

Law and Mechanism Design: Procedures to Induce Honest Bargaining

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Abstract

A classic challenge in contract and property law is unstructured negotiation between two parties with asymmetric information (i.e., each party has different private information) under bilateral monopoly (each party must negotiate with the other to try to reach an agreement), which often leads to prohibitively high transaction costs and, if the parties fail to agree, social costs as well. In these situations, the law should incorporate principles of mechanism design, a methodology that employs structured procedures to give the parties incentives to reach agreement. In terms of contract theory, mechanisms constitute algorithmic altering rules that reduce if not eliminate inefficient transaction costs. We review two bargaining mechanisms that inherently elicit honesty by making it a dominant strategy and discuss two extensions for legal applications. In particular, we show that algorithmic procedures would reduce transaction costs and lead to more efficient bargaining in pretrial settlement negotiations and blockholder disclosure under section 13(d) of the Securities Exchange Act of 1934. The former is a straightforward application of mechanism design to a negotiation situation wherein the social externalities of non-agreement justify inducing the honest disclosure of reservation prices, or “bottom lines.” The latter is an example of using mechanism design to facilitate negotiated settlements in situations presently subject to a suboptimal mandatory rule.

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I. INTRODUCTION

Freedom of contract is a fundamental principle of the American legal system. At its core, it reflects a free-market orientation that entrusts actors with the discretion to transact as they wish. We suggest, however, that a few *structured* restraints on freedom of contract could bring substantial improvements to legal fields as diverse as alternative dispute resolution and securities regulation. This is not such a radical idea: the law already curtails unstructured negotiation for the sake of other socially beneficial goals.

A classic example from property law is the case of *Boomer v. Atlantic Cement Co.*, which involved a nuisance claim by landowners against a neighboring factory for pollution.¹ Law and economics scholars have long debated whether the right to remain free from pollution should be protected through a property rule—thereby forcing the parties to negotiate—or a liability rule—thereby permitting one party essentially to force a judicial sale of this right by bringing a lawsuit.²

The predominant view is that in cases like *Boomer*, a liability rule would be more efficient because this is a *bilateral monopoly*. There is no “free market” here: neither party can simply decide to trade with a different neighbor. They are “stuck with each other,” in one scholar’s words.³ But the Coase Theorem suggests that, in the absence of transaction costs, the parties would still negotiate to the efficient outcome. Why abrogate contractual freedom by forcing a sale? Why not mandate a bargained-for solution?

There is a major source of transaction costs in cases like *Boomer*—namely, asymmetric information, in which each party has different private information. The Coasean ideal of efficient bargaining only applies in a frictionless world where each side knows how much the other values the activity. When one side does not know the other’s *reservation price*, or “bottom line” (as is typically the case), the price at which it is indifferent between transacting or not, it is in his or her best interest to engage in *strategic* negotiation. Often, this means opening with an extreme offer and yielding ground very slowly. This renders negotiations expensive and cumbersome, which is why scholars often advocate liability rules in bilateral monopoly with asymmetric information. A judicial forced sale of the entitlement—even at a price far from the parties’ actual valuation—is often more efficient than costly bargaining.

We suggest that this is a false dichotomy. The law need not choose between unstructured negotiation and forced sales by the judiciary. The 2007 Nobel Prize in Economics was awarded for the development of the field of *mechanism design*, which provides a third path. Mechanism design permits structuring the rules of interaction, or protocols to be followed, to reduce or eliminate the natural incentive of parties to posture and exaggerate. It is an interdisciplinary approach that has been adopted in economics, political science, and even computer science. The time has come for the law to embrace this methodology as well.

¹ 257 N.E.2d 870 (N.Y. 1970).

² See discussion *infra* Section II.A.

³ Carol M. Rose, *The Shadow of the Cathedral*, 106 YALE L.J. 2175, 2183 (1997).

Applying mechanism design to law means instituting algorithmic procedures that impose *structural* limitations on negotiations between the parties. Unlike liability rules, these procedures do not eliminate freedom of contract because they still permit the parties to negotiate and transact at a price that reflects their subjective valuations. Yet, by replacing unstructured negotiations with bargaining procedures, mechanism design can reduce or eliminate the incentives that prevent reaching agreement in these bilateral monopoly situations. In the language of contract theory, mechanism design provides structured altering rules that render contract formation more efficient. Indeed, the *ABA Journal* recently pointed out the increasing use of procedures like these by parties wishing to facilitate transactions and settle legal disputes.⁴

In this Article, we discuss two legal contexts that are particularly suited for mechanism design: settlement negotiations and mandatory disclosure under the securities laws. In both, we argue that imposing algorithmic negotiation procedures is justified because the failure to reach agreement imposes a cost on society. Mechanism design should be mandatory when transaction costs lead to impasse and significant negative externalities in negotiations.

It is easy to see how society pays for settlement negotiations that fail because of strategic bargaining. As a case in point, excessive litigation leads to greater costs of maintaining the court system. In certain contexts (e.g., labor negotiations), third parties, including the public, may be directly harmed by the failure to reach agreement.⁵

Securities regulation, however, is less obvious context for mandating mechanism design. We suggest that this is an example of the power of mechanism design to facilitate bargaining when the law has traditionally imposed a suboptimal mandatory rule. The recent controversy over blockholder disclosure under Section 13(d) of the Securities Exchange Act of 1934 has generally assumed that the disclosure duration must be fixed. We show that this is a situation ripe for bargaining, but an algorithmic procedure is essential to fostering settlements.

This Article proceeds as follows. In Part II, we summarize the problem of transaction costs in bargaining under bilateral monopoly with asymmetric information, show how mechanisms may be understood as structured altering rules, and summarize the literature on mechanism design. In Part III, we consider the application of mechanism design to contract law. We discuss the shortcomings of traditional bargaining theory, review two procedures that induce honest revelation of reservation prices in bargaining, and propose two extensions of these procedures for legal applications. In Part IV, we

⁴ See Deborah L. Cohen, *Not Playing Games: Firm Takes Decision-Making Theory into Transactions*, ABA JOURNAL (Jan. 1, 2013, 3:40 AM CDT), http://www.abajournal.com/magazine/article/not_playing_games_firm_takes_decision-making_theory_into_transactions/. One of the authors (Brams) is chairman of the advisory board of Fair Outcomes, Inc., the firm discussed in the article.

⁵ The students harmed in Chicago's 2012 teacher strike are just one example. See, e.g., Charles Lane, Editorial, *Students Are Victims in Chicago Fight Over Clout*, WASHINGTON POST, Sept. 10, 2012, http://www.washingtonpost.com/opinions/charles-lane-students-are-victims-in-chicago-fight-over-clout/2012/09/10/ec4b47c2-fb66-11e1-b2af-1f7d12fe907a_story.html; Monica Davey, *As Chicago Strike Goes On, the Mayor Digs In*, N.Y. TIMES, Sept. 17, 2012, at A1, available at <http://www.nytimes.com/2012/09/18/education/chicago-teachers-strike-enters-second-week.html>.

apply mechanism design to specific legal settings. We analyze its potential for improving the efficiency of bargaining in settlement negotiations and discuss specific procedures to permit negotiations in situations presently subject to a mandatory rule under the securities laws.

II. NEGOTIATION AND THE MECHANISM DESIGN LITERATURE

A. Transaction Costs in Bargaining Under Bilateral Monopoly with Asymmetric Information

A fundamental issue in the economic analysis of law is the problem of high transaction costs resulting from bargaining under bilateral monopoly conditions with asymmetric information.⁶ The initial insight was Ronald Coase's claim that in the absence of transaction costs, parties will bargain to the efficient outcome regardless of the initial allocation of rights.⁷ Ever since Calabresi and Melamad's well-known argument that the presence of prohibitively high transaction costs supports the imposition of liability rules rather than property rules,⁸ legal scholars have sought to prescribe effective rules in the bilateral-trade context where two parties are "stuck with each other."⁹ In these thin, illiquid markets, the presence of private information, which is not shared and therefore asymmetric, gives each party an incentive to misrepresent his or her bargaining offer and thereby render negotiations protracted and costly, if they succeed at all.

Scholars have proposed various ways to induce the truthful disclosure of reservation prices to reduce transaction costs in negotiations under bilateral monopoly conditions with asymmetric information. In a highly influential piece, Ian Ayres and Eric Talley propose dividing entitlements to induce uncertainty as to whether a party "will

⁶ For a general discussion of transaction costs under bilateral monopoly with asymmetric information, see RICHARD POSNER, *ECONOMIC ANALYSIS OF LAW* 251 (2003); Oliver E. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233, 241-42 (1979); see also William Samuelson, *A Comment on the Coase Theorem*, in *GAME-THEORETIC MODELS OF BARGAINING* 321, 324-31 (Alvin E. Roth ed., 1985).

⁷ See Ronald H. Coase, *The Problem of Social Cost*, 3 J. LAW & ECON. 1 (1960). The Coase Theorem has spawned a vast literature on the role of transaction costs in bargaining and trade. *E.g.*, James M. Buchanan, *Rights, Efficiency and Exchange: The Irrelevance of Transaction Costs*, reprinted in *THE LEGACY OF RONALD COASE IN ECONOMIC ANALYSIS* (S.G. Medema, ed. 1995); Robert D. Cooter, *The Cost of Coase*, 11 J. LEGAL. STUD. 1, 1-2 (1982); Robert C. Ellickson, *Of Coase and Cattle: Dispute Resolution Among Neighbors in Shasta County*, 38 STAN. L. REV. 623 (1986); Joseph Farrell, *Information and the Coase Theorem*, 1 J. ECON. PERSPECTIVES 113 (1987); Herbert Hovenkamp, *Coasean Markets*, 31 EUR. J. L. & ECON. 63 (2011); Steven G. Medema, *A Case of Mistaken Identity: George Stigler, "The Problem Of Social Cost," and the Coase Theorem*, 31 EUR. J.L. & ECON. 11 (2011); Donald H. Regan, *The Problem of Social Cost Revisited*, 15 J.L. & ECON. 427 (1972) (Neth.); see also ROBERT C. ELLICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* (1994).

⁸ Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972).

⁹ IAN AYRES, *OPTIONAL LAW: THE STRUCTURE OF LEGAL ENTITLEMENTS* 20 (2005) ("[W]hile contracts may serve as a fine paradigmatic example, the option approach is a powerful way to analyze any bilateral monopoly situation—that is any situation where there are two (or a small number of) people who 'are stuck with each other.'" (quoting Carol M. Rose, *The Shadow of the Cathedral*, 106 YALE L.J. 2175, 2183 (1997) ("Ayres and Talley are interested in situations in which two parties are stuck with each other, thin markets instead of 'thick' ones. Neighboring landowners seem to fit that bill.")).

ultimately emerge as a seller or a buyer.”¹⁰ In their view, “[t]his form of rational ambivalence . . . can lead the bargainers to represent their valuations more truthfully.”¹¹

As a case in point, a procedure called “Fair Buy-Sell,”¹² useful in cases of joint ownership, leaves uncertain which party will be the buyer and which the seller. Each party is thereby motivated to offer the other party a price that makes it indifferent between being the buyer and being the seller. Because the price is set at the mean of the two offers—with the party that offers more becoming the buyer and the party that offers less becoming the seller—each party does better than its offer and so profits from the transaction. Stergios Athanassoglou, Steven J. Brams, and Jay Sethuraman have shown that if the parties are equally endowed, each has an incentive to offer its truthful reservation price.¹³ Another approach to truthful revelation, as Ayres and Talley suggest, is to divide an entitlement by protecting the parties by liability rules, which has an “information-forcing quality . . . [that] can induce entitlement holders to signal credible information about their valuation.”¹⁴

The bulk of the law and economics literature responding to Ayres and Talley focused not on the question of inducing honest disclosure in bargaining, but rather on whether property rules or liability rules are more efficient in the asymmetric information setting. For example, Louis Kaplow and Steven Shavell argue that while total welfare is higher under a liability rule, welfare gains from bargaining are lower under a liability rule than a property rule.¹⁵ Ayres and Talley reply that litigation costs may still render liability rules more efficient.¹⁶ In a separate piece, Kaplow and Shavell argue that the choice between property and liability rules is indeterminate: “examples can be constructed in which either the liability rule is superior to property rules or the reverse is true.”¹⁷ Yet they conclude that a liability rule “tends to be superior” because “before any bargaining occurs . . . the liability rule is ahead of the property rules. . . . [A]fter imperfect bargaining occurs, the liability rule will remain ahead of the property rules, although not

¹⁰ Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade*, 104 YALE L.J. 1027, 1030 (1995).

¹¹ *Id.*

¹² For an informal description of fair buy-sell, see *Fair Buy-Sell*, FAIR OUTCOMES, INC., <http://www.fairoutcomes.com/fb.html> (last visited Sep. 24, 2012). Fair Outcomes, Inc. is a firm utilizing the patented fair buy-sell procedure to provide on-line dispute resolution and negotiation consulting services. For a formal academic analysis of fair buy-sell, see Stergios Athanassoglou, Steven J. Brams & Jay Sethuraman, *A Note on the Inefficiency of Bidding Over the Price of a Share*, 60 MATHEMATICAL SOC. SCI., 191 (2010); for a related mechanism applicable to dividing assets among players, see Peter Cramton, Robert Gibbons & Paul Klemperer, *Dissolving a Partnership Efficiently*, 55 ECONOMETRICA 615 (1987).

¹³ Athanassoglou, Brams & Sethuraman, *supra* note 12, at 191.

¹⁴ Ayres & Talley, *supra* note 10, at 1100.

¹⁵ Louis Kaplow & Steven Shavell, *Do Liability Rules Facilitate Bargaining? A Reply to Ayres and Talley*, 105 YALE L.J. 221, 227-29 (1995).

¹⁶ Ian Ayres & Eric Talley, *Distinguishing Between Consensual and Nonconsensual Advantages of Liability Rules*, 105 YALE L.J. 235, 249 (1995).

¹⁷ Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713, 735 (1996).

as far ahead.”¹⁸ These arguments led to a series of articles by other scholars considering the relative superiority of property and liability rules.¹⁹

In our view, however, a crucial aspect of the discussion has gone unnoticed. The scholarship thus far has considered the choice between property and liability rules against the backdrop of unstructured negotiation. There seems to be a shared assumption that the legal system faces a choice between two fundamental approaches: either compel the parties to engage in unstructured, free-for-all negotiation (property rule), or permit one party to force an involuntary “cashing out” of an entitlement on the other via the judicial process (liability rule). But there is a third option: compel the parties to negotiate in order to transfer the entitlement but restrict the *procedural* rules governing the negotiation. The right process just might eliminate the incentive to engage in costly strategic bargaining, reduce transaction costs, and thereby facilitate efficient trade.

Legal scholarship has yet to consider the question of whether procedural improvements can eliminate much of the transaction costs resulting from unstructured negotiation under asymmetric information. Interestingly, a substantial portion of the law deals with rules of procedure for judicial proceedings.²⁰ Many articles have suggested ways to improve speed and efficiency in the courtroom.²¹ Some authors have even considered the implications of different procedural rules in alternative dispute resolution.²² But the law and economics literature has yet to consider whether a type of contracting procedure could reduce the transaction costs lying at the heart of the Calabresi and Melamad framework and much of modern law and economics scholarship. As we explain *infra*, Ian Ayres’s recent article on altering rules comes closest—indeed, in our view, bargaining procedures constitute a type of altering rule—but the question of which procedures are most appropriate in different situations has been largely unaddressed.

But there is a voluminous body of literature, both theoretical and empirical, that is specifically dedicated to evaluating which types of procedures efficiently facilitate optimal agreement in bilateral trade bargaining under asymmetric information.²³ Interestingly, the law and economics literature has considered similar ideas when evaluating the “incomplete contracting” field. Incomplete contracting scholarship develops formal models for designing effective *ex ante* procedures within contractual

¹⁸ *Id.*

¹⁹ *E.g.*, Richard A. Epstein, *A Clear View of The Cathedral: The Dominance of Property Rules*, 106 YALE L.J. 2091, 2104-05 (1997); Carol M. Rose, *The Shadow of the Cathedral*, 106 YALE L.J. 2175 (1997);

²⁰ These include the federal rules of civil and criminal procedure and their corresponding state analogues.

²¹ *E.g.*, Patrick E. Longan, *The Shot Clock Comes to Trial: Time Limits for Federal Civil Trials*, 35 ARIZ. L. REV. 663 (1993); John Burritt McArthur, *The Strange Case of American Civil Procedure and the Missing Uniform Discovery Time Limits*, 24 HOFSTRA L. REV. 865 (1996); Carrie E. Johnson, Comment, *Rocket Dockets: Reducing Delay in Federal Civil Litigation*, 85 CAL. L. REV. 225 (1997).

²² *E.g.*, Benjamin Aaron, *Some Procedural Problems in Arbitration*, 10 VAND. L. REV. 733 (1957); Steven J. Brams & Samuel Merrill, III, *Binding Versus Final-Offer Arbitration: A Combination Is Best*, 32 MGMT. SCI. 1346 (1986); Dao-Zhi Zeng, Shinya Nakamura & Toshihide Ibaraki, *Double-offer Arbitration*, 31 MATHEMATICAL SOC. SCI. 147 (1996); Ellen E. Deason, *Procedural Rules for Complementary Systems of Litigation and Mediation — Worldwide*, 80 NOTRE DAME L. REV. 553, 562–565 (2005); Katherine Stone, *Procedural Justice in the Boundaryless Workplace: The Tension Between Due Process and Public Policy*, 80 NOTRE DAME L. REV. 501 (2005).

²³ See *infra* Section III.A.

terms to ensure efficient performance.²⁴ Price terms, for example, might be intentionally omitted from the contract, replaced by a procedure for determining the price in real time.

