial Litigation in the Federal Courts* §§44:31, 50:50 (3d ed.). For a 50-state survey, see *Post Judgment Interest / Prejudgment Interest / Punitive Damages / United States and Canada 2010* (Munich Re 2010).

²⁸Further, attempting to fix this by setting prejudgment interest at a penalty rate—i.e.,

For this same reason, prejudgment interest cannot affect pre-suit bargaining failure for “frivolous” claims. As noted in the Introduction, one might question claims by the defense bar of the prevalence of “frivolous” lawsuits by noting that a lawsuit is only truly frivolous if both parties *know* the claim has no merit. In a complete information setting, why aren’t these claims resolved without a suit being filed? The answer this paper provides is that complete information provides no guarantee of a pre-suit settlement. Further, precisely because the settlement value of frivolous claims comes from the defendant’s litigation costs rather than an expected judgment on the merits (see Hubbard (2016) for discussion), the availability of prejudgment interest cannot affect this dynamic.

4.3 Discovery and Case Management

The model in this paper treats trial as an outside option during pre-suit bargaining but a breakdown outcome during post-filing bargaining. This yields a sharp distinction between pre-filing and post-filing behavior. Stalling is attractive pre-suit, because it pushes back the day of reckoning in court, thereby reducing the present value of the settlement the defendant will pay. In the model, once suit is filed, the timetable for trial is fixed, and the parties settle immediately. The assumption of a fixed time until trial is a useful simplification for modeling and exposition, but of course one could easily use the logic of this model to understand stalling *during* litigation as well. Whenever bargaining or litigation activity has the effect of pushing back the trial date, this replicates the strategic environment of Stage 1 in the model. If the gains from delay are greater than the costs of continued dickering, then the defendant will have an incentive to delay and the plaintiff may forgo settlement bargaining in order to preempt stalling.

These observations in turn have implications for rules governing disclosure and discovery in litigation. If asymmetric information is the source of bargaining failure, then mechanisms to reduce asymmetric information such as mandatory disclosure requirements and party-driven discovery are essential policy tools for encouraging settlement and reducing court dockets. But if (the threat of) stalling is an empirically important source of bargaining failure, rulemakers may need to reconsider the policy options for addressing docket congestion. For example, as noted above, fixed trial dates make post-filing stalling pointless. Importantly, this does not require that the pre-trial process be compressed—in the model, a firm but distant trial date works just as well as a firm but early trial date. Rather, the key is that by prolonging negotiations (over settlement or discovery or motion practice or whatever), the defendant cannot delay trial.

a prejudgment interest rate higher than the parties’ discount rates—that applies pre-filing will introduce an opposite problem: P now has an incentive to strategically delay filing in order to inflate the present value of the judgment she will receive.

5 Conclusion

There is a crucial difference between the plaintiff P and the defendant D in a dispute: when a settlement or trial occurs, it is D who pays, and P who receives. This means that, if the parties discount the future, then all else equal, D benefits from delay and P suffers. It is only the presence of continuation costs that creates a tradeoff for D : the benefit from delaying payment against the costs from continuing to negotiate or litigate.

This asymmetry between plaintiffs and defendants means bargaining failure may occur even though it imposes real costs on the parties. Under plausible conditions, plaintiff incurs the cost F of filing suit, even though both parties would prefer to split the surplus from saving F . The reason for bargaining failure is that if the plaintiff attempts to bargain to a settlement, defendant gains by stalling if the benefits of delay exceed the costs of continued bargaining. Settlement, in other words, is not subgame perfect, even though it is first-best. Only after plaintiff files suit, and delaying settlement cannot reduce the present value of the potential trial judgment, do the parties settle immediately for an amount that reflects the present value of the breakdown outcome and splits saved litigation costs.

This paper's analysis of the stalling phenomenon is not purely academic. The model predicts that for wide ranges of realistic parameter values (for example, cases with equal pre-suit bargaining costs for P and D), bargaining failure and immediate and costly filing of litigation is the equilibrium outcome. The model explains the prevalence of categories of litigation, such as uncontested debt collection actions, that cannot be explained by prevailing models of suit and settlement. In this way, it prompts us to reconsider the possible tools for encouraging more efficient settlement of cases out of court.

