# Theories of Bargaining Delays

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**Contract negotiations over wages are sometimes accompanied by strikes; similarly in legal contexts, settlements of damage claims may require lengthy negotiations. These and other costly delays in resolving disputes are the subject of the studies described in this article. Formulations in terms of game theory indicate that procedural features can allow delays, but the main cause may be informational disparities between the parties. Several models are described and related to data about strikes.**

BARGAINING PERVADES BUSINESS AND LEGAL PRACTICE. It is routine in many transactions, but news reports about mergers, strikes, and legal disputes depict dramatic aspects too. In simple cases, the routine part is agreement on a price or wage in an economic context, or settlement of a claim in a legal context; negotiations often address additional contractual provisions, but the price summarizes how gains from trade are divided. Drama enters when contention for greater shares incurs costly delay. The costs are evident in a strike when production is curtailed, or in a legal dispute when fees are paid for agents such as attorneys. Perpetual delay, an impasse, can be efficient when there are no advantages from trade and the parties quickly seek alternatives elsewhere. If resolution is reached eventually, however, then a tragic element ensues with the realization that a similar agreement could have been concluded earlier at less cost.

This feature of regret is characteristic of bargaining. The parties' shared interests in an efficient resolution are in conflict with their opposing interests about dividing profits. Expensive contention about the price depletes the "pie" divided, yet each can believe that insisting on a larger share might be worth the cost incurred. This pursuit of personal advantage produces a delayed agreement that was feasible earlier.

Bargaining occurs in other spheres, providing useful analogies. Costly economic and political battles occur in contests (price wars) for market shares among competing firms, in arms races and wars among nations, and in other "Hobbesian" contexts. Such examples are variants of bargaining lacking enforceable contracts and means of payment. Similarly, battles among animals competing for mates or prey select winners; the costs are injuries or energy consumption. In some species, however, tournaments conducted beforehand establish a hierarchy; in others, ritualized battles reduce costs. Such examples indicate that some contests for advantage are informational, revealing the relative strengths of the participants. In economic contexts, behavioral norms and ethical rules of fair division mimic the effects of ritualized resolution of conflicts.

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The observation that individual incentives promote mutually costly struggles over division of the pie motivates some of the attempts to improve the bargaining process. A third-party mediator is sometimes employed to enhance communication and propose a compromise; or an arbitrator judges the arguments and renders a binding decision. Arbitration according to statutory rules is the ultimate role of a judge or jury if a legal claim is decided in court, but costs are usually higher; some jurisdictions encourage nonbinding arbitration by a legal expert before bringing a case to trial. Arbitration is often mandatory in critical public-service occupations, and mediation of private-sector wage disputes is mandatory in some Canadian provinces. These forms of "alternative dispute resolution" are increasingly popular.

In considering the potential for alternative procedures, recent theoretical studies have focused on understanding the fundamental barriers to quick resolution of negotiations. In this article, we describe several contributions derived from game theory. In practice, bargaining is affected by notions of fairness and by strong emotions. The game-theoretic formulation abstracts from these aspects to find the range of outcomes consistent with relentless optimizing behavior by each party. A principal aim is to identify situations that allow or require delay in reaching an agreement. Delay is an important source of inefficiencies, and one observable in such data is strike duration, but it is not the only one: other possibilities are inefficient contract provisions and failure to reach an agreement when a mutually profitable one exists.

The assumptions invoked by game theory are stringent. The assumption of maximizing behavior is strengthened by suppositions that the parties know precisely the procedural rules governing the process, and that they have formidable powers of calculation (*1*). Fixity of the procedure precludes negotiations in the free flow of natural language to convey information and intentions; instead, the language is limited to offers, acceptance or rejection, and supplementary decisions such as to strike (*2*). However, it enables studies of the effects of alternative procedures and informational disparities between the parties. Calculation includes selection of one's own strategy and, less credibly, anticipation of the other's strategy. This assumption of equilibrium—the parties' strategies are optimal responses, each to the other—is a hallmark of game theory. Rather than a normative axiom or an approximation of empirical fact, which is ambiguous at best, it is a prerequisite here for identification of fundamental barriers to quick resolution of negotiations (*3*). A stronger assumption is needed for useful results: each party's strategy is not only optimal initially, but also in each subsequent contingency (*4*). This restriction excludes a strategy whose initial optimality depends on intimidating the other party by a threat that is incredible, in the sense that carrying out the threat would not be optimal.