This slightly differs from our notion of a bargaining mechanism. We ask whether regulators should institute mandatory procedures for the sake of reducing transaction costs and improving social welfare, not whether parties would find it optimal to agree to use a procedure on their own initiative. Interestingly, the incomplete contracting literature has been criticized for failing to reflect actual contracting and for assuming that people have unrealistic cognitive abilities.²⁵ Of course, current practice does not resolve the normative question of whether bargaining procedures would be more efficient than fixed terms.²⁶ More fundamentally, even if cognitive limitations are implied by the empirical underutilization of bargaining procedures, this merely suggests that the law should not force contracting parties to invent such procedures in an ad hoc manner but, instead, should offer a repertoire of procedures from which the parties can choose the one best suited to resolving the dispute they face.

We show later that regulators can establish simple, easy-to-follow bargaining procedures for situations in which unstructured negotiation would likely lead to inefficiently high transaction costs. Since neither set of procedures involves long chains of reasoning, concerns with citizens' ability to engage in backward induction are misplaced. Indeed, the reason why parties will be truthful about their reservation prices is intuitive, even if a mathematical argument is needed to prove this rigorously. By contrast,

²⁴ See, e.g., PATRICK BOLTON & MATHIAS DEWATRIPONT, *CONTRACT THEORY* (2005); OLIVER D. HART, FIRMS, CONTRACTS, AND FINANCIAL STRUCTURES 34 (1995); Oliver Hart & John Moore, *Incomplete Contracts and Renegotiation*, 56 *ECONOMETRICA* 755 (1988); Ilya Segal, *Complexity and Renegotiation: A Foundation for Incomplete Contracts*, 66 *REV. ECON. STUD.* 57, 72-73 (1999).

²⁵ See Eric A. Posner, *Economic Analysis of Contract Law After Three Decades: Success or Failure?*, 112 *YALE L.J.* 829, 859 (2003) (citing Karen Eggleston, Eric A. Posner & Richard Zeckhauser, *The Design and Interpretation of Contracts: Why Complexity Matters*, 95 *NW. U. L. REV.* 91, 122-25 (2000)). See also George J. Mailath, *Do People Play Nash Equilibrium? Lessons from Evolutionary Game Theory*, 36 *J. ECON. LIT.* 1347 (1998) ("The contracts that the models predict do not exist in the world. Instead, we see simple fixed price contracts or contracts that are conditional on a relatively small number of real world contingencies. Intuitively, the problem with the predicted contracts is that they are too complex for parties to design. To write such contracts, parties would need to imagine their bargaining position if a breach should occur, and then work their way via backward induction to the optimal terms of the contract. People are not very good at backward induction."). But see George S. Geis, *Automating Contract Law*, 83 *N.Y.U. L. REV.* 450, 489 (2008) ("I suspect that [empirical analysis of historical contracts], while complicated, would reveal some areas where parties have restructured their contracts in procedural terms."). However, Geis subsequently observes: "Yet even a quick glance through CORI or other contract databases suggests that many agreements do indeed lack the sort of procedural bargaining mechanisms prescribed in the incomplete contracting literature. They are simple fixed price deals, or they focus more on substantive contingencies." *Id.* at 489. Geis has advanced ideas similar to ours by suggesting the automated analysis of historical contracts, see *id.*, and proposing that parties incorporate procedural mechanisms into contracts to facilitate optimal substantive outcomes. See George S. Geis, *Internal Poison Pills*, 84 *N.Y.U. L. REV.* 1169, 1209 (2009). Unlike Geis, we argue for the regulatory imposition of mechanisms to advance social goals. See discussion *infra* Section II.C.

²⁶ See Ian Ayres, *Valuing Modern Contract Scholarship*, 112 *YALE L.J.* 881, 881 (2003) ("[T]he thought that efficiency analysis would provide a mechanism to predict the details of current doctrine is a serious misreading of the aims of modern scholarship."); see also Richard Craswell, *In That Case, What Is the Question? Economics and the Demands of Contract Theory*, 112 *YALE L.J.* 903 (2003) (supplying a general critique of Posner's argument).

the opportunity cost of informal bargaining may be arduous and prolonged negotiation; if negotiation fails, a dispute may end up in costly litigation. Regulators would seem well-suited to institute mandatory procedures, possibly embodied in a web site, that enjoy a greater level of public trust than those operated by private entities.²⁷

The mandatory nature of bargaining procedures is justified under the two traditional rationales for mandatory rules in contract law: paternalism and externalities.²⁸ At one level, these procedures protect “parties within the contract”²⁹ by mitigating transaction costs: parties cannot be trusted with unstructured negotiation because, in the presence of asymmetric information, they have a natural incentive to distort their offers, which may prevent their reaching a mutually satisfactory agreement.³⁰ A bargaining procedure thus promotes efficiency by restricting the method by which negotiation can be conducted in order to advance what the parties would have wanted in the absence of transaction costs—a bargain that maximizes their respective utilities. At another level, bargaining procedures protect “parties outside the contract”³¹ by constraining negotiation to ameliorate the social externalities of non-agreement and providing additional regulatory benefits, such as obtaining accurate information about reservation prices. Bargaining mechanisms are thus justified as mandatory constraints on parties’ contractual freedom when they not only benefit the parties themselves but also minimize social costs, e.g., the costs imposed on the public by a strike if the parties cannot reach an agreement.

Despite their mandatory nature, however, bargaining procedures differ fundamentally from traditional mandatory rules, because they do not replace the negotiation of efficient substantive terms between the parties. Indeed, a bargaining rule merely prescribes the process by which an agreement is to be reached. Accordingly, it is best understood as an altering rule—albeit a mandatory altering rule—as we explain in the next Section.

B. Negotiation Mechanisms as Procedural Altering Rules

In this Section, we suggest that the bargaining procedures—*negotiation mechanisms* in our terminology³²—can be understood under traditional contract theory as structured altering rules. As Ian Ayres explains in his recent article, altering rules are “the necessary and sufficient conditions for displacing a default legal treatment with some particular other legal treatment.”³³ A classic example of altering rules in contract law is

²⁷ That said, as noted *supra* note 7, at least one commercial website, FAIR OUTCOMES, INC., does not charge for the use of one of its patented procedures and escrow services (“Fair Buy-Sell”), which we alluded to earlier as an example of a procedure in which a party does not know whether it will be the buyer or the seller.

²⁸ See Ian Ayres & Robert Gertner, *Filling Gaps in Incomplete Contracts: An Economic Theory of Default Rules*, 99 YALE L.J. 87, 88-89 (1989) (“[I]mmutable rules are justifiable if society wants to protect (1) parties within the contract, or (2) parties outside the contract. The former justification turns on paternalism; the latter on externalities.” (footnote omitted)).

²⁹ *Id.* at 88.

³⁰ See Davey, *supra* note 5.

³¹ Ayres & Gertner, *supra* note 28, at 88.

³² See discussion *infra* Section II.C for a discussion of the field of mechanism design.

³³ Ian Ayres, *Regulating Opt-Out: An Economic Theory of Altering Rules*, 121 YALE L.J. 2032, 2036 (2012).

the U.C.C. requirement that a disclaimer of the warranty of merchantability must mention “merchantability” to be effective.³⁴ Altering rules thus specify the procedural conditions under which agreement regarding contractual terms will be effective. Viewed in this light, bargaining procedures are simply a highly structured type of altering rule. The default substantive allocation of rights may be displaced by agreement between the contracting parties if and only if they comply with the specified procedure.

One might quibble with our characterization of bargaining procedures as altering rules because we are advocating the application of mechanisms to contract formation and not simply the displacement of defaults for specific terms once agreement has been reached. Yet we see little substance in this distinction. Terms of a contract that are essential to agreement are no less subject to default rules than non-essential terms. By making agreement on such terms necessary for contract formation, the default rule is simply a condition that altering the term is a necessary prerequisite to a binding agreement. Our proposal follows the line of reasoning implied in Ayres’s suggestion to mandate disclosure of information concerning markups and comparable sales if contractors wish to displace the default rule that a price must be reasonable.³⁵ Presumably, any attempt to agree on a non-reasonable price without such disclosure would be ineffective, leading the price term to revert to the reasonable price default. We simply propose taking this one step further by conditioning the very formation of a contract upon compliance with an altering rule that formalizes the bargaining procedure. Doctrinally, this would mean replacing the reasonable price default rule with no substantive default and a condition that agreement on price must be reached, as is currently the case with the quantity term.³⁶ The altering rule for these terms would then consist of the execution of a bargaining procedure.

Another analogy in Ayres’s article further illuminates the role of bargaining procedures as effective altering rules: the use of software confirmations to ensure that users give sufficient thought to their actions.³⁷ Ayres discusses a “two-click altering rule” of clicking on an attachment and clicking on a button in a confirmation window in Microsoft Outlook to displace the default rule that attachments do not open upon opening an e-mail message.³⁸ He rightly points out that this altering rule is itself a default, which can be “altered” by checking a box in the confirmation window.³⁹

We propose to focus on the *procedural* content of this altering rule for opening e-mail attachments. Clicking on the attachment is just one possible process for altering the non-opening default. While the check box second-order altering rule reduces the first-order altering rule from two clicks to one, this still may not be the most efficient method of opening attachments. One could think of numerous alternative mechanisms, from opening documents “in place,” within the e-mail message, to automatically downloading attachments to a folder on the computer. Our point is that the mechanism itself matters.

³⁴ [U.C.C. § 2-316 \(1977\)](#).

³⁵ *Id.* at 2107.

³⁶ For more discussion on quantity v. price defaults, see Ayres & Gertner, *supra* note 8, at 95-97.

³⁷ Ayres, *Regulating Opt-Out*, *supra* note 33, at 2040-41, 2063-66, 2068-69.

³⁸ *Id.* at 2040.

³⁹ *Id.*

In the context of bargaining under bilateral monopoly with asymmetric information, bargaining theory has shown that certain procedures can minimize transaction costs and reduce social externalities by giving parties natural incentives to honestly disclose reservation prices. We suggest that policymakers should look to these mechanisms as a regulatory means of prescribing more efficient and socially beneficial altering rules.

Indeed, Ayres acknowledges that altering rules can reduce transaction costs and promote external social goals such as enhancing competition.⁴⁰ As we mentioned earlier, his proposal for an altering rule that conditions displacement of a “reasonable price” default on certain types of disclosure is a good example.⁴¹ Mechanisms are closest to this type of altering rule because they impede contractual freedom to reduce the transaction costs inherent in unstructured negotiations as well as promote socially beneficial goals, such as truthful disclosure of reservation prices.⁴²

Unlike traditional mandatory rules, mechanisms do not suffer from the inefficiency of pooling all contractors at identical, predetermined terms. One of the chief advantages of altering rules is that they can induce efficient separating equilibria.⁴³ Mechanisms permit parties more efficiently to contract for optimal outcomes, maximizing their utility by setting their own contracting terms. They operate by *structuring* incentives within the negotiation process, not eliminating them. Mechanisms are rules of bargaining, and as such they still permit contractors to realize the benefit of their bargain (e.g., the economic value obtained by agreement, which they might not reach on their own).

Our mechanisms offer an additional advantage beyond preserving individual efficiency: they provide an effective platform to regulate microeconomic transactions that may have detrimental macroeconomic outcomes. In the financial regulatory context, Ian Ayres and Joshua Mitts recently pointed out the potential for increased systemic risk with excessive clustering of home mortgages at low levels of equity.⁴⁴ This reflects a more general problem where individually rational microeconomic decisions contribute to macroeconomic risk by leading to excessive pooling equilibria.⁴⁵

In these situations, regulation can reduce systemic risk by inducing contractors to choose beneficial separating equilibria. Mechanisms are particularly suited for this task, because the parties’ freedom of contract is already constrained by the bargaining

⁴⁰ See *Id.* at 2103.

⁴¹ See *Id.* at 2107.

⁴² In *Regulating Opt-Out*, Professor Ayres mentions a prior proposal he developed with Barry Nalebuff to impose a mechanism-like altering rule for credit card issuers wishing to unilaterally raise a cardholder’s interest rates. The card issuer must first “put the existing account balance up for auction on a LendingTree-like service that would allow other credit card issuers to bid for a chance to issue a new card and take over the existing balance.” *Id.* at 2108 (quoting Ian Ayres & Barry Nalebuff, *A Market Test for Credit Cards*, FORBES, July 13, 2009, at 96, available at <http://www.forbes.com/forbes/2009/0713/opinions-market-credit-cards-why-not.html>). Such an altering rule is similar to the type of mechanisms we envision, but our approach alters incentives in a more fundamental way: it induces the parties to reveal their reservation prices, or bottom lines, which are private information.

⁴³ See Ayres, *Regulating Opt-Out*, *supra* note 33, at 2091.

⁴⁴ See Ian Ayres & Joshua Mitts, *Three Proposals for Regulating the Distribution of Home Equity*, YALE J. ON REG. (forthcoming Feb. 2014) (manuscript at 13–20), available at <http://ssrn.com/abstract=2161545>.

⁴⁵ *Id.* at 48.

procedure. If, for example, as Ayres and Mitts propose, the law should impose a system of leverage licensing to enable regulators to directly control the distribution of home equity,⁴⁶ such licenses could be implemented more easily and cheaply if actors were already utilizing a structured mechanism to reach agreement. The mechanism would serve as a natural enforcement device by simply preventing agreement at unlicensed terms.

As we explain fully in Section IV.B *infra*, the power of mechanistic altering rules is particularly evident when applied to the recent controversy over blockholder disclosure. While any altering rule permitting private ordering would be more efficient than the current ten-day mandatory rule, a mechanism could also induce the honest disclosure of reservation prices. This would bring independent social benefits, such as assisting the S.E.C. in improving the mechanism (e.g., by increasing penalties for opportunistic bargaining conducted in bad faith) and other aspects of securities regulatory policy. Finally, a mechanism could induce hedge funds to separate at different equilibria to prevent the negative social externality of pooling at an identical lengthy waiting period.

C. What is Mechanism Design? A Review of the Literature

In this Section, we introduce the field of mechanism design, which provides a link between the conceptual notion of a bargaining procedure and specific theoretical and empirical research on structured procedures that give actors incentives to reach certain desired outcomes. Mechanism design is a vast, sophisticated field encompassing economics, political science, and computer science.⁴⁷ It is “the art of designing the rules of the game (a.k.a. mechanism) so that a desirable outcome (according to a given objective) is reached despite the fact that each agent acts in his own self-interest.”⁴⁸ In 2007, the Royal Swedish Academy of Sciences awarded the Nobel Prize in Economics to three scholars for “having laid the foundations of mechanism design theory,” which addresses “the optimal mechanism to reach a certain goal, such as social welfare or private profit” in “transactions [that] do not take place in open markets but within firms, in bargaining between individuals or interest groups and under a host of other institutional arrangements.”⁴⁹ Mechanism design, in the view of the Academy, “has greatly enhanced our understanding of the properties of optimal allocation mechanisms in

⁴⁶ See *id.* at 33-39.

⁴⁷ For an overview of mechanism design, see Eric S. Maskin, *Mechanism Design: How to Implement Social Goals*, 98 AM. ECON. REV. 567 (2008); Roger B. Myerson, *Perspectives on Mechanism Design in Economic Theory*, 98 AM. ECON. REV. 586, 586-87 (2008); Maskin, Myerson, and Leonid Hurwicz won the 2007 Nobel Prize in Economics. Recent books on mechanism design that reflect different approaches to the subject include Y. NARAHARI, DINESH GART, RAMASURI NARAYANAM & HASTAGIN PRAKASH, *GAME THEORETIC PROBLEMS IN NETWORK ECONOMICS AND MECHANISM DESIGN SOLUTIONS* (2009) and RAKESH V. VOOHRA, *MECHANISM DESIGN: A LINEAR PROGRAMMING APPROACH* (2011).

⁴⁸ Tuomas Sandholm, *Automated Mechanism Design: A New Application Area for Search Algorithms*, in *PRINCIPLES AND PRACTICE OF CONSTRAINT PROGRAMMING – CP 2003* 19, 19 (Francesca Rossi, ed. 2003).

⁴⁹ Press Release, Royal Swedish Academy of Sciences, The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2007 (Oct. 15, 2007), http://www.nobelprize.org/nobel_prizes/economics/laureates/2007/press.html.

such situations, accounting for individuals' incentives and private information.”⁵⁰ Five years later, in 2012, the Nobel Prize in Economics was awarded to two scholars for mechanism design of a different sort—finding “stable matching[s]” of “new doctors with hospitals, students with schools, and organ donors with patients.”⁵¹

Mechanism design arose out of the fundamental insight by Leonid Hurwicz that efficient outcomes could be obtained if procedures are designed to be *incentive-compatible*, giving parties an incentive to truthfully report their private information.⁵² Roger Myerson subsequently articulated the “revelation principle” in its most general form, which shows that “[g]iven any feasible auction mechanism, there exists an equivalent feasible direct revelation mechanism which gives to the seller and all bidders the same expected utilities as in the given mechanism.”⁵³ This insight led to substantial innovations in bargaining theory⁵⁴ and auction theory.⁵⁵ For example, scholars have used principles of mechanism design to propose many specialized forms of auctions, including combinatorial,⁵⁶ flexible double,⁵⁷ and simultaneous ascending auctions.⁵⁸

Mechanisms have been used in a wide range of political applications, including school choice and student assignment,⁵⁹ voting,⁶⁰ and the design of democratic political institutions.⁶¹ Mechanism design has recently even taken hold in the computer science

⁵⁰ *Id.*

⁵¹ Press Release, Royal Swedish Academic of Sciences, The Prize in Economic Sciences 2012 (Oct. 15, 2012), available at http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2012/press_02.pdf (last visited Aug. 27, 2013).

⁵² See Leonid Hurwicz, *On Informationally Decentralized Systems*, reprinted in *STUDIES IN RESOURCE ALLOCATION PROCESSES* 425, 430 (Kenneth J. Arrow, and Leonid Hurwicz, eds. 1977) (“It is therefore natural to seek a feature of the mechanism that would in some sense equalize the chances of the participants, regardless of their initial endowments.”). For an overview of the history of mechanism design, see generally Prize Comm., ROYAL SWEDISH ACAD. OF SCIS, SCIENTIFIC BACKGROUND ON THE SVERIGES RIKSBANK PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL 2007: MECHANISM DESIGN THEORY (2007), available at http://www.nobelprize.org/nobel_prizes/economics/laureates/2007/advanced-economicsciences2007.pdf.