A Proofs

A.1 Proof of Proposition 1

The proof is by backward induction. If Stage 2 ends without a settlement, both parties pay their continuation costs c_i and the breakdown outcome is a payment from D to P of πJ . In turn N_2 , therefore, P is willing to accept any amount no less than the discounted present value of the breakdown outcome minus the savings from avoiding her continuation cost c_p . Thus D maximizes his payoff by offering

$$S_{N_2} = \delta_p \pi J - c_p \tag{11}$$

which P accepts. Given this, in turn $N_2 - 1$, D is willing to accept any settlement demand no greater than the discounted present value of S_{N_2} plus the savings from avoiding his continuation cost c_d . Thus, P maximizes her

payoff by offering

$$S_{N_2-1} = \delta_d(\delta_p \pi J - c_p) + c_d \quad (12)$$

which D accepts. More generally, on any odd-numbered turn $n \in \{1, 3, \dots, N_2\}$, D will offer and P will accept:

$$S_n = \delta_p(S_{n+1}) - c_p \quad (13)$$

On any even-numbered turn $n \in \{0, 2, \dots, N_2 - 1\}$, P will offer and D will accept:

$$S_n = \delta_d(S_{n+1}) + c_d \quad (14)$$

Thus, on the first turn of the subgame, P will offer and D will accept the following settlement:

$$S_0 = \delta_p^{\frac{N_2+1}{2}} \delta_d^{\frac{N_2+1}{2}} \pi J - \sum_{k=1}^{\frac{N_2+1}{2}} \delta_p^{k-1} \delta_d^k c_p + \sum_{k=0}^{\frac{N_2-1}{2}} \delta_p^k \delta_d^k c_p \quad (15)$$

Holding T_2 constant while letting $N_2 \rightarrow \infty$ (i.e., holding δ^N constant), yields this equilibrium settlement amount in continuous time:

$$S_0 = e^{-\rho T_2} \pi J + \int_0^{\frac{T_2}{2}} e^{-2\rho t} (c_d(t) - c_p(t)) dt \quad (16)$$

where $\rho \equiv \frac{\rho_p + \rho_d}{2}$. When litigation costs are constant, solving the integral yields expression 3.

A.2 Proof of Corollary 1.1.

Given that total surplus from settlement is

$$C_p + C_d = \int_0^{T_2} e^{-\rho_p t} c_p(t) dt + \int_0^{T_2} e^{-\rho_d t} c_d(t) dt \quad (17)$$

we have that the plaintiff's share of the total surplus is

$$\sigma_p = \frac{\frac{1}{2} \int_0^{T_2} e^{-\rho t} (c_d(t) - c_p(t)) dt + \int_0^{T_2} e^{-\rho_p t} c_p(t) dt}{\int_0^{T_2} e^{-\rho_p t} c_p(t) dt + \int_0^{T_2} e^{-\rho_d t} c_d(t) dt} \quad (18)$$

If costs arise at a fixed rate, such that $c_p(t) = c_p$ and $c_d(t) = c_d$, then plaintiff's share of the surplus can be expressed as

$$\sigma_p = \left(\frac{\rho_d}{\rho_p + \rho_d} \right) \left(1 + \frac{\rho_p (c_d e^{-\frac{\rho_d T_2}{2}} + c_p e^{-\frac{\rho_p T_2}{2}}) (e^{-\frac{\rho_d T_2}{2}} - e^{-\frac{\rho_p T_2}{2}})}{c_p \rho_p (1 - e^{-\frac{\rho_p T_2}{2}}) + c_d \rho_p (1 - e^{-\frac{\rho_d T_2}{2}})} \right) \quad (19)$$

The remainder of the corollary follows from Expression (19), with the aid of L'Hospital's rule to calculate the limit as $T \rightarrow 0$.

A.3 Proposition 2: Proof.

As before, we begin our consideration of the pre-suit context by considering the equilibrium in the absence of an outside option. The breakdown outcome in Stage 1 has payoff zero for both parties. Thus, there is nothing to gain from P attempting to negotiate a settlement other than the nuisance value to D of avoiding negotiations:

$$S_0^{ps-zoo} = (\alpha B_d - (1 - \alpha) B_p, -\alpha B_d + (1 - \alpha) B_p) \quad (20)$$

$$S_0^{ps-zoo} = \frac{1}{2} \int_0^{T_1} e^{-\rho t} (b_d(t) - b_p(t)) dt \quad (21)$$

Where I define the total *remaining* cost to party i as of turn n is

$$B_{ni} = \sum_{k=n}^{N_1} \delta^{k-n} b_{ki} \quad (22)$$

such that the cost to party i of bargaining through the end of Stage 1 (i.e., bargaining until the breakdown outcome triggers) is $B_i = B_{0i}$.