Although restrictive, these assumptions enable an analysis of bargaining as a strategic problem, conditioned by procedural rules and data about the parties' preferences and information. This mode of

analysis contrasts with analyses based on axiomatic normative or ethical criteria, or on empirical predictions derived from behavioral regularities. We first review models emphasizing effects of procedural rules and then describe the implications of informational disparities.

## Models of Procedural Effects

A basic example envisions bargaining over the price of an item of value $v$ for the buyer that costs the seller $c$ to supply, where $v > c$. Thus, an outcome occurs at a time $t$ with an agreed price $p$ indicating that the seller's share of the pie $v - c$ (the gain from trade) is $p - c$ and the buyer's is $v - p$. The simplest procedure specifies alternating offers: at discrete times separated by intervals of duration $\Delta$, one proposes a price and the other accepts immediately or makes a counteroffer next time. We consider two extremes among the possible specifications of the costs of delay: (i) they are proportional to delay, so that the seller nets $p - c - d_s t$, and the buyer nets $v - p - d_b t$. The parameters $d_s$ and $d_b$ are costs incurred each period of delay by the seller and the buyer. (ii) They represent foregone interest earnings on investment of the proceeds, so that the seller nets $[p - c]\delta_s^t$ and the buyer nets $[v - p]\delta_b^t$. The parameters $\delta_s$ and $\delta_b$ are discount factors reflecting interest rates $r_s$ and $r_b$; for example, $\delta_s = e^{-r_s\Delta}$. Legal and arbitration contexts add the feature that at some time the dispute is decided by a judge if the parties still disagree.

This model is from Ståhl (*5*) and Rubinstein (*6*). It specifies an explicit procedure, and preferences manifest impatience for settlement, in the sense that delay is expensive. A main prediction from this example is that agreement occurs immediately and the equilibrium price is unique. Uniqueness requires an elaborate proof, but the resulting absence of delay is plausible: a delayed agreement would be anticipated by both parties, and therefore at any earlier time the proposing party could offer mutually favorable terms. For instance, the seller could earlier propose a higher price that the buyer would prefer to accept rather than incur the cost of waiting for the anticipated lower price later.

The equilibrium price depends on who makes the first offer. If it is $p_s$ when the seller proposes, and $p_b$ when the buyer proposes, then $p_s$ is the highest price the buyer cannot afford to reject in favor of proposing $p_b$ next time, and similarly $p_b$ is the lowest price the seller cannot afford to reject and propose $p_s$ next time. In case (ii), therefore, these two prices are determined by the equations

$$v - p_s = [v - p_b]\delta_b \text{ and } p_b - c = [p_s - c]\delta_s$$

In this case, either price provides an almost even split of the pie when the interest rates are similar and the interval $\Delta$ is small. Case (i) produces an asymmetric split: the party with the smaller cost obtains all the pie when he proposes first, and all but the other's cost when second. If either party has an alternative option, say the buyer can buy elsewhere at a price $p$, then the predicted price is the lesser of $p$ and $p_s$ when the seller makes the first offer.

Delay is evidently not necessary in this example. If the parties can anticipate the eventual split, and the procedure allows earlier resolution, then they have incentives to decide matters quickly. A similar proposition applies to "bargaining in the shadow of the law," studied by Mnookin and Kornhauser (*7*). In pretrial bargaining over legal claims, if the court's eventual resolution of the dispute is clear beforehand, then the parties have strong incentives to settle. Another application of these ideas, to bargaining between banks and sovereign nations over restructuring debt contracts, is provided by Bulow and Rogoff (*8*).

The proposition requires qualification, however, and to illustrate we describe a procedural modification that supports multiple equilibria, and thereby allows delay (*9*). Suppose time runs continuously, and the parameters $\Delta$ and $\Delta'$ specify two fixed durations. Each party can propose a price at any time $t \geq 0$ provided he has waited at least $\Delta$ after the other's previous offer and $\Delta'$ after his own previous offer, if any; agreement is reached when one repeats the other's offer or they propose the same price simultaneously. This modified procedure has the merit that it eases restrictions on the timing of offers. However, as equilibrium outcomes it allows a wide range of prices at time zero and at much later times; thus, delay is possible but not necessary. The proximate cause of delay is the multiplicity of immediate agreements, permitting attachment of "stigma" to anyone attempting earlier resolution. To see this, suppose a delayed agreement on a price $p^\circ$ occurs when they both remain silent until they propose $p^\circ$ simultaneously. If $p^\circ$ is in the middle of the range between $p_*$ and $p^*$ of prices obtainable as immediate agreements, then either party (say the seller) is deterred from making earlier proposals by the prospect that his audacity will be countered by the other's insistence thereafter on the lower price $p_*$, which is obtainable as an equilibrium outcome in a continuation of the bargaining. Thus, delay can be sustained by mutual expectations of ritual delay, enforced by punishing deviant behavior. Similar inefficiencies are intrinsic features of procedures allowing multiple equilibria. In this example the multiplicity derives from the artifact of simultaneous proposals. Indeed, if simultaneous proposals are excluded, say by ignoring one of them, then again there is a unique equilibrium without delay.