⁵³ Roger Myerson, *Optimal Auction Design*, 6 *MATHEMATICS OF OPERATIONS RESEARCH* 58, 62 (1981). These conclusions built on Myerson’s earlier work. See Roger Myerson, *Incentive Compatibility and the Bargaining Problem*, 47 *ECONOMETRICA* 61 (1979).

⁵⁴ See discussion *infra* Section III.A.

⁵⁵ See generally Paul Milgrom, *PUTTING AUCTION THEORY TO WORK* 35, 37-38 (2004); Paul Klemperer, *Auction Theory: A Guide to the Literature*, 13 *J. ECON. SURVEYS* 227 (1999).

⁵⁶ See, e.g., Peter Cramton, Yoav Shoham & Richard Steinberg, *Introduction to Combinatorial Auctions*, in *COMBINATORIAL AUCTIONS* (Peter Cramton, Yoav Shoham, & Richard Steinberg, eds., 2006).

⁵⁷ See, e.g., Peter R. Wurman, William E. Walsh & Michael P. Wellman, *Flexible Double Auctions For Electronic Commerce: Theory and Implementation*, 24 *DECISION SUPPORT SYSTEMS* 17, 18 (1998).

⁵⁸ See, e.g., Paul Milgrom, *Putting Auction Theory To Work: The Simultaneous Ascending Auction*, 108 *J. POL. ECON.* 245, 246 (2000).

⁵⁹ E.g., Parag A. Pathak, *The Mechanism Design Approach to Student Assignment*, 3 *ANN. REV. ECON.* 513 (2011); Atila Abdulkadiroğlu & Tayfun Sönmez, *School Choice: A Mechanism Design Approach*, 93 *AM. ECON. REV.* 729note 3 (2003).

⁶⁰ E.g., STEVEN J. BRAMS, *MATHEMATICS AND DEMOCRACY: DESIGNING BETTER VOTING AND FAIR-DIVISION PROCEDURES* (2008); Jens Großer, *Voting Mechanism Design: Modeling Institutions in Experiments*, in *EXPERIMENTAL POLITICAL SCIENCE: PRINCIPLES AND PRACTICES* 72 (Bernhard Kittel, Wolfgang J. Luhan & Rebecca B. Morton, eds., 2012).

⁶¹ See Emmanuelle Auriol & Robert J. Gary-Bobo, *On Robust Constitution Design*, 62 *THEORY & DECISION* 241 (2007).

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literature, where it is known as “algorithmic mechanism design.”⁶² This research seeks to design algorithms “where the participants cannot be assumed to follow the algorithm but rather their own self-interest.”⁶³ Examples of applications of algorithmic mechanism design include preserving privacy,⁶⁴ real-time scheduling,⁶⁵ and even pricing wireless Internet access at Starbucks.⁶⁶ Algorithmic mechanism design is essentially a mirror image of our proposal: because computer-science applications cannot force actors to comply with the mechanism, algorithmic mechanism design focuses on designing procedures which achieve goals based on fulfilling actors’ self-interest. On the other hand, because the law can compel compliance, we argue for the mandatory imposition of mechanisms—but only when execution of the procedure would be in parties’ and society’s interests (i.e., when transaction costs are high and non-agreement imposes negative externalities).

While most of the mechanism design literature is theoretical in nature, there are an increasing number of empirical studies as well. For example, an experiment on house allocation mechanisms with seventy-eight subjects found that the theoretical advantages of the top-trading cycles mechanism over the random serial dictatorship with a squatting-rights mechanism held true in practice.⁶⁷ In the auction context, an experimental test of sealed-bid auctions with ambiguity showed that ambiguity leads to lower prices in first-price auctions, but first-price auctions enjoy higher revenue than second-price auctions regardless of whether ambiguity due to incomplete information is present.⁶⁸ Mechanisms are particularly suited to experimental testing because of their procedural nature, and experimental results can inform the design of effective mechanisms in practice.⁶⁹

Surprisingly, relatively little legal scholarship has addressed mechanism design, despite its having great potential to inform policymaking. A handful of articles have utilized mechanism design in a descriptive sense, i.e., to model existing legal rules. In particular, Eric Talley utilizes the theoretical advantages of mechanism design—namely,

⁶² E.g., Noam Nisan & Amir Ronen, *Algorithmic Mechanism Design*, 35 GAMES & ECON. BEHAV. 166 (2001). Nisan and Ronen’s paper has been highly influential, with over 1,100 citations as of Sept. 8, 2012 according to Google Scholar. For a general overview of algorithmic mechanism design, see NOAM NISAN ET AL., *ALGORITHMIC GAME THEORY* (2007).

⁶³ Nisan & Ronen, *supra* note 61, at 166.

⁶⁴ See generally Frank McSherry & Kunal Talwar, *Mechanism Design via Differential Privacy*, in 48TH ANNUAL IEEE SYMPOSIUM ON FOUNDATIONS OF COMPUTER SCIENCE 94 (2007).

⁶⁵ See generally Ryan Porter, *Mechanism Design for Online Real-Time Scheduling*, in EC ’04 PROCEEDINGS OF THE 5TH ACM CONFERENCE ON ELECTRONIC COMMERCE 61 (2004).

⁶⁶ See Eric J. Friedman & David C. Parkes, *Pricing WiFi at Starbucks: Issues in Online Mechanism Design*, in EC ’03 PROCEEDINGS OF THE 4TH ACM CONFERENCE ON ELECTRONIC COMMERCE 240 (2003).

⁶⁷ See generally Yan Chen & Tayfun Sonmez, *An Experimental Study of House Allocation Mechanisms*, 83 ECON. LETTERS 137 (2004). The theoretical advantages of the top trading cycles mechanism were proven in Atilla Abdulkadiroğlu & Tayfun Sönmez, *House Allocation with Existing Tenants*, 88 J. ECON. THEORY 233, 249 (1999).

⁶⁸ See Yan Chen, Peter Katsušćák & Emre Ozdenoren, *Sealed Bid Auctions With Ambiguity: Theory and Experiments*, 136 J. ECON. THEORY 513, 514 (2007).

⁶⁹ See Großer, *supra* note 59, at 72, 73-74 (“Game theory provides an effective toolbox for describing specific institutions and procedures, and revealing the players’ strategic incentives in these mechanisms. Its mathematical structure makes it relatively easy to test the games’ assumptions and predictions in experiments. In turn, laboratory results often inspire game theoretic modeling when unexpected behavior is observed, yielding more realistic assumptions about the players’ behavior . . . or their motives . . .”).

that the theory is applicable regardless of the precise bargaining game utilized by the parties—to demonstrate the efficiency of the liquidated damages penalty doctrine.⁷⁰ He shows that the penalty doctrine “reduces both parties’ incentives and abilities to engage in deceptive behavior during renegotiation, and it thereby mitigates the inefficiencies that usually accompany bilateral monopoly.”⁷¹

Despite the apparent similarities, Talley’s approach differs fundamentally from ours. Talley employs mechanism design theory—particularly the revelation principle⁷²—to model an existing legal rule and argue that his model demonstrates that the existing legal rule can reduce transaction costs.⁷³ Our claim, however, is normative: we are not justifying existing doctrine but suggesting the imposition of altering rules based on principles of mechanism design—namely, the use of structured procedures—to reduce transaction costs and social externalities. This distinction also sets our proposal apart from other legal literature utilizing mechanism design to model existing legal rules.⁷⁴

With one exception, we could not find any literature using game-theoretic principles of mechanism design in a normative sense, i.e., to suggest designing legal rules consisting of mechanistic procedures.⁷⁵ In a 2009 article, George S. Geis utilized mechanism design to propose an “internal poison pill” consisting of embedded options that place minority shareholders under a “veil of ignorance” in order to “elicit honest valuations.”⁷⁶ This proposal, however, does not argue for a new legal rule but rather for a “novel security,” which would constitute a “tool for finessing the dual hazards of majority expropriation and minority holdout.”⁷⁷ Nonetheless, Geis recognizes the appeal of a mechanism design approach in protecting entitlements:

⁷⁰ Eric L. Talley, *Contract Renegotiation, Mechanism Design, and the Liquidated Damages Rule*, 46 STAN. L. REV. 1195, 1220-1225 (1994).

⁷¹ *Id.* at 1198.

⁷² *See id.* at 1222-23.

⁷³ *See id.* at 1225-49.

⁷⁴ *See, e.g.*, Farrell, *supra* note 7, at 117-21 (describing the theoretical role of mechanism design in contractual settings); Jason Scott Johnson, *Default Rules/Mandatory Principles: A Game Theoretic Analysis of Good Faith and the Contract Modification Problem*, 3 S. CAL. INTERDISC. L.J. 335 (1993). Practice preceded theory in the case of final-offer arbitration—whereby an arbitrator cannot split the difference between the two final offers of each side but must choose one offer or the other—which is used to reach settlements in salary disputes in major league baseball and in some disputes between government agencies and their public-employee unions. While designed to induce the two sides to make offers that converge on a settlement, this is not the case in theory as well as practice. *See* Steven J. Brams & Samuel Merrill, III, *Equilibrium Strategies for Final-Offer Arbitration: There Is No Median Convergence*, 28 MANAGEMENT SCIENCE 927 (1983), and, at a less technical level, Steven J. Brams, D. Marc Kilgour & Samuel Merrill III, *Arbitration Procedures*, in NEGOTIATION ANALYSIS 47 (H. Peyton Young ed., 1991). Another example in which an empirical procedure (to match medical interns and residents with hospitals) was used before its theoretical properties were well understood is described in ALVIN E. ROTH & MARILDA A. OLIVEIRA SOTOMAYOR, TWO-SIDED MATCHING: A STUDY IN GAME-THEORETIC MODELING AND ANALYSIS 4-5 (1992).

⁷⁵ However, the arbitration and two-sided matching procedures described in the preceding footnote, though tried out empirically before they were analyzed theoretically, are certainly examples of procedures grounded in game theory. So are two arbitration procedures (cited earlier) that induce the two sides to reveal their reservation prices. *See* BRAMS & MERRILL, *supra* note 22; ZENG ET AL., *supra* note 22.

⁷⁶ George S. Geis, *Internal Poison Pills*, 84 N.Y.U. L. REV. 1169, 1209 (2009).

⁷⁷ *Id.* at 1221.

One of the more exciting developments in economic theory posits that incentive-molding rules can corral parties toward optimal social ends strictly by appealing to their rational self-interest. If these ideas can be put into practice, it may become possible for policymakers to craft intermediate legal entitlements—somewhere in between the property and liability rules of Calabresi and Melamed—that promote welfare-enhancing substantive outcomes at a streamlined administrative cost.⁷⁸

We echo this observation, for it lies at the heart of our proposal to institute mechanistic altering rules. Yet relatively little legal scholarship has engaged with the mechanism design literature in a normative, rule-setting sense. In the following Part, we present a theoretical proposal for incorporating mechanism design in the contractual setting.

III. APPLYING MECHANISM DESIGN TO CONTRACTUAL NEGOTIATIONS

This Part examines theoretical aspects of applying mechanism design to law. It begins by discussing the problem of inducing honesty in bargaining in light of the Chatterjee-Samuelson procedure and the problem of collusion in light of the Bonus Procedure, which does induce honesty, absent collusion. Section III.B discusses the Two-Stage Procedure, which is robust against collusion but slightly less efficient than the Chatterjee-Samuelson procedure. Finally, Section III.C considers issues related to the implementation of mechanism design in legal applications.

A. Truth-Telling and Collusion in Bargaining: The Chatterjee-Samuelson and Bonus Procedures

As Ayres and Talley show, a major source of transaction costs in bargaining is the incentive to misrepresent offer prices.⁷⁹ This so-called honesty-in-bargaining problem has been considered extensively in the bargaining literature. Beginning with the seminal works by John von Neumann and Oskar Morgenstern⁸⁰ and John F. Nash,⁸¹ economic and game-theoretic scholars have considered the circumstances under which bargaining will lead to different outcomes using cooperative game theory. The use of non-cooperative game theory to study bargaining was pioneered by Kalyan Chatterjee and William Samuelson, who asked what bargaining offers by a buyer and a seller would constitute an equilibrium in a game of incomplete information.⁸²

Their procedure consists of the sealed-bid submission of offers, b and s , by a buyer and a seller, respectively. If $b \geq s$, a transaction is consummated at a price equal to $kb + (1 - k)s$, where $0 \leq k \leq 1$. The Chatterjee-Samuelson procedure has been shown to be more efficient than any other procedure in maximizing the parties' expected profit in

⁷⁸ *Id.*

⁷⁹ Ayres & Talley, *supra* note 28, at 1030.

⁸⁰ JOHN VON NEUMANN AND OSKAR MORGENSTERN, *THEORY OF GAMES AND ECONOMIC BEHAVIOR* 15-31 (2d ed. 1944).

⁸¹ John F. Nash, Jr., *The Bargaining Problem*, 18 *ECONOMETRICA* 155 (1950).

⁸² Kalyan Chatterjee & William Samuelson, *Bargaining Under Incomplete Information*, 31 *OPERATIONS RES.* 835 (1983).

equilibrium.⁸³ However, the Chatterjee-Samuelson procedure has an infinite number of inefficient asymmetric equilibria as well.⁸⁴ More importantly, at all of these equilibria, the parties have a natural incentive to exaggerate their reservation prices, except when the prices are extreme, in order to maximize their expected profit.⁸⁵

Mechanisms to address the honesty-in-bargaining problem were proposed in a 1996 article by political scientist Steven J. Brams and mathematician D. Marc Kilgour⁸⁶ and in a 2012 article by Steven J. Brams, D. Marc Kilgour, and economist Todd R. Kaplan.⁸⁷ Of course, these are not the only mechanisms found in the literature, but they are particularly relevant here because they give the parties a *weakly dominant strategy*—at least as good and sometimes better than any other strategy—of honestly revealing their reservation prices, though these prices are not necessarily those used in the settlement that occurs (for reasons to be discussed later). By utilizing these mechanisms, the law can ensure that when there is not a settlement, it will be known whether one is possible, even though it may not be revealed to the parties themselves.

As we discuss further in Section III.C, the accurate disclosure of reservation prices can serve valuable social goals. The incentive structure induced by these mechanisms makes such honest disclosure in the parties' best interests, independent of the behavior of an opponent (because truthful revelation is a weakly dominant strategy, which we will say more about later).

Brams and Kilgour present the Bonus Procedure as a solution to the honesty problem in single-offer bargaining.⁸⁸ The latter is epitomized by the procedure of Chatterjee and Samuelson (1983), which, as noted earlier, Roger B. Myerson and Mark A. Satterthwaite showed leads to a greater expected profit in equilibrium than any other

⁸³ Roger B. Myerson & Mark A. Satterthwaite, *Efficient Mechanisms for Bilateral Trading*, 29 J. ECON. THEORY 265 (1983).

⁸⁴ See W. Leininger, P. B. Linhart & R. Radner, *Equilibria of the Sealed-Bid Mechanism for Bargaining With Incomplete Information*, 48 J. ECON. THEORY 63, 66 (1989).

⁸⁵ For a detailed explanation of the incentive to make dishonest offers in the Chatterjee-Samuelson procedure, and of how some of the bargaining procedures to be discussed can reveal true reservation prices if not induce truthful offers, see STEVEN J. BRAMS, *NEGOTIATION GAMES: APPLYING GAME THEORY TO BARGAINING AND ARBITRATION* 34-38 (rev. ed.2003). Note that Vickery-Clarke-Groves (VCR) mechanisms also induce honest disclosure of reservation prices, but they are not ex post budget-balanced and individually rational. The original work of these researchers is given in Theodore Groves, *Incentives in Teams*, 41 ECONOMETRICA 617 (1973); Edward H. Clarke, *Multipart Pricing of Public Goods*, 11 PUBLIC CHOICE 17 (1971); William Vickrey, *Counterspeculation, Auctions, and Competitive Sealed Tenders*, 16 J. FIN. 8 (1961).

⁸⁶ Steven J. Brams & D. Marc Kilgour, *Bargaining Procedures that Induce Honesty*, 5 GROUP DECISION & NEGOTIATION 239 (1996).

⁸⁷ Steven J. Brams, Todd R. Kaplan & D. Marc Kilgour, *A Simple Bargaining Mechanism That Elicits Truthful Reservation Prices* (Feb. 2012) (unpublished manuscript), available at http://politics.as.nyu.edu/docs/IO/2578/Bargainin_Feb_2012.pdf. Another procedure to encourage “reasonable settlement offers” is described in Robert H. Gertner & Geoffrey P. Miller, *Settlement Escrows*, 24 J. LEGAL STUD. 87 (1995), but it does not render honesty a weakly dominant strategy in the way that the bargaining procedures we analyze later do.

⁸⁸ In legal applications, bargaining will often be a single offer in practice. Even if there are multiple offers, this procedure would be effective for each offer. In the “thin” two-person markets that are the subject of this analysis, structured negotiations help to capture the efficiency usually found only when there is competition among many players in large markets.

bargaining mechanism.⁸⁹ Generally speaking, however, it induces the parties to shade their offers (for the buyer, downward from its reservation price unless it is already low; for the seller, upward from its reservation price unless it is already high—details to follow) to try to ensure as favorable a settlement as possible.

More precisely, under the Chatterjee-Samuels procedure, a transaction occurs at a price equal to the mean of the buyer and the seller's offers if they overlap (i.e., $b \geq s$). However, the Chatterjee-Samuels procedure generally leads buyers and sellers to exaggerate their reservation prices, denoted by B and S , respectively.