If the value of the outside option to plaintiff is less than this amount, the outside option is irrelevant, and the parties settle for this amount. But so long as the settlement value of plaintiff's claim in litigation is larger than this, the equilibrium strategies and outcomes in Stage 1 will depend on the value of the plaintiff's outside option. Call the pair of payoffs from the exercise of this option $W_p = (W - F, -W)$. The payoffs from the exercise of plaintiff's outside option are determined by the post-filing subgame and the plaintiff's cost F of exercising the option.

The highest defendant will ever offer in turn 1 is $S_1^{pre-suit} = \delta_p (W - F) - b_{1p}$, which plaintiff will accept. Given this, the highest settlement demand that plaintiff can make in turn 0 is $S_0^{pre-suit} = \delta_p \delta_d (W - F) - \delta_d b_{1p} + b_{0d}$. But if plaintiff forgoes negotiation and invokes the outside option of suit right away, she receives $W - F$. Thus, the parties will fail to settle, and plaintiff will

immediately file suit, if the latter is a higher payoff for the plaintiff:

$$W - F > \delta_p \delta_d (W - F) - \delta_d b_{1p} + b_{0d} \quad (23)$$

or rearranging:

$$(1 - \delta_p \delta_d)(W - F) + \delta_d b_{1p} - b_{0d} > 0 \quad (24)$$

For $N_1 \rightarrow \infty$, we can explicitly consider the optimal amount of time plaintiff is willing to negotiate before filing suit. Taking limits and using continuous time, if plaintiff invokes her outside option at time $n > 0$, this will lead to a settlement at time 0 where plaintiff demands, and defendant pays

$$S_0^{pre-suit}(n) = e^{-\rho n}(W - F) + \frac{1}{2} \int_0^n e^{-\rho t}(b_d(t) - b_p(t))dt \quad (25)$$

Thus, plaintiff's optimal period during which plaintiff is willing to bargain is given by the solution to the following problem:

$$\max_n S_0^{pre-suit}(n) = e^{-\rho n}(W - F) + \frac{1}{2} \int_0^n e^{-\rho t}(b_d(t) - b_p(t))dt \quad (26)$$

The first order condition is

$$\frac{\partial S_0}{\partial n} = e^{-\rho n} \left[\frac{1}{2}(b_d(n) - b_p(n)) - \rho(W - F) \right] = 0 \quad (27)$$

The second order condition is

$$\frac{\partial^2 S_0}{\partial n^2} \Big|_{n=n^*} = \frac{1}{2} e^{-\rho n} (b'_d(n) - b'_p(n)) > 0 \quad (28)$$

In the simplest case, $b_i(t) = b_i$ for $i \in \{p, d\}$. If so, only corner solutions are relevant. If $\frac{\partial S_0}{\partial n}$ is negative, plaintiff gains nothing from bargaining, and thus sues immediately. If $\frac{\partial S_0}{\partial n}$ is positive, plaintiff is willing to bargain through period T , and thus plaintiff will reach a settlement at time 0 of $S_0(T)$. Thus, the condition for pre-suit bargaining failure is

$$\rho > \left(\frac{1}{2} \right) \frac{b_d - b_p}{W - F} \quad (29)$$

B Appendix: Additional Results

Proposition A1: Optimal timing of default. *In Stage 2, default will occur immediately or not at all. Cases without default will settle immediately. The value of the settlement will depend on whether default after period 0, but*

before trial, would have been optimal for D in the absence of settlement.

Remark. In the absence of settlement, the optimal timing of default is not obvious. Earlier default saves litigation costs, but if $\rho > 0$, later default reduces the present value of the judgment that must be paid; in principle, the judgment could be so large that delay is ideal.

Proposition A1: Proof. The present-value payoffs when a defendant who defaults on turn n are $(\delta^n J - (C_p - \delta^n C_{np}), -\delta^n J - (C_d - \delta^n C_{nd}))$.