Multiplicity can derive from other features too. Fernandez and Glazer (*10*) analyze the procedure of alternating offers at fixed intervals, interpreted as bargaining between a union and a firm, with the added feature that in each period without agreement on a new contract the union can choose between striking and working at the wage specified in the previous contract (*11*). This multiplicity of retaliatory options available to the union allows a range of immediate wage agreements; as in the previous example, therefore, ritual delay is also possible.

A second qualification is that the parties must be able to anticipate the eventual agreement. This fails when either party has private information about some aspect of the process. For instance, in legal contexts one party may know information subject to discovery or subsequently revealed in trial testimony. Additional possibilities are that the procedure is ambiguous or that either party is uncertain about the other's preferences. We use the latter to illustrate the implications of private information.

## Models of Informational Effects

Three main examples of how informational disparities can cause delay have been studied. Following a schema developed in Kennan and Wilson (*12*), we refer to them as models of attrition, screening, and signaling.

*Attrition.* Attrition models assume preferences fit case (i), but each party is uncertain about the other's cost of delay, assuming only that it is described by a specified probability distribution. Although developed to describe contests between animals competing for survival or reproduction, attrition models apply also to bargaining (*13*). Because it is mutually costly, delay resembles a battle to ascertain the stronger party (the one with the smaller cost) who then claims the entire pie as in the basic model above. Attrition models aptly describe arms races and price wars among firms competing for survival or market shares, and other instances of implicit bargaining. They capture the retrospective sense of regret: the waste of battle was avoidable if the stronger party had been identified initially; but tragically, battle may be the only credible test of strength. The

parties' motives prospectively illustrate a wider class of reputational models: each party's continuing struggle is an investment in a reputation for likely being stronger, which earns a profitable return if the other capitulates first (*14*).

Attrition models appear less pertinent to explicit bargaining over wages and prices because they rely on privacy of information about delay costs affecting profits additively, and their predictions of winner-take-all outcomes appear unrealistic.

*Screening*. Screening models usually suppose that preferences fit case (ii) and, in the simplest version, the seller is uncertain about the buyer's valuation. Although $v$ is known to the buyer, the seller perceives it as a random variable described by a probability distribution that is common knowledge. We simplify further by supposing the seller makes all proposals, at discrete times $t = 0, \Delta, 2\Delta, \ldots$ as before.

In this version, the seller sorts the possible types of the buyer using a "skimming" strategy. That is, he offers successively lower prices until the buyer accepts. This strategy exploits a high-value buyer's impatience to trade. The buyer waits for prices less than his valuation and then accepts when the cost of further delay outweighs the advantage of waiting for the next lower price. Anticipating the buyer's behavior, the seller designs an optimal sequence of prices to offer, The equilibrium is essentially unique, assuming the seller's cost is strictly less than all possible values of the buyer so that the gain from trade is surely positive (*15*).

This model's prediction of delay is ephemeral, however. As the interval $\Delta$ between offers is shortened, the maximum delay shrinks to zero, and the seller's offers decline to the least possible value of the buyer. This striking property, conjectured by Coase (*16*), persists in more general versions (including alternating offers) whenever the equilibrium shares some general features of the unique equilibrium described above (*17*). Thus, significant delay is necessary only if offers are infrequent.

Theories of the frequency of offers (apart from simplistic physical limits and inducements to "keep trying") must contend with significant reputational aspects. During a strike, the firm's rejection of a wage proposed by the union creates an incentive to propose a lower wage quickly to shorten the strike. But the union can anticipate the Coase property: readiness to make offers frequently encourages the firm to anticipate and wait for even lower wage proposals, which ultimately produces quick agreement, but on terms unfavorable to the union. Making the firm pay the consequences of rejection, by enduring the strike for a significant duration before offering a lower wage, is the source of the union's power to gain an appreciable share of the pie. Screening models thus have a subtle implication: building a reputation for toughness (construed as an ability to maintain members' morale to sustain wage demands without compromise over significant durations) is the dominant feature of a successful strategy. Building a reputation might involve repeated bargaining over a succession of contract negotiations with one firm, or with many firms in an industry. In this sense, delay is compounded from uncertainty about the buyer's value, which justifies the seller's skimming strategy, and an overriding incentive to build a reputation for infrequent revision of offers.