Assume that the parties' reservation prices are independent and uniformly distributed over $[0,1]$. Then there is a linear symmetric Nash equilibrium in which the buyer will offer⁹⁰

$$b = \begin{cases} B & \text{if } 0 \leq B \leq 1/4 \\ (2/3)B + 1/12 & \text{if } 1/4 < B \leq 1 \end{cases}$$

and the seller will offer

$$s = \begin{cases} (2/3)S + 1/4 & \text{if } 0 \leq S < 3/4 \\ S & \text{if } 3/4 \leq S \leq 1 \end{cases}$$

The Chatterjee-Samuels procedure thus encourages both parties to exaggerate their reservation prices, except when $B \leq 1/4$ or $S \geq 3/4$, in which case one party truthfully reports its reservation price. But in these cases, there will be no settlement, because even though the buyer will be honest if its price is not greater than $1/4$, and the seller will be honest if its price is at least $3/4$, the other party won't be honest in this circumstance, precluding all settlements except in the intermediate range, $B > 1/4$ and $S < 3/4$, given $B \geq S$.

In fact, B must exceed S by at least $1/4$ in order for there to be a settlement. While other distributions lead to different exaggerated offers, the buyer generally benefits from understating B , and the seller from overstating S , when the parties make equilibrium offers, b and s , respectively.

Is there an antidote to exaggeration and posturing? The Bonus Procedure solves the honesty problem by paying a bonus to the buyer and seller when their offers overlap (i.e., $b \geq s$) and they settle at the mean of their offers, $m = (b + s)/2$.⁹¹ Brams and Kilgour prove that in a game of incomplete information in which the buyer does not know the seller's reservation price but believes it to be distributed according to some probability density function (not necessarily the uniform density function, which we assumed for the Chatterjee-Samuels procedure earlier), the parties' dominant strategies, which we star, are to bid $b^* = B$ and $s^* = S$ (i.e., to be truthful) if the bonus given to each party is half the difference between their offers, $(b^* - s^*)/2 = (B - S)/2$.

Assume $B \geq S$. Then the buyer's expected profit with such a bonus will be

⁸⁹ Myerson & Satterthwaite, *supra* note 82, at 266.

⁹⁰ This analysis also assumes that the players believe each other's reservation price to be so distributed.

⁹¹ See Brams & Kilgour, *supra* note 87, at 239.

$$P_B(B,S) = B - m + (B - S)/2 = B - S$$

because $m = (B + S)/2$. Similarly, the seller's expected profit will be

$$P_S(B,S) = m - S + (B - S)/2 = B - S$$

If and only if $B < S$ will there be no settlement, resulting in a profit of 0.

Notice that the parties benefit equally when their reservation prices overlap, each receiving an expected profit of $B - S$. Because bidding one's reservation price is optimal whatever the other party does, these strategies constitute a dominant-strategy Nash equilibrium. (However, it is *weakly* dominant, because it may not always give a better outcome than any other strategy but, instead, one that is at least as good and in at least one instance better.)

Brams and Kilgour explain why it is optimal for the buyer to bid its reservation price for any offer s of the seller:⁹²

The optimality of $b = B$. . . is not difficult to understand intuitively. The buyer gains $B - s$ when there is an exchange, and 0 when there is not. Obviously, the buyer would prefer an exchange [if and only if] $B > s$. By picking $b < B$, the buyer gains $B - s$ when $s \leq b < B$, but misses out on some profitable exchanges when $b < s < B$. On the other hand, if $B > b$, the buyer effects every profitable exchange (when $s < B$), but these also include some of negative value (when $B < s < b$). Thus, moving b away from B in either direction costs the buyer, so $b = B$ is optimal.⁹³

A similar argument shows why the seller will not deviate from being truthful and bid $s = S$.

Paying a bonus equal to half the difference between the buyer and seller's offers if they settle alters the parties' incentives such that dishonesty becomes suboptimal. Specifically, were the buyer to make an offer different from his or her reservation price, he or she would either fail to make a purchase or make a suboptimal purchase (i.e., by paying a price above his or her reservation price).

The Bonus Procedure structures the bargaining incentives so that it is in the parties' interest to bid their honest reservation prices. Inducing such honesty, however, necessitates paying the bonus. This cost could fall on a regulatory agency, as discussed further in Part IV *infra*. To obviate budget concerns, Brams and Kilgour show that a tax can be assessed to recoup the cost of paying the bonus. This tax must be assessed prior to bargaining but remains lower than the two sides' combined expected profit. We discuss such a taxing mechanism to render the Bonus Procedure budget-balanced in Subsection III.C.1.

As Brams and Kilgour acknowledge, a drawback of the Bonus Procedure is that it is vulnerable to collusion, whereby the parties increase the size of the bonus they receive

⁹² We substitute our notation for the buyer's and seller's offers and reservation prices, and correct one inequality, in this quotation.

⁹³ Brams & Kilgour, *supra* note 87, at 244.

by submitting offers farther apart than their reservation prices ($b - s > B - S$), resulting in their receiving a bigger bonus. However, as Brams and Kilgour show, a “collusion equilibrium” is highly unstable, because a party has no incentive to select a collusion strategy given that the other party has chosen its collusion strategy. To be sure, legal penalties could be imposed to raise the cost of collusion, at least on an expected-value basis, but collusion may not be easy to detect.

The Two-Stage Procedure that we discuss next may be preferable if the legal regime in question is particularly concerned with the possibility of collusion. But such robustness comes at a price, because the Two-Stage Procedure is not as efficient as the Bonus Procedure since not all profitable settlements are implemented.

B. The Two-Stage Procedure: Overview, Visualization, and Implementation

1. Overview of the Mechanism

The Two-Stage Procedure proposed in Brams, Kaplan, and Kilgour (2012) is another mechanism that makes the honest disclosure of reservation prices a weakly dominant strategy.⁹⁴ The mechanism is conducted with the assistance of a referee, which in the legal setting might be a computer program operated by a regulatory agency.

In stage 1 of the mechanism, the buyer and seller submit their reserve prices, and \hat{S} , to a referee, which may not be their truthful reservation prices. However, Brams, Kaplan, and Kilgour prove that the players have weakly dominant strategies of being truthful under the Two-Stage Procedure, so we henceforth presume these prices are the parties’ true reservation prices, B and S . If $B < S$, then the buyer is unwilling to pay as much as the seller is asking, so there is no settlement and the procedure ends.

If $B \geq S$, on the other hand, then there is the *possibility* of a settlement, and we proceed to stage 2. In stage 2, the buyer and seller submit to the referee their offers, b and s , respectively. If both offers are within the reservation price window $[S, B]$ —that is, both are at least equal to S and do not exceed B —a transaction is consummated at the mean of the offers, $m = (s + b)/2$. If only one offer is in this window, the referee picks one of the two parties at random. If the chosen party’s offer is the one in the window, a settlement occurs at that offer (b or s). Otherwise, there is no settlement.

As with the Chatterjee-Samuelson procedure and the Bonus Procedure, we assume under the Two-Stage Procedure that each party knows its own reservation price and believes that the other party’s reservation price is distributed over some interval, which we suppose to be $[0, 1]$. In the case of the Chatterjee-Samuelson procedure, we assumed the distribution to be uniform, making it equally likely that the other party’s reservation price is at any point in $[0, 1]$. If we make the same assumption for the Two-Stage Procedure, then the optimal offers of the buyer and seller in stage 2, which we star, are as follows:

⁹⁴ Brams, Kaplan & Kilgour, *supra* note 86, at *5-*11. We will briefly discuss a third honesty-inducing mechanism later.

$$b^* = \frac{B}{2}; \quad s^* = \frac{1-S}{2}$$

These choices in stage 2, together with each party's truthful revelation of its reservation price, B or S , in stage 1, constitute the Nash-equilibrium strategies of the players under the Two-Stage procedure.

By (truthfully) choosing B and S in stage 1, the parties maximize the width of the interval, $[S, B]$, if any, in which a settlement occurs (at m , b , or s) without either party's incurring a loss. But it is in stage 2, when $B \geq S$, that the parties maximize their expected profit

- by the buyer's selecting b so as to shade downward its reservation price (from B to $B/2$) by choosing the midpoint of the interval, $[0, B]$, in which S can fall; and
- by the seller's selecting s so as to shade upward its reservation price (from S to $(1 + S)/2$) by choosing the midpoint of the interval, $[S, 1]$, in which B can fall.

Unlike the Chatterjee-Samuelson procedure, the offers need not overlap (i.e., $b \geq s$) in stage 2, but one or both must fall in $[S, B]$. The exaggeration of the reservation prices that occurs at stage 2—when the players report b^* and s^* —“affords” the parties the opportunity to be honest at stage 1 by truthfully reporting B and S .

The Two-Stage Procedure can be modified in various ways without affecting its honesty-inducing nature. First, the order of the stages can be reversed or even implemented simultaneously.⁹⁵ The Two-Stage Procedure may be combined with the Chatterjee-Samuelson procedure to improve the efficiency of the mechanism but reduce the gains from truth-telling.⁹⁶ From an implementation perspective, the referee, after receiving the reservation price of one party, can initiate the use of the procedure by disclosing to the other party that it received such information and asking for a response. We discuss initiation of the procedure by a government regulator in the context of enforcement and its mandatory use in Part IV.

Perhaps the most compelling property of the Two-Stage Procedure is the incentive it gives the parties to reveal their reservation prices honestly in stage 1, regardless of whether an agreement is reached in stage 2. Indeed, the mere use of the mechanism over time can provide valuable information to regulators or other actors in the legal system regarding the distribution of reservation prices and the reason why a settlement was or was not reached. For example, learning how many agreements failed in stage 1 (i.e., because there was no overlap in reservation prices) as opposed to stage 2, in which one or both parties' offers did not fall within the reservation price window, can shed light on whether reservation prices (in stage 1) or offers (in stage 2) more frequently lead to bargaining failures.

It is worth noting that the most efficient of the three procedures we have discussed so far is the Bonus Procedure, which leads to a settlement whenever $B \geq S$ and so captures the maximum possible expected profit of $1/6$ 0.167 when the parties' reservation

⁹⁵ *Id.* at *15.

⁹⁶ *Id.* at *15-*16.

prices are uniformly distributed over $[0,1]$. (Later we show how this figure is obtained.) Its drawbacks are that a third party must pay each of the bargainers a bonus and that it is vulnerable to collusion. The next most efficient is the Chatterjee-Samuelson procedure, which provides an expected profit of $9/64 = 0.141$ but is not honesty-inducing. Finally, the Two-Stage Procedure provides an expected profit of $1/8 = 0.125$ which makes it $(1/8)/(9/64) = 8/9 \approx 0.89$, or almost 90 percent as efficient as the Chatterjee-Samuelson procedure and, like the Bonus Procedure, honesty-inducing.⁹⁷

We next show how the Two-Stage Procedure can be made more transparent to the parties via a visualization of the different possible outcomes that can occur under it. We then discuss questions of implementation and possible extensions of this procedure. Later, in Subsection III.C.2, we describe more fully how regulatory policy can benefit from obtaining accurate information on reservation prices, where we also describe how the parties might “transcend” the limitations of the procedure.

2. Visualization

Because the Two-Stage Procedure is not as straightforward as the Chatterjee-Samuelson procedure or the Bonus Procedure, it is helpful to illustrate the conditions under which a settlement is or is not reached:

Stage 1. The buyer and seller submit their *reservation prices*, B and S , to a referee. If these prices do not overlap (i.e., $B < S$), there is no settlement, and the procedure ends:

0 _____ B _____ S _____ 1

If $B \geq S$, there is an *overlap interval*, $[S,B]$, and the procedure goes to stage 2:

0 _____ S _____ B _____ 1

Stage 2. The buyer and seller submit their *offers*, b and s , to the referee, which can produce a settlement in three different ways:

(i) If both b and s fall in the overlap interval, whether they do not crisscross because $s > b$ (first diagram) or do because $b > s$ (second diagram), the settlement price is the mean $m = (b + s)/2$:

0 _____ S _____ b _____ m _____ s _____ B _____ 1

⁹⁷ See Brams, Kaplan & Kilgour, *supra* note 86, at *14. Another honesty-inducing procedure, called the “Penalty Procedure,” makes the probability of implementing a settlement, given $B \geq S$, to be a function of the amount of overlap of B and S (i.e., $B - S$), but its expected profit is only $1/12 = 0.083$, which makes it $(1/12)/(9/64) = 16/27 \approx 0.59$, or less than 60 percent, as efficient as the Chatterjee-Samuelson procedure. See Brams & Kilgour, *supra* note 87, at 248. For a more detailed comparison of the three procedures, see D. Marc Kilgour, Steven J. Brams & Todd R. Kaplan, *Three Procedures for Inducing Honesty in Bargaining*, PROCEEDINGS OF THE 13TH CONFERENCE OF THEORETICAL ASPECTS OF RATIONALITY 170 (2011).

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$$0 \quad S \quad s \quad m \quad b \quad B \quad 1$$

(ii) If only b is in the overlap interval, then the settlement price is b with probability $\frac{1}{2}$:

$$0 \quad S \quad b \quad B \quad s \quad 1$$

(iii) If only s is in the overlap interval, then the settlement price is s with probability $\frac{1}{2}$:

$$0 \quad b \quad S \quad s \quad B \quad 1$$

In both cases (ii) and (iii), there is no settlement with probability $\frac{1}{2}$, even though one party's offer is inside the overlap interval (the mean of the parties' offers, m , may or may not be inside). In addition, there is no settlement with certainty if both b and s fall outside the overlap interval, even though m may fall inside (not shown).

As indicated earlier, Brams, Kaplan, and Kilgour (2012) prove that this mechanism renders it optimal for the parties to be truthful about their reservation prices, B and S , in stage 1, independent of their beliefs about the other party's reservation price. However, the parties' optimal offers, b and s , in stage 2 do depend on these beliefs (defined by a probability distribution over the other party's reservation price) and do not simply duplicate B and S .

In fact, because one or both of b and s are used in the settlement price, the bargainers have an obvious incentive to exaggerate them: The buyer will always choose $b \leq B$, and the seller will always choose $s \geq S$, as we indicated earlier when the parties' beliefs are given by a uniform distribution over the other party's reservation price. Consequently, one or both of the parties' offers may fall outside the overlap interval.

If exactly one of b or s falls inside, then there will be a settlement only with probability $\frac{1}{2}$, not certainty. This uncertainty, for which one inside offer is necessary but not sufficient to produce a settlement, helps to induce the bargainers to be truthful about B and S . Moreover, even when the mechanism fails to produce a settlement, it does reveal—if it continues to stage 2 because the reservation prices overlap—that these prices *allow* for a mutually profitable settlement.

3. Implementation

The implementation of the Two-Stage Procedure is straightforward. Although the referee could be a person, his or her task is completely mechanical. Hence, we propose that implementation be by a computer program, to which the parties input, separately and independently, B and S . The mechanism then determines if $B \geq S$ in stage 1. If not, there is no settlement, and the procedure ends.

If there is overlap, the players input, separately and independently, b and s . Provided that there is either *double overlap* (both b and s are in $[S, B]$) or *single overlap* (only one of b or s is in $[S, B]$), a price is determined according to the rules of stage 2.

It is worth noting that the mechanism could be initiated by just one party (say, the buyer), who would input B and then invite the seller to use the mechanism—using email

or some other form of communication—to input S . If the seller agrees, the mechanism would proceed as already discussed.

If the seller refuses, the buyer would be sent a confidential and dated statement, e.g., in the form of an affidavit, that he or she proposed B , which could then be used as evidence (e.g., in a judicial proceeding) that he or she made a good-faith offer to try to reach a settlement. We believe that the willingness of one party to input his or her reservation price, and possibly use it later as evidence of his or her commitment to a settlement, might well induce the other party to follow suit and use the mechanism.

As noted earlier, the order of stages 1 and 2 can be reversed without changing the incentive of the mechanism to induce the parties to be truthful about their reservation prices. Here is how it would work: In stage 1, the parties would submit their offers; in stage 2, they would submit their reservation prices. If the offers crisscross in stage 1 ($b \geq s$), the referee would announce that there is a settlement price—the mean of the offers, $m = (b + s)/2$ —and the procedure would end. If the offers do not overlap, each party would be asked in stage 2 to submit his or her reservation price without knowledge of the other party's stage 1 offer. The settlement, or lack thereof, would then be exactly the same as that in which the submission of the reservation prices precedes the submission of offers.

If the offers are made first (i.e., in stage 1), they can be thought of as “posted prices.” If the offers do not overlap at this stage, in stage 2 each party would have an incentive to be truthful about his or her reservation price to ensure, insofar as possible, that it overlaps the other party's offer (i.e., posted price), because a party's reservation price will not be the settlement—the overlapped offer (with probability $1/2$) will be if there is single overlap, or the mean of the two offers will be if there is double overlap. Of course, if the initial offers crisscross in stage 1, there will also be double overlap in stage 2, which is why there is no need to proceed to stage 2.

Because the two stages can be reversed without changing the incentives of the players to be truthful about their reservation prices, their order does not matter. Therefore, we can as well assume that the parties submit their offers and reservation prices simultaneously, as we indicated earlier.

Practically speaking, however, the bargainers will probably prefer to proceed in stages. Whether they submit their (i) reservation prices first or (ii) their offers first, the rules allow for the procedure to terminate in stage 1 if either the reservation prices *do not* overlap in (i), or the offers *do* cross in (ii). Thereby, going in stages renders the mechanism simpler, possibly needing only one stage, without strategic consequences. Because it is not evident whether the parties will prefer (i) or (ii), we recommend that the choice be up to them, unless, of course, they prefer the simultaneous submission of both their offers and reservation prices.

Assume that the parties choose (i), so they submit their reservation prices first. Then if stage 2 is reached, they know that there is an overlap interval and, therefore, that there is the *potential* for a mutually profitable settlement. If the mechanism fails to produce a settlement in stage 2, we recommend that the parties be told why it failed—either because both parties' offers, b and s , were outside the overlap interval, or one offer was inside but it was not implemented, which occurs with probability $1/2$ (*which party's offer was inside may or may not be revealed*).