In continuous time, which is suitable as the number of turns goes to infinity, the defendant's payoff from default at time n is

$$V_d(n) = -e^{-\rho n} J + \int_n^{T_2} e^{-\rho t} c_d(t) dt \quad (30)$$

The first-order condition for the optimal time to default is

$$\rho J = c_d(n^*) \quad (31)$$

The second-order condition for the optimal time to default is

$$c'_d(n^*) > 0 \quad (32)$$

When the first-order condition, and its corresponding second-order condition, are satisfied, then n^* is the optimal time to default so long as

$$V_d(n^*) > S_{n^*} = \frac{1}{2} \int_{n^*}^{T_2} e^{-\rho t} (c_d(t) - c_p(t)) dt + e^{-\rho T_2} \pi J \quad (33)$$

where S_{N^*} is the equilibrium settlement in the subgame without outside options beginning in turn n^* . In other words, default at n^* must be preferable to what would otherwise be the equilibrium settlement at n^* . Given the prospect of a future default, the parties will settle at time 0 for

$$S_0^{def} = \frac{1}{2} \int_0^{n^*} e^{-\rho t} (c_d(t) - c_p(t)) dt + e^{-\rho n^*} J \quad (34)$$

Remark. Note that if prejudgment interest perfectly preserves the present value of the judgment, then $\rho = 0$, and we have

$$V_d(n) = -J + \int_n^{T_2} e^{-\rho t} c_d(t) dt \quad (35)$$

and the first-order condition for the optimal time to default is

$$\frac{\partial V_d}{\partial n} = -e^{-\rho n} c_d(n) < 0 \quad (36)$$

so default occurs immediately or never. (And if default does not occur immediately, it is never optimal, and thus has no effect on settlement.) Given that default concedes the amount demanded, the award of prejudgment interest may be a reasonable assumption here.

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Figures

Figure 1: Summary of Payoffs and Outside Options

Feature	Pre-Suit	Post-Filing
Per-turn costs	b_i	c_i
Breakdown outcome	$(0,0)$	$(\pi J, -\pi J)$
P outside option	$(W - F, -W)$	
D outside option		$(J, -J)$

Notes: P 's outside option involves transfer of W and real cost of F ; W is determined endogenously based on Stage 2 bargaining outcomes.