*Signaling*. Like the reputational interpretation above, signaling models provide explanations of significant intervals between offers. However, they escape the Coase property by addressing the buyer's motive to justify a low price. This drastic refocus derives from a trivial alteration of the procedure, showing again that procedural effects are crucial. Allow offers at any time, with the parties proposing alternately, and suppose that after receiving a proposal the respondent must wait a short duration $\Delta$, but can wait longer. Assume preferences fit case (ii) and, for simplicity, that only the buyer's value is private (*18*).

The discretionary response now provides a signaling device that operates as follows. Upon receiving a proposed price from the seller, the buyer can accept after the interval $\Delta$, or wait longer to signal that his value is small and then propose a lower price. For such a signal to be credible, he must wait sufficiently long to refute any conjecture that his value might be high. Thus, the duration he waits and the price he then proposes must be such that it would have been unprofitable to do so were his value higher. Provided the mandatory interval $\Delta$ is sufficiently short, weak technical assumptions imply a unique equilibrium having this form. In particular, the seller initially proposes a price accepted by the buyer if his value is sufficiently high, and otherwise he signals his value by waiting an appropriately longer interval to propose (because now his value has been signaled credibly) the price predicted by the basic model without uncertainty described initially.

Similar results obtain in the case that both parties have private information. The more impatient party, say the seller, waits long enough to signal his cost credibly before making an initial proposal; the buyer then quickly accepts if his value is very high and otherwise waits long enough to signal his value credibly before making a counterproposal that the seller quickly accepts. According to this scenario, the parties usually agree on the price predicted in the absence of private information: unlike screening models, informational disparities have little effect on the agreed terms. The role of delay is solely to communicate credibly each other's private information. The element of regret is captured in the realization ex post that early credible verification of the seller's cost and the buyer's value could have avoided the costs of delay.

According to this scenario, delay is a necessary consequence of informational disparities. In particular, at most two serious offers are made and the rest is superfluous stalling to signal, say by the firm in a wage negotiation, that it cannot afford a high wage. In stark form, this view violates casual observation but some features, such as variable response intervals and scarce serious offers are realistic. Moreover, wages are fair in the sense that they would be the same in the absence of informational disparities. Screening models differ materially because they predict that wages and delays depend crucially on procedural parameters such as the frequency of offers, depending in turn on auxiliary considerations of morale or reputation; moreover, if offers are frequent, then the outcome strongly favors a party with superior information.

These three models of delay represent extremes of which various mixtures are possible. For instance, if the parties' delay costs are mixtures of cases (i) and (ii) then also outcomes are a mixture of attrition and, say, signaling outcomes: compared to a pure attrition model, delay may be shorter and the split, more equitable (*19*). New features appear too. The highest values for the buyer imply immediate acceptance, but also the lowest values lead the buyer to terminate negotiations even if the gain from trade is positive: credible signaling is too expensive. Additional possibilities arise if the seller's cost and the buyer's value are correlated or causally linked; in particular, realization of gain may be prevented even if both parties know the gain must be positive (*20*).

## Strike Data

These models offer differing predictions about the patterns found in data about strikes. We mention a few reviewed in Kennan and Wilson (*12*).

Attrition models predict that average wage settlements are unrelated to strike durations, which is the case for Canadian data, although U.S. data show some decline of wages with duration. They also predict that the settlement rate (the percentage settling each day

among those still unresolved) declines, which is generally consistent with the data. If only the firm has private information, screening and signaling models predict wages declining with duration, which as mentioned occurs in U.S. data, but they differ in the rate of decline. Plausible specifications of screening models can predict settlement rates of the right magnitude (2 or 3% per day), and signaling models do too if nonstrike slowdowns (described below) are included. These models predict settlement rates that mostly increase with duration, but this is not inconsistent with declining settlement rates observed in aggregate data: because different union-firm pairs can have different settlement rates, and those with high rates tend to settle early, the aggregate rate can still decline for an extended period.