If the mechanism fails in stage 2, the parties might still try to find a settlement by other means, such as informal bargaining, mediation, etc. We stress, however, that under

the mechanism, the parties must assign probability zero to the possibility that they could benefit further; otherwise, their incentive to be truthful in stage 1 will be compromised. Thus, for example, they might be told that the procedure cannot be used again for six months, or some other time period that signals that a settlement that they hoped for is “dead in the water” for a significant time—the implication being that they should take the procedure seriously when it is first tried.

But there is nothing in the mechanism, after it has been *unsuccessfully* tried, that prevents the parties from continuing to negotiate with each other—in effect, to transcend the limitations of the mechanism. So we ask: Can they do anything to assuage their dissatisfaction, and possibly escape the failure of the mechanism in stage 2, when it is known that their reservation prices overlap?

We suggested earlier that the parties be told whether the mechanism’s failure in stage 2 was because both their offers were outside the overlap interval, or only one party’s offer was inside and it was not selected with probability $\frac{1}{2}$. If both offers were outside, there would appear to be not much more that can be done except exhort the parties to try harder next time—if there even is a next time (but see below for a possible resolution to even this unpromising scenario).

More promising, it seems, is the situation in which exactly one party’s offer is inside. Then, if both parties are agreeable, there are two plausible ways in which their dispute can be resolved:

- Make the inside offer the settlement with certainty.
- Make the settlement the inside offer averaged with the other party’s reservation price.

In either case, the settlement will be inside the overlap interval, with the latter more favorable to the party that made the inside offer.

Both “solutions,” of course, would alter our mechanism and, in particular, undermine the incentive of the parties to be truthful about their reservation prices. Hence, we do not recommend appending either to the mechanism in a possible stage 3 but instead suggest that, if the mechanism fails in stage 2, the parties be asked whether either option to resolve their dispute would be acceptable to them.

Only if both parties agree would an option be used, which gives each party a veto on continuation. Presumably, the inside party would seek the latter solution and the outside party would push for the former (a compromise would be that the average of these two solutions be implemented).

After being told the settlement price, the parties may or may not be given the option of backing out of the settlement, which a party may want to do if the settlement price is very close to its reservation price. The option of backing out should make the parties more willing to try to “rescue” a settlement that is mutually profitable but which the mechanism failed to produce.

Now consider how a resolution might be achieved if *both* offers are outside the overlap interval in stage 2. The parties might be allowed to make new offers, in successive rounds, until at least one party’s offer goes inside the interval. If both offers go inside on the same round, the average would be the settlement; otherwise, the settlement would be the single offer that goes inside first.

In making successive offers, an optimal strategy is *not* to inch very slowly toward the other party's reservation price, because the other party could “beat you to the punch” and go inside first—and still, on average, be quite close to your reservation price and far from its own. While the idea of making successively better offers to try to converge on a settlement is the way real-life bargaining often occurs, it does not always get the bargainers to a settlement. By contrast, the aforementioned extensions of the Two-Stage Procedure, which would require both parties' acceptance to be implemented, would do just that.

Because, as noted earlier, these “fixes” to a failure in stage 2 *force* a settlement, they will, if implemented, affect how truthful the parties will be in reporting their reservation prices. Accordingly, we do not propose them as “add-ons” to our mechanism but, instead, as separate procedures that both parties can, if they wish, decide to use if they fail to reach a settlement in stage 2.

But, we emphasize again, if these fixes are anticipated, they alter the parties' incentives to be truthful, knowing that they might have the possibility of escaping the failure of the mechanism. We mention them only to make the point that the theoretical conditions that induce the parties to be truthful might, *in practice*, be renegotiated, especially if the parties are desperate for a settlement that they know, from the overlap of their reservation prices in stage 1, is within their grasp.

C. Extensions of the Procedures for Legal Applications

We next describe two extensions of the Bonus and Two-Stage Procedures to increase their appeal for legal applications. First, we show how an incentive-neutral tax can be incorporated into the Bonus Procedure to render it budget-balanced. Second, we show how the truthful information elicited under both the Bonus Procedure and the Two-Stage Procedure can be used to improve regulatory policy.

1. A Budget-Balanced Bonus: Taxing Under the Bonus Procedure

Both the Bonus and Two-Stage Procedures make honesty a weakly dominant strategy or part of one, thereby revealing the bottom lines of the parties. However, the Bonus Procedure requires paying a bonus to induce the honest disclosure of reservation prices. Surprisingly, perhaps, the bonus-giver can completely recover its bonus through taxation without altering the incentive of the parties to be truthful. This means that employing the Bonus Procedure could be entirely budget-balanced and revenue-neutral for a regulatory agency.

To understand how such a tax would work, recall that the Bonus Procedure yields the maximum possible expected profit, or *surplus*, of $1/6$ to the parties when their reservation prices are uniformly distributed over $[0,1]$. This surplus is the expected difference between B and S , integrated over the region in which $B \geq S$.⁹⁸

⁹⁸ For those with little or no knowledge of calculus, the definite double integral shown below can be interpreted as follows: It first “sums” B from S (when $B = S$) to 1; it then “sums” S from 0 to 1, thereby picking up the surplus, $B - S$, over the entire region in which $B \geq S$.

$$\begin{aligned}
\int_0^1 \int_S^1 (B - S) dB dS &= \int_0^1 \left[\frac{B^2}{2} - BS \right]_S^1 dS \\
&= \int_0^1 \left[\left(\frac{1}{2} - S \right) - \left(\frac{S^2}{2} - S^2 \right) \right] dS \\
&= \int_0^1 \left[\frac{1}{2} - S + \frac{S^2}{2} \right] dS \\
&= \left[\frac{S}{2} - \frac{S^2}{2} + \frac{S^3}{6} \right]_0^1 = \frac{1}{6}
\end{aligned}$$

This surplus is what the two parties *in total* receive when their reservation prices overlap and they are truthful. Because the Bonus Procedure doubles this amount, *each party* receives 1/6. By paying back one-half of this amount, or 1/12 each, to the bonus-giver, the parties can repay the total of 1/6 that the bonus-giver gave them to be truthful and still receive a surplus of 1/12 each. Consequently, the parties will have an incentive to be honest in reporting their reservation prices, netting, on average, all the gains from what honesty allows them to share.

However, one must be careful in interpreting this result.⁹⁹ The bonus-giver, on average, will recover its bonus and so break even. As for the parties, they must pay the tax even if there is no settlement. In fact, the tax must be charged before the parties report their reservation prices, B and S , because otherwise there will be some occasions (low values of B or high values of S) when the buyer and seller will be virtually certain that their profit at the honesty equilibrium will be less than the tax.

Consequently, they will have no motivation to pay the tax at these times. For this reason, the Bonus Procedure does not satisfy Myerson and Satterthwaite's *interim* individual-rational condition, though it does satisfy their *a priori* individual-rational condition.¹⁰⁰ That is, while it is in each party's interest to "play the game" over a long series of trials—for example, in repeated negotiations between labor and management—in any single trial a party may find it unprofitable because the likely profit it will receive from a settlement will be low or nonexistent.

The rationality of paying a tax, then, rests on an expectation over a series of plays, on some of which the parties will benefit but on others of which they will not. In fact, even if $B < S$, and there is therefore no settlement and zero profit to the parties, the tax still must be paid. Yet the strategy of honesty remains weakly dominant even after the tax

⁹⁹ Most of the discussion in this Section is adapted from STEVEN J. BRAMS, NEGOTIATION GAMES: APPLYING GAME THEORY TO BARGAINING AND ARBITRATION 44-45 (1st ed. 1990).

¹⁰⁰ See Myerson & Satterthwaite, *supra* note 2, at 268.

is charged, because a constant tax of $1/12$ subtracted from $P_B(B,S)$ and $P_S(B,S)$ does not affect their maximization.

It is not hard to generalize the tax calculation under the Bonus Procedure to prior distributions other than the uniform. With an appropriate tax, the bonus-giver can always break even in the long run, provided that there is no collusion by the parties.

Even without collusion, however, there may be some practical difficulties in determining an appropriate tax and implementing the Bonus Procedure. For example, the probability distribution(s) over the parties' reservation prices, assumed as common knowledge in our model, may not be known or agreed to by the parties. In this situation, perhaps, a trial-and-error taxing procedure could be used to determine an appropriate tax. Presumably, what the bonus-giver takes in by taxing—minus its costs of administering the Bonus Procedure—should be paid back in bonuses to the parties.

Adjustments in the tax may have to be made from time to time, especially if there is collusion between the buyer and the seller. Given some experience with a series of settlements, for example, the bonus-giver might decide it needs to raise the future tax to break even. The parties, knowing this possibility might arise—and perhaps facing severe sanctions if caught colluding—would presumably have little or no incentive to try to deceive the bonus-giver, at least in principle. The tax may raise enforcement challenges, such as preventing parties from attempting a transaction outside of the required procedure. However, to the extent that the tax discourages transactions from occurring at all, it can serve as a policy lever to induce the economically optimal level of transactions of this type.

Although bonuses are not needed in the Two-Stage Procedure to induce honesty, this procedure does not always produce settlements when the parties' reservation prices overlap, rendering it less efficient. Nonetheless, both the Bonus Procedure and the Two-Stage Procedure offer substantial advantages over the Chatterjee-Samuels procedure and unstructured bargaining by encouraging the truthful disclosure of reservation prices. Such information, as we next show, can be utilized to improve regulatory policy.

2. *Utilizing Truthful Information to Improve Regulatory Policy*

The Bonus Procedure and the Two-Step Procedure each provide an important social benefit—namely, eliciting truthful information that may be utilized to improve regulatory policy. The Two-Stage Procedure is especially well-suited to this information-providing function, because once stage 1 is completed, the parties know immediately whether there is the basis for a settlement.

Indeed, some parties may seek to engage in the Two-Stage Procedure simply to discover whether there is overlap in their reservation prices prior to making an actual offer. Because there is no bonus-giver, a regulator need not worry about possible collusion between the buyer and seller.

Assume that the Two-Stage Procedure advances to stage 2. While it tells the parties that a profitable settlement is possible, it provides the referee with more information. Specifically, if the referee is a regulator, he or she will learn whether a failure at stage 2 is because the parties' offers were outside the reservation window or because only one offer was in the reservation window but the random selection process caused termination of the procedure.

Regulators may also obtain descriptive data from each stage, such as the mean and distribution of reservation prices and offers, which they can use in administering the procedure in the future. An analysis of such data could provide, for example, a better understanding of why bargains fail at each stage. Thus, repeated failures at stage 1 might indicate that regulation is improperly encouraging negotiation in situations when it is premature, and regulators should instead discourage negotiation until an impasse is imminent or has already occurred.

At stage 1, repeated failures might suggest that the parties are engaging in opportunistic bargaining rather than being completely truthful. This information could then be used to improve the implementation of the mechanism (i.e., by increasing legal penalties for bargaining in bad faith). A regulator might also encourage good-faith bargaining by providing data on the reservation prices that led to settlements in similar situations in the past.¹⁰¹ This information may send the message that extreme deviations from previous successful uses of the Two-Stage Procedure will be viewed suspiciously.

Information on the reservation prices may produce other benefits. Suppose, for example, that under the Two-Stage Procedure such information shows that some socioeconomic groups systematically report a small overlap between their reservation prices, but the gap between their reservation prices and their offers is large. Consequently, even though the parties' reservation prices overlap, their offers tend to fall outside the narrow window for a settlement provided by the reservation prices. In addition, if one party is shading much more than the other, this might suggest power disparities that are inhibiting successful negotiation. Given such information, regulators would be better armed to take corrective measures.

In the case of the Bonus Procedure, regulators are more likely to observe a different kind of pattern—namely, that the parties' reservation prices overlap unusually much, rendering $B - S$ unexpectedly large. This would suggest collusion in order to “soak” the bonus-giver. If the bonus-giver is the government, then citizens might rightfully complain that their tax dollars are being wasted to promote a settlement. In such a situation, the public interest might be better served if the parties use the Two-Step Procedure, even though it is less efficient.

A possible solution to the opposite biases of the Two-Stage Procedure and the Bonus Procedure might be for a regulator not to specify in advance which honesty-inducing procedure he or she will use. To protect themselves whichever procedure is used, the parties would be well advised neither to understate nor overstate B and S —that is, to be *entirely* truthful—and not exaggerate too much their offers if the Two-Stage Procedure is used. Although truth-telling is a weakly dominant strategy under both procedures, keeping the parties in the dark before revealing the procedure to be used could, in effect, reinforce their incentive to tell the truth about their reservation prices and then, under the Two-Stage Procedure, make reasonable offers.

¹⁰¹ In principle this should not be necessary: Because the parties have weakly dominant strategies, they cannot do better than be truthful, whatever the past record is. Still, it may be helpful, especially for inexperienced negotiators, to know the record of success of different strategies. For example, if a union president is not sure how much he or she can compromise without losing the support of rank-and-file union members—and possibly being voted out of office—the record may serve as a guide to his or her determining a reservation price that otherwise might be difficult to estimate.

IV. APPLYING MECHANISM DESIGN TO SETTLEMENT NEGOTIATIONS AND SECURITIES REGULATION

This Part applies mechanism design in two legal contexts: settlement negotiations and securities regulation. Intuitively, the former seems well-suited for bargaining procedures, because traditional settlement negotiation is often slow, arduous, and unsuccessful. Indeed, the existence of mandatory pretrial settlement negotiations strongly demonstrates that excessive litigation imposes a substantial cost on society. Moreover, certain contexts (e.g., labor disputes) impose additional harm on third parties. Mandatory bargaining mechanisms to reduce transaction costs are plainly justified to reduce negative externalities and paternalistically facilitate agreement.¹⁰²

Securities regulation might seem an unusual arena in which to apply mechanism design. Yet mechanism design is useful whenever a legal regime imposes a suboptimal mandatory rule because of the high transaction costs arising from unstructured negotiation with asymmetric information. Mechanism design permits obtaining contractual equilibria more efficient than a mandatory rule, while retaining low transaction costs and the positive externalities of informing regulators regarding parties' reservation prices and the conduct of negotiations.

A. Settlement Negotiations

1. *An Overview of Mandatory Pretrial Settlement Negotiations*

Pretrial settlement has long been considered a better outcome for dispute resolution than the litigation process.¹⁰³ The Civil Justice Reform Act of 1990 and the Federal Rules of Civil Procedure have mandated pretrial settlement conferences in the federal courts,¹⁰⁴ and nearly every state has provided for a similar mechanism.¹⁰⁵ There is

¹⁰² For a general discussion of viewing civil procedure through the lens of bargaining, negotiation, and contract law, see generally Judith Resnik, *Procedure as Contract*, 80 NOTRE DAME L. REV. 593 (2005).

¹⁰³ See, e.g., Stephen McG. Bundy, *The Policy in Favor of Settlement in an Adversary System*, 44 HASTINGS L.J. 1 (1992); Robert D. Cooter & Daniel L. Rubinfeld, *Economic Analysis of Legal Disputes and Their Resolution*, 27 J. ECON. LITERATURE 1067, 1074-76 (1989); Samuel R. Gross & Kent D. Syverud, *Don't Try: Civil Jury Verdicts in a System Geared to Settlement*, 44 UCLA L. REV. 1, 3 (1996); Kent D. Syverud, *The Duty to Settle*, 76 VA. L. REV. 1113 (1990); David M. Trubek et al., *The Costs of Ordinary Litigation*, 31 UCLA L. REV. 72, 122 (1983). *But see* Owen Fiss, *Against Settlement*, 93 YALE L.J. 1073, 1075 (1983) ("Settlement is for me the civil analogue of plea bargaining . . . although dockets are trimmed, justice may not be done."); Judith Resnik, *Managerial Judges*, 96 HARV. L. REV. 374, 424-25 (1982).

¹⁰⁴ See Civil Justice Reform Act of 1990, 28 U.S.C. § 471, 473(b)(5) (2012) (authorizing district courts to require that "representatives of the parties with authority to bind them in settlement discussions be present or available by telephone during any settlement conference"). *Cf.* FED. R. CIV. P. 16(a)(5) ("In any action, the court may order the attorneys and any unrepresented parties to appear for one or more pretrial conferences for such purposes as . . . facilitating settlement."). See also *G. Heileman Brewing Co. v. Joseph Oat Corp.*, 871 F.2d 648, 652 (7th Cir. 1989) (holding that district courts may "order represented parties to appear at pretrial settlement conferences").

¹⁰⁵ See, e.g., ALA. R. CIV. P. 16(a)(5); CAL. R. CT. 3.1380(a); CONN. R. SUPER. CT. 14-13; FLA. R. CIV. P. 1.200; ILL. SUP. CT. R. 218; MASS. R. CIV. P. 16; MINN. R. PRAC. ANN. 305.02; NEV. R. CIV. P. 16.1(b); 22

a vast body of alternative dispute resolution scholarship examining the “art” of settlement negotiations in light of the “psychological, sociological, and communicational principles that influence other interpersonal relations.”¹⁰⁶ This literature provides a helpful set of practical recommendations to facilitate settlement in unstructured negotiation.¹⁰⁷

Interestingly, economic analysis has been employed, primarily in a descriptive sense, to model parties’ incentives throughout the litigation and settlement process.¹⁰⁸ Law and economics scholarship has yet to address the normative question of whether structured procedures might be mandated to fundamentally alter parties’ incentives to reduce transaction costs in settlement negotiations. Alternative dispute resolution scholars have compared the strengths and weaknesses of different procedures such as arbitration and mediation.¹⁰⁹ But this literature takes the distribution of incentives as given and does not rigorously examine whether a legal mandate to utilize a certain “negotiation procedure” might inherently improve the likelihood of reaching agreement.

N.Y. COMP. CODES R. & REGS. Tit. 22§ 202.12(a), (c)(5); PA. R. CIV. P. 212.3(b); WA. R. SUPER. CT. CIV. CR. 16.