Figure 2: Simplified Game Tree

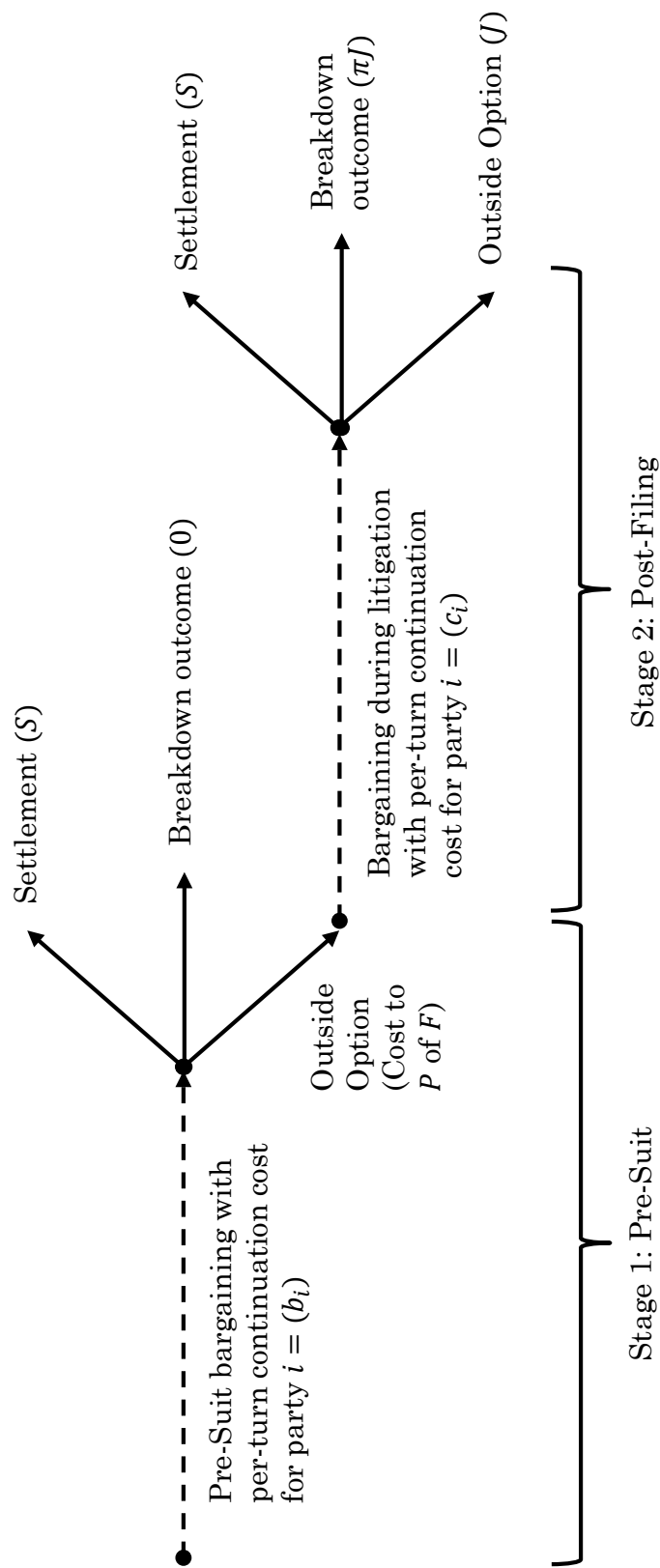


Figure 3: Pre-Suit Bargaining Failure as a Function of Discount Rate, Bargaining Costs, and Outside Option Value

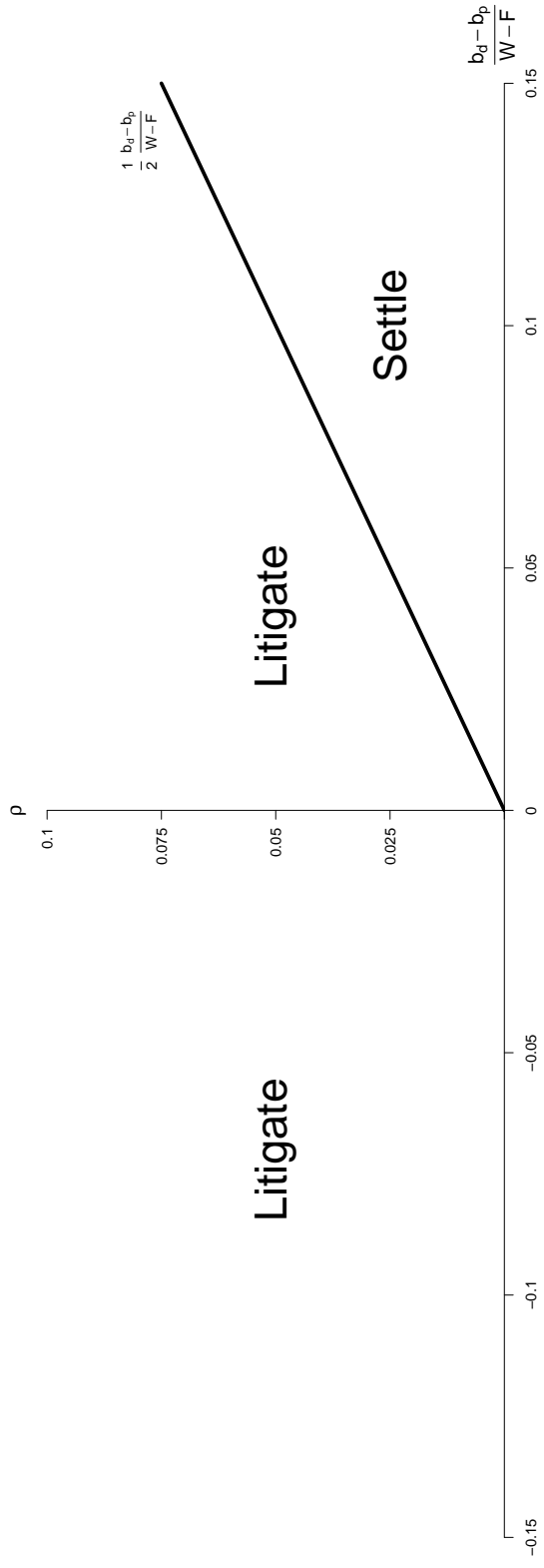


Figure 4: Litigation and Default in Debt Collection Cases

	Total Terminations	Default Judgments as % of Terminations	Full Trials as % of Terminations
Taiwan, Ordinary Procedure			
All Cases	215,022	16.4	41.4
Debt Collection Cases	46,125	40.5	17.4
Non Debt Collection Cases	168,897	9.8	48.0
US Federal Courts			
All Cases	588,110	4.1	0.8
Debt Collection Cases	13,659	48.3	0.3
Non Debt Collection Cases	574,451	3.0	0.8

Source: Civil Cases Administrative Data (Judicial Yuan, Taiwan); Federal Court Cases: Integrated Data Base (U.S. Federal Judicial Center) as processed in Chang and Hubbard (2018).