Signaling models are adaptable to consideration of other features, such as the union's tactical choice between a slowdown or a strike to pressure the firm (*11, 21*). Indeed, strikes and lockouts account for less than half the average duration between expiration and settlement; also, a majority of contract renewals incur delays, but less than a third of these involve strikes, which are usually initiated quickly. Signaling models nicely predict that the union opts initially for a strike only if the old wage is low. Remarkably, plausible assumptions imply that slowdowns and strikes communicate information at similar rates, measured as the portion of the pie depleted by delay costs; thus, slowdowns are relatively efficient and attractive to the union when the old wage is not too low (*22*).

Further work is needed to establish how well each model fits the data overall. Some isolated facts lend support to the models' general hypothesis that strategic behavior, complicated by informational asymmetries, is important. The models predict that workers' eligibility for unemployment compensation after 8 weeks in New York encourages higher settlement rates earlier and lower ones later, as in fact occurs. They also predict that Quebec's law prohibiting firms from hiring replacement workers increases average wages and strike durations, and in fact the estimated increase in average durations is more than 50%. This effect is clearest in screening models, where exclusion of replacement workers enhances the union's power to discriminate among firms according to their profitability, unimpeded by competition from nonunionized workers. On the other hand, in practice, delay costs appear lower than these models predict (*12, 23*). In the United States only about 15% of labor contract negotiations involve strikes (in Canada, 22%) and the median durations are typically about 3 weeks in comparison with contracts lasting 3 years. Similarly, about 10% of legal claims reach trial (higher rates occur for issues such as child custody). About a third of contract negotiations for government workers subject to mandatory binding arbitration involve arbitration hearings, but these are less costly than strikes or trials. A possible explanation for these observations is that only a minority of disputes are afflicted with informational asymmetries.

## Discussion

The models described here offer suggestions about the root causes of costly bargaining delays. The models without informational disparities indicate that delay is not intrinsic. Sensible procedures are capable of obviating any necessity for delay. The three models with informational disparities, however, indicate that delay may be possible or essential. Although they depend on different structural features of preferences, attrition and signaling models share the prediction that delay is primarily a means of eliciting information. The costliness of delay ensures its credibility as a signal, so if other means of verification are absent then the parties may rely on it. Screening models, on the other hand, posit procedures allowing manipulation of delays. Frequent offers minimize delay, which is socially efficient, but bias the terms against a party with inferior information.

These possibilities for delay of various types and amounts are reflected also in studies of the basic incentive compatibility conditions implied by any equilibrium of any bargaining process. These conditions are independent of procedural rules but they are sensitive to informational disparities. One fundamental implication is that mutual uncertainty about whether the gain from trade is positive requires some inefficiency, either as delay or as a breakdown of negotiations (*24*). Among the ways of satisfying these conditions, a great variety of possibilities is found, each with effects on the relative advantages obtained by the parties, on costs of delay and on the overall efficiency of the outcome. A practical recommendation that emerges is to avoid the bite of these conditions by establishing (before informational disparities arise) long-term contracts to regulate disputes (*25*). Alternatively, side payments can compensate for expected disadvantages; for example, in a screening model, short intervals between offers disadvantage the seller but reduce delays, so in recompense the buyer might pay the seller to speed up the process.

These remarks are not intended to imply that the sources of delay mentioned are exhaustive. Delays due to emotional and cognitive responses, such as distrust or attribution of malicious intent, are familiar. Even in anonymous settings, each party may be reluctant to forego the share he deserves, expects, or promised to constituents. Even for "super-rational" parties, there are competing hypotheses. One of importance is that agents employed by the parties may have incentives to delay (if they are paid to negotiate) or to avoid agreement (if it would adversely affect their future). A possible example of the latter is the motive for incumbent management or directors to thwart a hostile takeover or merger offer, or settlement of a shareholders' suit (*26*). A common view too is that negotiations are not concluded until the issue is ripe for settlement. In terms of the models above, ripeness might be interpreted in terms of increased costs of further delay or acquisition or inference of new information; but possibly delay enables clarification of consequences or preferences (*27*). A relevant instance in legal contexts is the opportunity that delay provides to proceed with discovery or auxiliary court tests such as appeals.

We close with cautions about the capability of game theory to study bargaining delays. The method's reliance on the parties' super-rationality restricts applications to a few foundational issues. Its dependence on detailed specifications of procedures and preferences is limiting too. Procedures are rarely explicit and often ambiguous, and more often the procedure is free-form negotiation in natural language imbued with subtle nuance or cautious ambiguity. The method also depends on exogenous specification of opportunities for commitment. The models above exclude commitment except as it might be specified in the procedure; however, resolute determination might be tested by costly delays, much as in attrition models. Further, preferences are often not well known beforehand; rather, negotiation is partly a process of finding acceptable terms. Similarly, the models assume unitary actors, whereas in fact a union or a firm is an organization requiring time to resolve conflicting interests internally. Negotiations involving free-form discussion as well as self-discovery of preferences can take time for reasons unrelated to game-theoretic models.