¹⁰⁶ CHARLES B. CRAVER, EFFECTIVE LEGAL NEGOTIATION AND SETTLEMENT § 1.01 (4th ed. 2001); *see also*, e.g., Richard Birke & Craig R. Fox, *Psychological Principles in Negotiating Civil Settlements*, 4 HARV. NEGOT. L. REV. 1 (1999); Russell B. Korobkin, *Psychological Impediments to Mediation Success: Theory and Practice*, 21 OHIO ST. J. ON DISP. RESOL. 281 (2006); Russell Korobkin & Chris Guthrie, *Psychological Barriers to Litigation Settlement: An Experimental Approach*, 93 MICH. L. REV. 107, 109 (1994) (“[P]sychological processes create barriers that preclude out-of-court settlements in some cases.”); Tristin Wayte et al., *Psychological Issues in Civil Law*, in 14 PERSPECTIVES IN LAW & PSYCHOLOGY 323 (James R. P. Ogloff ed., 2004).

¹⁰⁷ E.g., CRAVER, *supra* note 105, at § 5.01-§ 9.03 (discussing techniques for effective unstructured negotiation such as “assessing negotiator personalities,” “establishing negotiation tone,” and “questioning”). Similar literature exists for negotiating corporate transactions. E.g., Fred Tannenbaum, *The Second Half of Smart: How to Temper Your Intelligence and Become a More Effective Deal Lawyer*, PRACTICAL LAWYER 25, Oct. 2006.

¹⁰⁸ The literature on this topic is vast. The primary strand of analysis utilizes the so-called standard model, which models settlement as deriving from agreement on the expected value of a lawsuit, “defined as the probability of liability multiplied by the expected judgment amount.” Robert J. Rhee, *The Effect of Risk on Legal Valuation*, 78 U. COLO. L. REV. 193, 194 (2007) (citing John P. Gould, *The Economics of Legal Conflicts*, 2 J. LEGAL STUD. 279 (1973); William M. Landes, *An Economic Analysis of the Courts*, 14 J.L. & ECON. 61 (1971); Richard A. Posner, *An Economic Approach to Legal Procedure and Judicial Administration*, 2 J. LEGAL STUD. 399 (1973); George L. Priest & Benjamin Klein, *The Selection of Disputes for Litigation*, 13 J. LEGAL STUD. 1, 6-30 (1984); Alan E. Friedman, Note, *An Analysis of Settlement*, 22 STAN. L. REV. 67 (1969)). Accordingly, litigation is considered a mere transaction cost that should be eliminated under the Coasean ideal of frictionless bargaining. *Id.* at 194, 200 (crediting Posner and Landes with formulating the standard model of litigation settlement). More recently, a *real-options approach*, which incorporates the variance of expected outcomes into the settlement decision, has been proposed to incorporate the parties’ “ability to adapt to new information into the model itself.” Joseph A. Grundfest & Peter H. Huang, *The Unexpected Value of Litigation: A Real Options Perspective*, 58 STAN. L. REV. 1267, 1273–1276 (2006). *But see* Rhee, *supra*, at 212-213 (critiquing Grundfest and Huang for assuming perfect information, misconstruing variance in the litigation context, and ignoring risk preferences).

¹⁰⁹ E.g., Lela P. Love & Kimberlee K. Kovach, *ADR: An Eclectic Array of Processes, Rather than One Eclectic Process*, 2000 J. DISP. RESOL. 295; Frank E. A. Sander & Stephen B. Goldberg, *Fitting the Forum to the Fuss: A User-Friendly Guide to Selecting an ADR Procedure*, 10 NEGOTIATION J. 49 (1994).

We suggest that mandatory bargaining procedures for settlement negotiations are justified under the twin rationales of paternalism and externalities.¹¹⁰ In this context, the social externality of non-agreement is particularly easy to see: lack of settlement imposes substantial costs on society in the form of maintaining the court system.¹¹¹ Moreover, in certain contexts, such as labor negotiations, third parties suffer direct injury when the parties cannot reach agreement. Any mechanism that encourages settlement between striking schoolteachers and the administration benefits those schoolchildren who suffer the detrimental effects of a suspended education because of the dispute.¹¹²

Indeed, the existence of statutory mandates to conduct pretrial settlement conferences implies legislative recognition of this social cost. Courts are also increasingly utilizing alternative dispute resolution, further indicating that the legal system is searching for ways to reduce the mounting costs of excessive litigation.¹¹³ In effect, our proposal to utilize mandatory bargaining procedures can be viewed as simply one type of pretrial mediation, albeit with an approach based on altering incentives to reduce transaction costs inherent in direct negotiation and ultimately to foster agreement.

The economically rigorous nature of our proposed bargaining procedures relates to a paternalistic justification as well. Scholars have shown that a substantial source of transaction costs in settlement negotiations arises from the presence of asymmetric information.¹¹⁴ The *inherent* incentives to posture and exaggerate are precisely those that can be mitigated very effectively by mechanism design.

To be sure, our mechanisms do not solve all problems. One knotty problem will be for the two parties to agree on the range in which B and S can fall, which we assumed earlier to be the interval $[0, 1]$. Our model also assumes that each party has a distribution over the other party's reservation price in this interval. Then, given that $B \geq S$, the overlap interval, $[S, B]$, will be a subinterval in this range.

Presumably, the buyer will want the seller to think that the interval is bounded from below by a very low price (from which the buyer benefits), and the seller will want the buyer to think that the interval is bounded from above by a very high price (from which the seller benefits). Notwithstanding these incentives, the fact that litigants make high-low agreements in lawsuits, which fix the maximum and minimum amounts that the defendant will pay the plaintiff, suggests that reaching a consensus on a range, wherein B and S must lie, is not an impossible task. Given such a range, and assuming that each

¹¹⁰ See Ayres & Gertner, *supra* note 8, at 88–89.

¹¹¹ See generally COMMITTEE FOR ECONOMIC DEVELOPMENT, BREAKING THE LITIGATION HABIT: ECONOMIC INCENTIVES FOR LEGAL REFORM 9–10 (2000), available at <http://www.ced.org/pdf/Breaking-the-Litigation-Habit.pdf>; A. Leo Levin & Denise D. Colliers, *Containing the Cost of Litigation*, 37 RUTGERS L. REV. 219 (1985) (discussing the rising cost of litigation). But see Charles Silver, *Does Civil Justice Cost Too Much?*, 80 TEX. L. REV. 2073, 2112 (2002) (concluding that “[s]tudies of procedural reform proposals consistently find that reforms save few dollars”).

¹¹² See, e.g., Lane, *supra* note 5; Davey, *supra* note 5 at A1.

¹¹³ See, e.g., Thomas J. Stipanowich, *ADR and the “Vanishing Trial”*: The Growth and Impact of “Alternative Dispute Resolution,” 1 J. EMPIRICAL LEGAL STUD. 843 (2004).

¹¹⁴ E.g., Lucian Ayre Bebchuk, *Litigation and Settlement Under Imperfect Information*, 15 RAND J. ECON. 404 (1984); Robert D. Cooter & Daniel L. Rubinfeld, *Economic Analysis of Legal Disputes and Their Resolution*, 27 J. ECON. LIT. 1067 (1989); John Kennan & Robert Wilson, *Bargaining with Private Information*, 31 J. ECON. LIT. 45 (1993).

party has a distribution over it, the calculations we described earlier, which yield the parties' optimal strategies, can be made.

We are not naively suggesting that bargaining procedures can overcome every obstacle to settlement. In particular, a party that is very likely to emerge victorious at trial may have little incentive to negotiate. But many settlement negotiations are conducted against a backdrop of great uncertainty regarding the eventual outcome at trial. This is especially likely to be the case with labor disputes and complex commercial disputes, where there may be significant legal or factual ambiguity. Holding all else equal, reducing transaction costs in the bargaining process through a mandatory procedure can facilitate more effective agreement. To the extent that one side may have a greater likelihood of prevailing at trial, this information will be incorporated into both sides' reservation prices for the procedures that we propose.

2. *Applying the Bonus and Two-Stage Procedures to Settlement Negotiations*

The operation of the Bonus and Two-Stage Procedures in the context of settlement negotiations is fairly straightforward. The procedures could be conducted via a web site or computer program operated by the court itself. Alternatively, the services of a private firm may be employed if it could implement the procedures more cheaply than the court itself.¹¹⁵ The operator of the procedure would simply request the parties' offers and possibly tax them (if the Bonus Procedure were used), or request reservation prices and offers (if the Two-Stage Procedure were used), apply the algorithms as described in Part III *supra*, and report the settlement if the application of the procedures is successful. If not, extensions of the Two-Stage Procedure discussed in Subsection III.B.3 could be tried.

A more complex question is whether courts could compel the parties to engage in either of the procedures under current law. Numerous state statutes explicitly permit judges to order the parties to engage in court-supervised mediation,¹¹⁶ and bargaining mechanisms would likely qualify as a form of mediation.¹¹⁷ Congress has empowered federal district courts to compel mediation, including services provided by private-sector firms, by adopting local rules.¹¹⁸ Moreover, the First Circuit has held that district courts

¹¹⁵ Fair Outcomes, Inc. provides game-theoretic dispute-resolution services, albeit using a different set of procedures. FAIR OUTCOMES, INC.: GAME THEORETIC SOLUTIONS FOR DISPUTES AND NEGOTIATIONS, <http://www.fairoutcomes.com> (last visited Sep. 30, 2012).

¹¹⁶ See, e.g., FLA. STAT. § 44.102(2)(b) (2013) ("A court . . . [m]ay refer to mediation all or any part of a filed civil action for which mediation is not required under this section."); see also Holly A. Streeter-Schaefer, *A Look at Court Mandated Civil Mediation*, 49 DRAKE L. REV. 367, 373-77 (2001) (listing state statutes that permit mandatory mediation).

¹¹⁷ See, e.g., FLA. STAT. § 44.1011(2) (2012) ("'Mediation' means a process whereby a neutral third person called a mediator acts to encourage and facilitate the resolution of a dispute between two or more parties."). Bargaining mechanisms would certainly constitute a neutral process. The only difficulty might lie in the definition of the term "person." Human supervision of an automated bargaining procedure might be sufficient to bring it within the definition of mediation under the Florida statute.

¹¹⁸ See 28 U.S.C. §§ 651-653 (2006). The definition of an "alternative dispute resolution process" under the federal statute is "any process or procedure, other than an adjudication by a presiding judge, in which a neutral third party participates to assist in the resolution of issues in controversy . . ." §651(a). The statute

have inherent power to compel the parties to engage in court-supervised mediation even absent a local rule: “[I]n the absence of a contrary statute or rule, it is perfectly acceptable for the district court to appoint a qualified and neutral private party as a mediator.”¹¹⁹ However, the court emphasized, “a mediation order must contain procedural and substantive safeguards to ensure fairness to all parties involved.”¹²⁰

Compelling the parties to engage in a bargaining procedure would therefore seem permitted in many instances. However, one caveat is in order. Mediation (unlike arbitration) is typically considered to be a non-binding process. Indeed, the First Circuit justified its holding by emphasizing that “[i]n the context of non-binding mediation, the mediator does not decide the merits of the case and has no authority to coerce settlement.”¹²¹ Accordingly, while existing law may permit a court to compel the parties to *engage* in a bargaining procedure, it seems unlikely that a court could coerce the parties into *accepting* the transaction outcome as a binding judgment.

In our view, this does not present any difficulty. If the parties truthfully report their reservation prices, as would be in their best interest under both the Bonus and Two-Stage Procedures, each party’s next-best alternative (i.e., proceeding to litigation), will be reflected in his or her reservation price. Accordingly, it would be in the parties’ best interest to voluntarily accept the transaction if it can be effected by the bargaining mechanism. Indeed, one of the most powerful aspects of mechanism design is its capability to make the basis of win-win solutions—truthful revelation of reservation prices—at least part of a dominant strategy for both parties.¹²²

3. *Social Benefits of Honesty-Inducing Procedures for Settlement Negotiation*

There are substantial informational advantages to utilizing an honesty-inducing procedure for settlement negotiation. One of the greatest benefits of the Two-Stage Procedure is that it permits discovering the parties’ truthful reservation prices, and surmising the distribution of such prices from related cases, even when settlements are not obtained. This information could be used in several ways.

Data on reservation prices could be utilized by lawmakers, or regulators who exercise legislative authority over the substantive legal regime forming the subject of the dispute. This data could provide valuable feedback on whether individuals are actually behaving as the lawmaker or regulatory body would expect. It could also show the economic conditions (i.e., combinations of reservation prices and substantive law) under

specifically authorizes “professional neutrals from the private sector” to provide ADR services. § 653(b). However, any ADR procedure must be adopted by local rule. § 651(b).

¹¹⁹ *In re Atl. Pipe Corp.*, 304 F.3d 135, 146 (1st Cir. 2002) (citing *Ex parte Peterson*, 253 U.S. 300, 312 (1920)).

¹²⁰ *Id.* at 147.

¹²¹ *Id.* at 146.

¹²² *Cf.* STEVEN J. BRAMS & ALAN D. TAYLOR, *THE WIN-WIN SOLUTION: GUARANTEEING FAIR SHARES TO EVERYBODY* 13 (2000) (discussing the notion of a win-win solution). For more technical details on fair-division algorithms, see STEVEN J. BRAMS & ALAN D. TAYLOR, *FAIR DIVISION: FROM CAKE-CUTTING TO DISPUTE RESOLUTION* (1996).

which disputes are arising. This could facilitate improving the law or regulatory regime constituting the subject of the dispute.

As a concrete example, consider a tort lawsuit over negligence where the alleged damages exceed the defendant's insurance coverage. Data regarding the prices at which the parties are *willing* to settle—even if no settlement is actually reached—could lead lawmakers or a regulatory body to set more accurate minimum insurance coverage requirements in the future. Or take a securities lawsuit over alleged fraud or misrepresentation. Obtaining aggregate data regarding the distribution of the parties' reservation values would indicate what the firm and plaintiffs were willing to pay (or receive in settlement). Any overlap in reservation prices—even if no settlement were actually reached—would indicate that agreement is possible in principle. This suggests that some system of compensation, such as given by the Bonus Procedure, might be justified to ensure agreement.

In these situations, the Two-Stage Procedure provides the additional benefit of discovering precisely *where* negotiations broke down. Failure in stage 1 means that agreement was not feasible, rendering adjudication appropriate. But failure in stage 2 indicates that agreement was possible, even though the Two-Stage Procedure failed to find it. While it may have been optimal for each party to shade its offer, we suggest that the law should consider ways to minimize the incentive to exaggerate (e.g., via the Bonus Procedure). It may also suggest suboptimal opportunistic negotiation, which could lead to penalties *ex post*. For example, the discovery of manipulative behavior in stage 2 offers in settlement negotiations might lead to the imposition of sanctions.¹²³

In addition, aggregate data regarding the conduct of settlement negotiations could be reported to an oversight body, which could consider whether there might be procedural defects with the negotiation process. For example, voluntary demographic data could be obtained from litigants and examined to determine whether certain social groups are consistently underutilizing the bargaining mechanism. This finding might suggest that these users should receive special assistance and guidance when utilizing the procedures. Indeed, scholars have recently raised concerns regarding the lack of representation in settlement negotiations, and alternative dispute resolution more generally.¹²⁴ In addition to easily providing guidance for *pro se* litigants, another advantage of a bargaining procedure is that the negotiations could be conducted asynchronously, free from the pressure of intimidation and other traditional tactics of unstructured negotiation. They could even be conducted remotely, reducing the cost of physically attending negotiations.

¹²³ See *Chambers v. NASCO, Inc.*, 501 U.S. 32, 46–51 (1991) (finding that courts have inherent power to impose sanctions for “bad-faith conduct”). However, such conduct is not synonymous with exaggerated offers, which will in general be optimal. This means that judging when bargaining is in bad faith, unnecessarily opportunistic, or purely manipulative—not just strategic to optimize value for oneself—will not be straightforward. Put another way, one cannot ask the parties to ignore, to their detriment, their self-interest.

¹²⁴ See generally, e.g., Stephan Landsman, *Nothing for Something? Denying Legal Assistance to Those Compelled to Participate in ADR Proceedings*, 37 *FORDHAM URB. L.J.* 273, 280–281 (2010).

B. Securities Regulation: Reconsidering Mandatory Blockholder Disclosure

1. Overview, Private Ordering, and Efficient Trade

At the core of the United States securities laws lies the fundamental principle of mandatory disclosure. When enacting the Securities Act of 1933 and the Securities Exchange Act of 1934, Congress emphasized the necessity of mandatory disclosure by pointing to the need to “provid[e] all [market] participants the opportunity to make informed investment judgments.”¹²⁵ Academic scholars have also justified mandatory disclosure generally under principles of efficiency.¹²⁶

Nonetheless, scholars have long questioned whether *every* disclosure requirement under the securities laws should be mandatory.¹²⁷ Jonathan Macey and Jeffrey Netter, for example, have argued that the mandatory disclosure of a blockholder’s plans and purposes under Item 4 of schedule 13D is inefficient and should be replaced by a private ordering system where individual firms can opt in to require disclosure on a firm-specific basis.¹²⁸ Larry Ribstein has even advocated rendering the whole of affirmative disclosure under the securities laws optional, subject to a variety of exceptions to protect unseasoned investors.¹²⁹ These arguments follow from the basic economic principle that mandatory rules are generally less efficient than bargained-for terms.¹³⁰

The latest debate over mandatory disclosure involves section 13(d) of the Securities Exchange Act of 1934. Section 13(d) requires investors who acquired over 5% of the beneficial ownership of a reporting company to disclose their equity stake within ten days.¹³¹ As with most disclosure requirements under the securities law, blockholder disclosure was justified under a fairness rationale. When introducing the bill that would later become the Williams Act of 1968, Senator Willaims condemned the contemporary

¹²⁵ Eric D. Roiter, *Illegal Corporate Practices and the Disclosure Requirements of the Federal Securities Laws*, 50 *FORDHAM L. REV.* 781, 783 (1982) (citing *SEC v. Texas Gulf Sulphur Co.*, 401 F.2d 833, 849 (2d Cir. 1968) (en banc); H.R. REP. NO. 73-1383, at 5, 13 (1934)).

¹²⁶ E.g., John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 *VA. L. REV.* 717, 747-51 (1984).

¹²⁷ E.g., Frank H. Easterbrook & Daniel R. Fischel, *Mandatory Disclosure and the Protection of Investors*, 70 *VA. L. REV.* 669, 714 (1984) (“We have not constructed a compelling case for regulation of any sort, let alone for the particular regulations the SEC uses.”); Henry Manne, *Economic Aspects of Required Disclosure under Federal Securities Laws*, in *WALL STREET IN TRANSITION* 23, 31-40 (H. Manne & E. Solomon eds., 1974).

¹²⁸ Jonathan R. Macey & Jeffrey M. Netter, *Regulation 13D and the Regulatory Process*, 65 *WASH. U.L.Q.* 131, 154 (1987) (“Interestingly, no one has ever explained why target firms could not themselves provide incentives for bidders to disclose the information required by the Williams Act if such disclosure would benefit shareholders. If shareholders of potential target firms find such information of value, they could make appropriate adjustments in their firms’ articles of incorporation that would require the disclosure.”).

¹²⁹ Larry E. Ribstein, *Private Ordering and the Securities Laws: The Case of General Partnerships*, 42 *CASE W. RES. L. REV.* 1, 26-30 (1992).

¹³⁰ See Ayres and Gertner, *supra* note 28, at 89, 89 n.15 (citing Anthony T. Kronman, *Specific Performance*, 45 *U. CHI. L. REV.* 351, 370 (1978) (“[E]x ante arguments for the efficiency of a particular legal rule assume that individuals remain free to contract around that rule, and a legal system that denies private parties the right to vary rules in this way will tend to be less efficient than a system that adopts the same rules but permits contractual variation.”)).

¹³¹ Securities Exchange Act of 1934 § 13(d), 15 U.S.C.A. § 78m(d)(1) (2012).

practice of corporate raiders being able to operate under a “cloak of secrecy . . . while obtaining the shares needed to put him on the road to successful capture of a company.”¹³² The ten-day disclosure window was introduced after the Securities and Exchange Commission argued that pre-acquisition disclosure would be impracticable.¹³³

Section 929R of the Dodd-Frank Wall Street Reform and Consumer Protection Act empowered the S.E.C. to shorten this ten-day period by rule.¹³⁴ In a recent petition, the law firm Wachtell, Lipton, Rosen & Katz requested that the S.E.C. exercise its rulemaking authority under section 929R and shorten the disclosure window.¹³⁵ Wachtell Lipton noted that activist hedge funds have utilized the ten-day window to acquire massive blocks of ownership far exceeding the 5% disclosure threshold.¹³⁶ In Wachtell Lipton’s view, such stealth acquisitions contravene the purpose of the disclosure requirement enacted by the Williams Act.¹³⁷

Law professors Lucian Bebchuk and Robert Jackson replied to Wachtell Lipton in an academic article, arguing that the ten-day window should be preserved because it provides an essential incentive for activist hedge funds to intervene in target companies.¹³⁸ Since hedge funds do not typically acquire controlling blocks of ownership, they must share the benefit of their activism pro rata with other investors. To make intervention worthwhile, hedge funds need to acquire shares during the ten-day window prior to disclosing their holdings.¹³⁹ These shares are cheaper than post-disclosure, because investors bid up the company’s stock upon a schedule 13D announcement of hedge fund intervention. As finance research shows that hedge fund activism is beneficial for target companies, the S.E.C. should retain the ten-day window as a form of compensation for hedge funds to monitor and discipline management.¹⁴⁰

In a recent paper, Joshua Mitts takes a different approach.¹⁴¹ Mitts argues that it is essential to consider the costs as well as the benefits of hedge fund activism. Empirical

¹³² 111 Cong. Rec. 28,258 (Oct. 22, 1965).

¹³³ See 112 Cong. Rec. 19,004 (Aug. 11, 1966).

¹³⁴ Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. 111-203, § 929R, 124 Stat. 1866 (2010).

¹³⁵ Letter from Wachtell, Lipton, Rosen & Katz to Elizabeth M. Murphy, Sec’y, U.S. Sec. & Exch. Comm’n (Mar. 7, 2011), <http://www.sec.gov/rules/petitions/2011/petn4-624.pdf>.

¹³⁶ *Id.* at 6 (citing Maxwell Murphy, *How Bill Ackman Stalked J.C. Penney*, WALL ST. J., (October 8, 2010, 3:50 PM) (Deal Journal), <http://blogs.wsj.com/deals/2010/10/08/how-bill-ackman-stalked-jc-penney/>; Joann S. Lublin & Karen Talley, *Big Shoppers Bag 26% of J.C. Penney*, WALL ST. J., October 9, 2010).

¹³⁷ *Id.* at 2-3.

¹³⁸ Lucian A. Bebchuk & Robert J. Jackson Jr., *The Law and Economics of Blockholder Disclosure*, 2 HARV. BUS. L. REV. (forthcoming, 2012) (manuscript at 20), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1884226. But see Adam O. Emmerich, Theodore N. Mirvis, Eric S. Robinson & William Savitt, *Fair Markets and Fair Disclosure: Some Thoughts on the Law and Economics of Blockholder Disclosure, and the Use and Abuse of Shareholder Power 2* (Columb. L. & Econ. Working Paper No. 428, 2012), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2138945 (replying to Bebchuk and Jackson by reiterating the absence of “any explanation of how their position – their conception of how the Section 13(d) reporting rules should operate – is consistent with the clear purpose of the statute.”).

¹³⁹ *Id.* at *16-19.

¹⁴⁰ *Id.*

¹⁴¹ Joshua Mitts, *A Private Ordering Solution to Blockholder Disclosure*, 35 N.C. CENT. L. REV. 203 (2013), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2180939.

research in the management and accounting disciplines has shown that, with their extreme short-term orientation, hedge funds often exacerbate the pervasive problem of short-termism in corporate governance.¹⁴² A lengthy blockholder disclosure window may encourage detrimentally excessive activism.¹⁴³ Moreover, delayed disclosure facilitates trading on asymmetric information, which imposes economic and non-economic social costs.¹⁴⁴ To find the optimal duration for the blockholder disclosure window, Mitts proposes a private ordering solution akin to the approach taken in the proxy access context whereby the length of the disclosure window is set on a firm-specific basis by a shareholder amendment to the corporate bylaws.¹⁴⁵

This is an important first step toward incorporating mechanism design into securities regulation. The current mandatory ten-day window likely encourages an inordinate level of hedge fund activism and trading on asymmetric information that are harmful to firms and society as a whole. But this doesn't go far enough. It is probably impossible to find a single, universal duration that would be optimal for every firm because the distribution of costs and benefits may vary dramatically across firms.¹⁴⁶

Individual firms may be willing to accept a financial payment in exchange for delaying disclosure, however, and hedge funds may be willing to pay for such a delay to keep their actions secret for as long as possible. Imposing a mandatory rule, even at a firm-specific level, may preclude more tailored solutions that better satisfy the needs of individual firms and their hedge-fund suitors, enhancing the possibility of welfare-enhancing settlements for both sides.¹⁴⁷

Admittedly, viewing disclosure as a tradable "good" is counterintuitive in the context of a system of mandatory rules such as securities regulation. But it is quite natural from an economic perspective, inasmuch as we consider solely the two "sides" to the transaction, i.e., hedge funds and the target firm. (We will consider society and the investing public in Subsection IV.B.3.) Delayed disclosure imposes a certain cost on a firm by encouraging intervention by activist hedge funds that pursue an agenda of short-term profit maximization. Delayed disclosure also has value to hedge funds, because it permits acquiring shares at a below-market price, i.e., below the level that the market would have paid if it had the information regarding the hedge fund's accumulation.

Bebchuk and Jackson correctly point out that this discount is necessary to make activism worth it for institutional investors who take a non-controlling stake, such as hedge funds. Yet it does not follow that they should be permitted to obtain this discount at no cost. Activism would still be profitable if the price of obtaining the discount were less than the gross profit from intervention. Consider the following two examples:

¹⁴² *Id.* (manuscript at 27-30).

¹⁴³ *Id.*

¹⁴⁴ *Id.* (manuscript at 31-33, 35-37).

¹⁴⁵ *Id.* (manuscript at 43-44).

¹⁴⁶ *Id.* (manuscript at 39-40).

¹⁴⁷ In the following discussion, we consider the efficiency of blockholder disclosure from the perspective of hedge funds' willingness to pay. Later, we relate this analysis to the costs and benefits of hedge fund activism to target firms and society as a whole.

Hedge Fund	Buy @ (Pre-Disclosure)	Sell @ (Post-Disclosure) ¹⁴⁸	Cost of Activism	Gross Profit	Cost of Delayed Disclosure ¹⁴⁹	Net Profit/Loss
A	\$ 25	\$ 50	\$ 20	\$ 5	\$ 10	\$(5)
B	\$ 25	\$ 50	\$ 10	\$ 15	\$ 10	\$ 5

For hedge fund A, imposing a requirement to purchase delayed disclosure at the price of \$10 makes activism no longer profitable. But for hedge fund B, activism remains profitable even at this price.

This example illustrates that requiring hedge funds to purchase delayed disclosure would not necessarily eliminate hedge fund activism. But it is also unnecessary to take a static approach to pricing delayed disclosure. Why should every hedge fund pay the same price to delay disclosure? In the example above, it would be profitable for hedge fund A to intervene if the price of delayed disclosure was in the range of \$[0, 5]. An identical, fixed price for delayed disclosure across all hedge funds is plainly less efficient than pricing that varies with hedge funds' and firms' willingness to pay.

Of course, the current regulatory regime does not charge a fixed price to obtain a given level of delayed disclosure. It simply imposes a mandatory rule that disclosure is required after ten days. Yet this mandatory rule is essentially identical to charging a fixed cost of disclosure for those firms that desire to purchase shares after the ten-day window but are unable to do so. For them, the ten-day window imposes a cost on any purchase subsequent to the expiration of the window equal to the difference between the pre- and post-disclosure prices. When averaged with the shares that were purchased at discount during the ten-day window, this is equivalent to any other "price" the firm must pay to reach its desired level of ownership. Under Wachtell Lipton's proposal to shorten the disclosure window to one day,¹⁵⁰ this "cost of delayed disclosure" would jump

¹⁴⁸ Technically, this column should reflect the price at which the hedge fund sells the shares after intervention, i.e., at the conclusion of its holding period. However, this price would be similar to that of the post-disclosure "pop" if markets are at least temporally efficient over the short run, i.e., the share price incorporates immediately the effect of hedge fund intervention *in the short run*. Hedge fund activism may cost firms over the long-run, but the finance literature strongly suggests that it brings short-term benefits, and these are reflected in the share price "pop" upon the schedule 13D filing which discloses the blockholder acquisition. See Alon Brav et al., *Hedge Fund Activism, Corporate Governance, and Firm Performance*, 63 J. FIN. 1729, 1730 (2008) ("[T]he market reacts favorably to activism [immediately after disclosure], consistent with the view that it creates value. . . . We find that the positive returns at announcement are not reversed over time."); April Klein & Emanuel Zur, *Entrepreneurial Shareholder Activism: Hedge Funds and Other Private Investors*, 64 J. FIN. 187, 188 (2009) ("[H]edge fund targets earn 10.2% average stock returns during the period surrounding the initial Schedule 13D [disclosure]. . . . Furthermore, our target abnormal returns do not dissipate in the 1-year period following the initial Schedule 13D.").

¹⁴⁹ This includes transaction costs associated with the purchase of delayed disclosure and reflects the total cost of delayed disclosure for the duration that would permit acquiring the number of shares such that the average price equals the figure in the second column. A hedge fund could not acquire an unlimited number of shares because, eventually, the average price would rise above the profitable level. For the sake of simplicity, this analysis assumes that each hedge fund has already determined the duration of disclosure that would permit the optimal acquisition of shares in light of the average cost and other idiosyncratic constraints, such as portfolio diversification and total assets under management.

¹⁵⁰ Letter from Wachtell, Lipton, Rosen & Katz, *supra* note 135, at 5.

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dramatically for most hedge funds. However, the possibility of acquiring more than 5% ownership on that first day means that activism might still be profitable for the few firms that are able to do so and thereby reduce their “cost of delayed disclosure” sufficiently to obtain a profit.

This discussion demonstrates just how inefficient a mandatory rule would be when applied to all firms. But the same structural inefficiency would exist with firm-specific fixed disclosure durations. In that case, each firm would impose a different “cost of delayed disclosure” through different fixed disclosure durations under the same analysis described *supra* with a single universal disclosure window. Nonetheless, such an approach would still prevent some welfare-enhancing trade from occurring. Many hedge funds might be willing to intervene if the cost of delayed disclosure were slightly lower and firms might be willing to accept this price. The mere presence of different fixed durations does not imply efficient competition or even a “marketplace” of disclosure windows. This is particularly true in this type of thin market where target firms are not necessarily substitutes for each other, and changes to the disclosure duration would require undertaking the cumbersome process of amending corporate bylaws.

Moreover, while a fixed duration may have a similar effect as purchasing delayed disclosure for hedge funds, it is fundamentally different for target firms. Under a fixed disclosure window, the cost of delayed disclosure inherently imposed by being forced to purchase post-disclosure is paid to other shareholders selling to the hedge fund on the secondary market. However, if delayed disclosure were conducted as a sale transaction between hedge funds and target firms, this price would be paid directly to firms rather than other shareholders. This would fundamentally alter firms’ cost/benefit calculation regarding hedge fund activism. Firms might conclude that the possibility of encouraging detrimental short-termism is acceptable if they will receive a monetary payment in exchange for this risk.¹⁵¹ Under a cost-benefit analysis, the ability to sell delayed disclosure offsets the potential cost of hedge fund activism.

Viewed in this light, even a firm-specific mandatory disclosure rule is suboptimally inflexible. The costs and benefits of hedge fund activism are likely to vary from firm to firm, but they may also vary *across time* within a single firm. Unless we unrealistically assume that firms can alter their bylaws rapidly in response to changing conditions, there could be many Pareto-optimal transactions prevented by a fixed disclosure duration.

We have suggested throughout this discussion that the suboptimal nature of a mandatory rule derives from its inability to reflect hedge funds’ and firms’ reservation prices (i.e., willingness to pay and willingness to sell at a given price) for *specific transactions* of delaying disclosure. In our view, this is a fundamental paradigm shift that could greatly improve the efficiency of blockholder disclosure and has profound implications for securities regulation as a whole. Once a mandatory disclosure rule is understood as a suboptimal replacement for investors’ and firms’ willingness to pay for disclosure, it is possible to reconceive of the entire issue as a bargaining problem. Delayed blockholder disclosure has value to hedge funds and firms, but the mandatory

¹⁵¹ We discuss *infra* the question of who should conduct the sale of disclosure from within target firms and how to reduce agency costs.

rule is inhibiting efficient trade. As the Coase Theorem implies, the law should permit the two parties to bargain to the efficient solution.

However, the mandatory nature of the blockholder disclosure rule is not the *only* source of inefficiency. Unstructured negotiation between firms and hedge funds regarding the duration of the blockholder disclosure window would likely lead to severe transaction costs. And thus we come full circle to the problem with which we opened this Article: the Coasean ideal of bargaining to the efficient outcome applies only in a world of zero transaction costs. Negotiations between a hedge fund and target firm are a classic case of bilateral monopoly: this is a thin market characterized by little-to-no competition between hedge funds and firms, such that both sides are “stuck with each other” and have an incentive to hold out for the best possible price.¹⁵² Moreover, because hedge fund activism is threatening to management and the status quo, even simply receiving a signal that a hedge fund is accumulating a block of shares might lead management to take the preemptive action of announcing such information and thus undermining any chance of hedge fund activism succeeding.

Nonetheless, this shows that the fundamental challenge with implementing negotiated transactions for blockholder disclosure is not *whether* such an approach would be optimal but rather *how* to facilitate such negotiations effectively (i.e., with minimal transaction costs). In other words, this is a question of how to structure the rules of bargaining—a question that is suited quite nicely for mechanism design. Society would be better off if the parties could negotiate to an optimal outcome, but the nature of the bilateral monopoly context and problems of incomplete information make unstructured bargaining impracticable. This is a situation calling for a bargaining mechanism.

We will show shortly how the Bonus and Two-Stage Procedures could be applied to blockholder disclosure to attenuate these transaction costs and facilitate efficient trade. But before doing so, it is necessary to distinguish between two different sources of potential transaction costs that would arise with a negotiated solution in this context: agency costs vs. bargaining incentives. Up to this point, we have referred to the “firm” as an entity capable of conducting negotiations and maximizing “its” utility when bargaining with hedge funds. Of course, firms are artificial entities created by the law. Regardless of the procedure utilized, negotiation must be actually performed by individuals acting on behalf of the firm. It is essential to consider potential agency costs that might arise when negotiating with hedge funds for delayed disclosure.

As we noted previously, management and its supporters on the board of directors have a strong incentive to preserve the status quo and oppose hedge fund activism even if the firm’s shareholders would benefit from the intervention. This is the rationale behind a proposal to permit private ordering at the firm-specific level through an amendment to the corporate bylaws. Shareholders—particularly long-term shareholders who might enact such an amendment—have interests most closely aligned with those of the firm itself. The benefit to the firm from hedge fund activism is reducing managerial slack. It thus seems that giving management the authority to negotiate with the very entities tasked with disciplining and monitoring it might lead to significant agency costs.