### REFERENCES AND NOTES

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probabilistic inferences.

3. A. Roth [*Axiomatic Models of Bargaining* (Springer-Verlag, Berlin, 1979)] surveys the axiomatic theories initiated by J. Nash [*Econometrica* **28**, 155 (1950)]. H. Raiffa [*The Art and Science of Negotiation* (Harvard Univ. Press, Cambridge, MA, 1982)] suggests a normative approach based on prescriptive optimization of one's strategy in response to an accurate description of the other's behavior.
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11. Labor law requires the firm to pay the old wage until an "impasse" such as a strike or lockout occurs.
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14. Reputational models are reviewed by R. Wilson [in *Game-Theoretic Models of Bargaining*, A. Roth, Ed. (Cambridge Univ. Press, New York, 1985), chap. 3; in *The Economics of Imperfect Competition and Employment*, G. Feiwel, Ed. (Macmillan, London, 1989), chap. 8; in *Perspectives on Deterrence*, P. Stern *et al.*, Eds. (Oxford Univ. Press, New York, 1989), chap. 8]. Some legal disputes burdened by substantial fees involve attrition in games of "chicken" studied by D. Kreps and R. Wilson [*J. Econ. Theor.* **27**, 253 (1982)] and by J. Ordover and A. Rubinstein [*Q. J. Econ.* **101**, 879 (1986)]: if the plaintiff has superior information about his prospects at trial then he may continue negotiation in hopes the defendant will concede, but eventually concedes himself if he knows he is likely to fail in court.
15. D. Fudenberg, D. Levine, J. Tirole, in *Game-Theoretic Models of Bargaining*, A. Roth, Ed. (Cambridge Univ. Press, New York, 1985), chap. 5; D. Fudenberg and J. Tirole, *Rev. Econ. Stud.* **50**, 221 (1983); F. Gul, H. Sonnenschein, R. Wilson, *J. Econ. Theor.* **39**, 155 (1986); O. Hart, *Q. J. Econ.* **104**, 25 (1989); J. Sobel and I. Takahashi, *Rev. Econ. Stud.* **50**, 411 (1983). Similar constructions apply to alternating offers, as in S. Grossman and M. Perry [*J. Econ. Theor.* **39**, 120 (1986)], although uniqueness fails; and to versions where the buyer's discount factor or both his value and his discount factor are privately known, as in S. Bikhchandani (*Rev. Econ. Stud.*, in press) and A. Rubinstein [*Econometrica* **53**, 1151 (1985)].
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21. P. Cramton and J. Tracy, unpublished paper.
22. Slowdowns are often implemented by working to rule to ensure wages, but reduced productivity might also reflect impediments to cooperation or morale.
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24. R. Myerson, *Econometrica* **47**, 61 (1979); R. Myerson and M. Satterthwaite, *J. Econ. Theor.* **28**, 265 (1983).
25. An example might be the steel industry contract signed in 1973 pegging wages to expected long-term productivity growth and mandating binding arbitration of other disputes.
26. R. Mnookin and R. Wilson [*Univ. Va. Law Rev.* **75**, 295 (1989)] explore this hypothesis in the case of the 2-year delay to settle the dispute between Pennzoil and Texaco. Like arbitration, Texaco's declaration of bankruptcy empowered the bankruptcy judge to influence a settlement and to include indemnification of Texaco's directors in the terms offered to shareholders.
27. Patterns of delay are also strongly affected by imposition of a deadline, as confirmed experimentally by A. Roth, K. Murnighan, and F. Schoumaker [*Am. Econ. Rev.* **78**, 806 (1988)]. If informational factors and other sources of impatience are negligible then this can be attributed partly to a "relativity" effect occurring whenever time can be rescaled arbitrarily. Whatever the fraction of disputes that settle in the first half of the interval until the deadline, one expects a similar fraction of those remaining to settle in the third quarter, that is, in the first half of the half remaining. Thus, the observed settlement rate increases as the deadline approaches.
28. Research supported by NSF grants SES8910930 and SES8908269 and a grant from the Hewlett Foundation to the Stanford Center on Conflict and Negotiation.