For example, as we mentioned, management might simply undermine any attempt at hedge fund intervention by preemptively announcing to the market that a hedge fund is

¹⁵² See Rose, *supra* note 4, at 2183.

attempting to negotiate for delayed blockholder disclosure. Strictly speaking, this is not a transaction cost arising from unstructured negotiation but rather an *agency cost*: the firm might be better off if a hedge fund were to intervene, but management's own interests diverge with those of the firm. Similarly, management might hold out for a price far in excess of what the firm's existing shareholders would have accepted, were they so informed and able to make the decision instead.¹⁵³

These agency costs may be ultimately diminished ex post through the instruments of corporate law. For example, shareholder litigation for violating the duty of loyalty might serve as an effective check against managerial self-interest in this context.¹⁵⁴ Upon discovering that management did not negotiate in good faith, either by disclosing the offer to the market or by insisting on an unreasonably high price, an injured shareholder might claim that the transaction failed the entire fairness test, which would arguably apply because of the inherent conflict of interest in this context.¹⁵⁵

Yet mechanism design can assist with reducing these agency costs as well. As noted *supra*, one of the most powerful benefits of applying mechanism design in a legal setting is the ability to convey valuable information to regulators and other interested parties.¹⁵⁶ Simply channeling negotiations through a structured procedure, operated by a regulator on a web site, would permit tracking attempted offers and management's response. These data could be disclosed to shareholders periodically, providing reliable evidence that would facilitate a shareholder's lawsuit in the event management did not conduct negotiations in good faith. Total disregard for shareholders' interests (e.g., by disclosing offers preemptively) could even be viewed as a form of market manipulation subject to civil and criminal penalties.¹⁵⁷ Indeed, the very threat of disclosure to the principal (i.e., shareholders) would likely compel the agent (i.e., management) to negotiate in the best interests of shareholders.

Mechanism design can make a greater contribution to reducing agency cost than simply facilitating ex-post enforcement. It is possible to apply the foregoing procedures to negotiations between management and the shareholders such that the firm's ultimate position when negotiating with hedge funds is itself the product of a negotiated transaction. We return to this point when considering the operation of the procedures *infra*.

This example nicely demonstrates how mechanism design can align management and shareholders' interests. Yet the most powerful aspect of mechanism design is its ability to structure bargaining incentives to induce the honest disclosure of reservation prices. Even if management's interests are perfectly aligned with those of shareholders, incentives remain in unstructured negotiation to bargain inefficiently by distorting offers

¹⁵³ As noted *infra*, the "sale" of delayed disclosure brings revenue to the firm that would improve its financial position and thus offsets the potential cost of excessive hedge fund activism.

¹⁵⁴ See, e.g., *Stone v. Ritter*, 911 A.2d 362, 370 (Del. 2006) ("[A] director cannot act loyally towards the corporation unless she acts in the good faith belief that her actions are in the corporation's best interest.") (quoting *Guttman v. Huang*, 823 A.2d 492, 506 n.34 (Del. Ch. 2003)).

¹⁵⁵ See *Weinberger v. UOP, Inc.*, 457 A.2d 701, 711 (Del. 1983).

¹⁵⁶ See discussion *supra* Subsection III.C.2.

¹⁵⁷ See discussion *infra* Subsection IV.B for further examples of how information obtained through bargaining procedures can facilitate effective enforcement of the securities laws.

and holding out for the best possible price.¹⁵⁸ By structuring the bargaining process, mechanism design can alter these incentives and make it in hedge funds' and firms' best interest to honestly disclose reservation prices and thereby reduce the transaction costs inherent in unstructured negotiation.

2. *Applying the Bonus and Two-Stage Procedures to Negotiating Delayed Blockholder Disclosure*

We propose that Congress enact a statutory reform to blockholder disclosure that would facilitate bargained-for transactions by utilizing principles of mechanism design. In particular, the Bonus and Two-Stage Procedures could each facilitate negotiated delayed disclosure, albeit with different strengths and weaknesses. Under both approaches, negotiation ideally would be conducted through an automated web site, operated by the S.E.C, that uses one of these procedures. We discuss the operation of each procedure, the choice between the procedures, and implementation issues of timing.

Before diving into the mechanics of the procedures, it is necessary to clarify what precisely would be negotiated. In the prior Section we referred generally to a price that hedge funds would pay for delayed disclosure. Of course, the parties are interested not only in the price but also the duration of the delay. In our view, it is sufficient to permit negotiation over a per-day price alone, thus giving hedge funds the freedom to delay disclosure for any duration provided that the appropriate price is paid. This proposal is not without challenges. In particular, firms might balk at the notion of giving hedge funds free rein to delay blockholder disclosure without any absolute durational limit. In our view, however, this concern is best addressed by setting the correct daily price for delayed disclosure. Hedge funds do not have unlimited resources. At the right price level, delayed disclosure beyond a certain duration will no longer be profitable, because the hedge fund cannot acquire a sufficient number of shares in that additional day to offset the marginal cost of one more day of delayed disclosure.¹⁵⁹

We now consider the operation of the procedures. If the S.E.C. were to apply the Bonus Procedure, it would begin by prompting the firm and hedge fund to input their offers. This would not necessarily be synchronous—we discuss issues of timing *infra*. If the hedge fund's offer was equal to or exceeded that of the firm's, the S.E.C. would pay a bonus equal to the one half of the difference of their offers and record a delayed disclosure transaction at a price equal to the mean of their offers. If the hedge fund's offer was less than that of the firm, no transaction would be consummated. Recording a

¹⁵⁸ See discussion *supra* Subsection II.A.

¹⁵⁹ It is possible to extend our proposal to permit simultaneous negotiation over the duration and the price of disclosure, but the negotiation process becomes much more complicated. Such an approach is largely unnecessary, because the per-day price would be effective the vast majority of the time. If lawmakers are particularly concerned with the potential for stealth acquisitions for an exceedingly long period, an intermediate solution might involve permitting each firm to elect a "growth function" in its corporate bylaws whereby each additional day of disclosure results in an increased price based on some function, e.g., an exponential increase with a constant base set in the bylaws.

transaction would impose a legal obligation on the hedge fund to pay the firm for the period of time that elapses until the schedule 13D blockholder disclosure form is filed.¹⁶⁰

As schedule 13D forms are filed with the S.E.C., tracking this duration should not be particularly difficult. The S.E.C. could easily send an automated “bill” based on the duration that elapses between the delayed disclosure transaction and the schedule 13D filing and collect payment from hedge funds to target firms. By conducting the process through the S.E.C.’s web site, the hedge fund could remain anonymous to target firms until the moment of schedule 13D disclosure. This anonymity is obviously essential for the transaction to function effectively. We return to this point when discussing the timing of the procedures *infra*.

If the S.E.C. were to apply the Two-Stage Procedure, it would operate in a similar manner, albeit with slight differences. It would begin by prompting the firm and the hedge fund for their reservation prices and offers. If their reservation prices do not overlap, the S.E.C. would terminate the negotiation. If they overlap, the S.E.C. would consider the relative position of the offers. If both offers are in the overlap interval of the reservation prices, a delayed disclosure transaction would be recorded at the mean of their offers. If only one of the two offers is in the overlap interval, the S.E.C. would record a delayed disclosure transaction at that offer price with probability equal to $\frac{1}{2}$, using a random device.

Choosing between these procedures requires considering their respective strengths and weaknesses. As we showed in Part III, both of these procedures make honesty a weakly dominant strategy, reducing transaction costs resulting from exaggeration and puffery. The strengths of the Bonus Procedure are its simplicity and complete transactional efficiency. Every optimal transaction is implemented. The primary downside of the Bonus Procedure is that it requires paying a bonus, which imposes a fiscal burden on a bonus payer, and its vulnerability to collusion.¹⁶¹ The fiscal impact may be ameliorated by the taxing procedure we presented in Subsection III.C.1 to render the application of the Bonus Procedure budget-balanced, or the funds may be drawn from the general treasury. The Two-Stage Procedure is less efficient because of exaggerated offers and the probabilistic implementation of a transaction, but it has the advantage of obtaining the honest disclosure of parties’ reservation values even if one or both offers do not fall in the overlap interval. This can reduce agency costs and provide valuable information to securities regulators regarding the value of blockholder disclosure to firms and hedge funds.

Certainly, the greatest challenge with implementing these procedures in the context of blockholder disclosure is determining the precise timing and nature of the interaction with the S.E.C.’s web site. Because it is essential not to “tip off” management that a specific hedge fund is accumulating shares, we suggest that negotiations be conducted anonymously, i.e., relayed through the S.E.C. to the parties without disclosing

¹⁶⁰ This assumes that hedge funds initiate the process upon acquiring 5% beneficial ownership. We discuss issues of timing *infra*.

¹⁶¹ One of us (Brams) has argued that the United States, in effect, paid large bonuses in the form of financial aid, military equipment, and security guarantees to engineer the 1978 Camp David agreement between Egypt and Israel, which was formalized by Anwar Sadat and Menachem Begin’s signing of a peace treaty in 1979 under the auspices of President Jimmy Carter. BRAMS, *supra* note 84, at 57-60.

their identity. It does not follow, however, that the process must be conducted synchronously or in “real time.” Indeed, simply knowing that a hedge fund is interested in purchasing delayed disclosure at a given moment in time might be sufficient to permit the firm to undermine any attempted hedge fund activism.

To that end, we suggest that the S.E.C. periodically request reservation prices and offers from target firms, perhaps when they submit their quarterly 10-Q filings. It is possible that a quarterly interval may be insufficient, i.e., if the firm’s reservation prices and corresponding offers change within the span of three months. We see no reason why firms need be restricted to certain intervals when updating their reservation price and offers, provided that the mechanism is binding with respect to the firm’s existing reservation price and offers at the time a hedge fund purchases delayed disclosure. The key requirement is that the firm’s preferences be set *ex ante*.

Of course, unlike the public filings, these reservation prices and offers would be submitted privately to the S.E.C. and remain confidential. A hedge fund interested in purchasing delayed disclosure would initiate the process on the S.E.C.’s web site, and the S.E.C. would simply utilize the data it had already obtained from the target firm to apply the procedures and determine whether to record a transaction. There is no need for target firms to know the identity of the hedge fund before setting their reservation prices and offers. Ideally, firms would supply these reservation prices and offers based on a thorough evaluation of their financial position and determination of the price the firm would be willing to receive in exchange for an additional day of delayed blockholder disclosure. This would permit management to consult with shareholders and arrive at this conclusion in a cooperative, reasoned fashion.

As noted previously, these procedures may also be utilized within the firm to resolve differing views between management and shareholders regarding the value of blockholder disclosure. For example, the Two-Stage Procedure could be used by management and the shareholders to determine the firm’s reservation price and offer *prior* to applying it in negotiations with the hedge fund.¹⁶² The informational advantages of the Two-Stage Procedure would permit the S.E.C. (again, likely through an automated algorithm) to evaluate whether management was negotiating in good faith with the shareholders.

In addition to enforcement penalties, the absence of good faith on management’s part might simply cause shareholders’ position to represent that of the firm in negotiations with the hedge fund. Alternatively, the Bonus Procedure could be applied with a modification: the entirety of the bonus could be paid to management to make agreement on a price in its best interest. This could be viewed as a type of “severance pay,” in recognition of the negative impact that acquisition of shares would have on management (e.g., if they are laid off). We present these possibilities only as examples of ways in which regulators may respond to potential bad faith, or the inherent conflict of

¹⁶² The collective bargaining position of management and shareholders when multiple individuals are involved could be determined by having each choose its ideal price and amalgamating these prices according to their weights (e.g., shareholders’ proportions of equity ownership). We propose that the final position of management and the shareholders be a *weighted median* of their positions—such that half the weight is on one side and half on the other—because the median, as opposed to the mean, is relatively invulnerable to manipulation.

interest in negotiations with an activist shareholder seeking to oust existing management. The notion of reducing the discretion typically afforded to management in cases of potential conflicts of interest underlies the imposition of a higher standard in allegations of a violation of the duty of loyalty, where the business-judgment presumption is replaced by a more exacting standard of fairness.¹⁶³

The ability to conduct these negotiations in an asynchronous manner shows the power of mechanism design. An algorithmic procedure for negotiation enables this type of reasoned, careful evaluation of the value of hedge fund intervention to a firm in an atmosphere free of the tension and pressure that would arise in an unstructured negotiation. It is even conceivable that allowance would be made to permit boards (and shareholders) to set reservation prices for specific hedge funds in anticipation of the value that certain suitors might bring to the firm, or to specify a more nuanced pricing structure. We leave these further refinements of our proposal for another day. But we emphasize that unlike the present mandatory rule under section 13(d), mechanism design permits facilitating efficient transactions, i.e., those in which the value to hedge funds of an additional day of disclosure exceeds the value to the firm.

3. *Regulating Social and Macroeconomic Effects*

In addition to reducing the social externality of non-agreement, mechanism design permits addressing additional social and macroeconomic effects that arise specifically in the context of blockholder disclosure. As we noted previously, simply conducting negotiations through a web site operated by a regulator could reduce agency costs by facilitating disclosure to shareholders in the event that management fails to conduct negotiations in good faith. Similarly, by retaining data regarding reservation prices and offers submitted through the web site, regulatory agencies could detect outliers who might be abusing the system rather than conveying genuine information in good faith. A centralized clearinghouse for negotiations would decrease the costs of regulatory enforcement to ensure that these transactions are being conducted appropriately.

Delayed blockholder disclosure imposes a cost on society because it permits trading on asymmetric information.¹⁶⁴ Mitts's proposal for a delayed disclosure fee fits nicely into the procedural framework we have articulated thus far. The S.E.C. could simply add the fee into the negotiation process, increasing the charge to the hedge fund by a certain percentage to reflect the social cost of delayed disclosure at that price.

The great advantage of a mechanism-design approach is that by obtaining honest disclosure of reservation prices (and offers if the Two-Stage Procedure is used), the S.E.C. can obtain a great deal of information regarding the distribution of the costs and benefits of delayed blockholder disclosure. This information can facilitate a more efficient response to the social cost of trading on asymmetric information as a result of delayed disclosure.¹⁶⁵ In the case of the Bonus Procedure, the S.E.C. could utilize a fee to break even when paying out bonuses for reaching agreements— being flexible about

¹⁶³ See, e.g., *Stone v. Ritter*, 911 A.2d 362 (Del. 2006).

¹⁶⁴ Mitts, *supra* note 141, at 227.

¹⁶⁵ See *id.*

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lowering or raising the fee as experience dictates—and closely monitoring the information it receives for signs of possible collusion.

In a similar manner, a mechanism-design approach would permit regulating the macroeconomic effects of the microeconomic transactions occurring here to prevent excessive pooling or separating equilibria.¹⁶⁶ For example, there may be a higher social cost to clustering of delayed disclosure at certain durations. By examining the data of delayed disclosure transactions along with the duration that passes until the schedule 13D form is filed, the S.E.C.'s algorithm could deduce if a certain combination of reservation prices/offers are leading to excessive clustering at certain disclosure durations.¹⁶⁷ The algorithm could then discourage such clustering by imposing a very high tax on future agreements at that given distribution of reservation values or offers.

The more general point is that mechanism design permits nimble and adaptable regulation to specific transactions by channeling negotiations through algorithmic procedures. This permits responding more intelligently to the macroeconomic effects of microeconomic contracting terms. By inducing the honest disclosure of reservation values, regulators can employ algorithms that can respond more accurately to the parties' actual incentives and thereby shape socially desirable outcomes more effectively. Indeed, at the very least, regulators may utilize aggregate information regarding the distribution of reservation prices, offers, and transaction prices to determine whether securities regulation is facilitating optimal intervention of prospective blockholders in target firms. More generally, a mechanism-design approach can be utilized in other contexts that presently employ mandatory disclosure to facilitate efficient transactions and informed regulatory policymaking.

V. CONCLUSION

In this Article, we have shown that mechanism design can reduce inefficient transaction costs arising from unstructured negotiations in bilateral monopoly with asymmetric information. Applying mechanism design to settlement negotiations has a straightforward rationale—failure to reach agreement because of strategic bargaining imposes a direct cost on society. It is a small step from mandatory mediation to structured negotiation procedures.

We believe that the example of blockholder disclosure demonstrates the power of viewing legal and regulatory regimes through the lens of procedural altering rules. There are many situations wherein the law presents an ultimatum: reach a deal through unstructured negotiation or accept a forced sale. For example, in corporate law, minority shareholders who oppose a merger are forced to sell their shares at the deal price. The only way to retain the contractual freedom to decide the price at which they will sell their shares is to convince the majority not to accept the deal. Even if law gives minority

¹⁶⁶ For a discussion of this problem in the context of low-equity mortgage lending, see generally Ayres & Mitts, *supra* note 3.

¹⁶⁷ In order to determine whether these combinations of transaction terms would indeed lead to excessive clustering, the algorithm might consider additional data, such as the share price and the anticipated “pop” in value upon the schedule 13D disclosure. This could indicate the likely profit a hedge fund would receive. The cost of intervention would remain difficult to estimate, but it could likely be inferred indirectly from empirical data regarding the distribution of reservation values.

shareholders appraisal rights, the choice again is between unstructured negotiation and a judicial determination of a “fair” sale price.

Mechanism design shows that this is a false dichotomy. Bargaining procedures can facilitate more efficient agreement between parties. Moreover, mechanism design can provide innovative solutions to the political aspects of corporate governance. Our suggestion to utilize a type of voting procedure for shareholder-management disputes could be extended to any type of decision facing a shareholder vote. One of us (Brams) has suggested voting procedures that might be used to give minority shareholders better representation—indirectly through majority positions they support, or directly by electing their own representatives—in matters pending a shareholder vote.¹⁶⁸

Finally, the use of algorithmic procedures in mechanism design suggests new ways of responding to the macroeconomic effects of microeconomic contracting. By directing contractual transactions through automated procedures, regulators could very effectively shape the aggregate macroeconomic outcome of individual agreements. As we mentioned, this might take the form of “smart” taxation or licensing that responds in real-time to changing macroeconomic conditions (e.g., excessive leverage clustering in a particular region). More fundamentally, mechanism design allows viewing contract law as not merely setting the bounds of private agreements but also regulating the structural conditions under which such agreement takes place.

¹⁶⁸ E.g., Steven J. Brams & Peter C. Fishburn, *Approval Voting*, 72 AM. POL. SCI. REV. 831 (1978). Additional information on different voting procedures, and comparisons among them, can be found in STEVEN J. BRAMS & PETER C. FISHBURN, *APPROVAL VOTING* (2d ed. 2007) and STEVEN J. BRAMS, *MATHEMATICS AND DEMOCRACY: DESIGNING BETTER VOTING AND FAIR-DIVISION PROCEDURES* (2008).