Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity

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I. INTRODUCTION

The institution of adjudication is in a state of great upheaval today. Mounting case backlogs and the litigation challenge posed by mass torts are pressuring Congress and courts to experiment with novel adjudication techniques. Some of the results are well-known—case tracking, alternative dispute resolution, greater reliance on settlement, and tighter pretrial screening of cases. Taken together, these changes foreshadow a major transformation in the practice and theory of adjudication.

This Article focuses on one particularly remarkable proposal for handling large-scale litigation: adjudication by sampling. This approach uses statistical methods to adjudicate a large population of similarly situated cases. Rather than decide each individual case separately, the court aggregates all the cases and selects a random sample. The court then adjudicates each sample case and statistically combines the sample outcomes to yield results for all cases in the larger population.

The sampling procedure is nicely illustrated by the most recent chapter in Judge Robert Parker's struggle with asbestos litigation, *Cimino v. Raymark Industries, Inc.*[1] After certifying a class action and adjudicating liability, Judge Parker faced the daunting prospect of 2298 hotly contested damage trials. Settlement negotiations had broken down, and defendants made credible threats to contest each case vigorously.[2] Judge Parker worried about the consequences in *Cimino* as well as in the thousands of pending and future cases that would have to be tried individually at the damages stage unless some aggregative procedure could be devised.

Judge Parker solved the problem by using stratified sampling.[3] He first divided the population of 2298 cases into five disease categories and selected random samples from each category for a total of 160 sample cases.[4] He then held jury trials of the damages issues for each of the

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1. 751 F. Supp. 649 (E.D. Tex. 1990) (appeal pending).

2. Judge Parker described defendants as having adopted a "fortress mentality" with the goal of avoiding liability "by obstructing the Court's ability to provide a forum in these cases." Id. at 651. These threats were credible in view of the potentially crippling effect of massive liability and the substantial benefit to defendants from delaying recovery.

3. For a description and defense of this procedure, see id. at 653, 657-66.

4. The disease categories, sample sizes, and total population sizes are as follows:

Disease	Sample Size	Total Population
Mesothelioma	15	32
Lung Cancer	25	186
Other Cancer	20	58
Asbestosis	50	1050
Pleural Disease	50	972
TOTAL	160	2298

sample cases. Finally, he combined the sample verdicts to arrive at a total damage award for each case in the overall population. He gave each sample case the actual verdict it received in its own trial, after remittitur in some cases, and he gave each of the remaining 2138 cases the average of the post-remittitur sample verdicts for its disease category.[5]

Judge Parker's statistical procedure has two crucial features. First, parties receive average outcomes rather than outcomes tailored to the specific facts of their individual cases. Second, not all parties receive their own day in court. Only the parties to the sample cases have a chance to litigate the issues personally.[6]

Cimino-style sampling is not the only procedural innovation with these two problematic features. All proposals that substitute statistically generated average verdicts for individualized tort judgments smooth over case-specific variation and sacrifice individual participation, at least to some extent. A recent proposal by Professors Kenneth Abraham and Glen Robinson is illustrative.[7] Under the Abraham-Robinson proposal, a tort plaintiff receives a verdict equal to the average of all past settlements and trial verdicts in similar cases, with case similarity defined by statistically generated claim profiles. Whereas *Cimino*'s procedure averages over a sample of concurrently litigated cases, the Abraham-Robinson proposal averages over a set of historical cases, those that have already been resolved by settlement or fully litigated judgment. Both approaches, however, award average rather than

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See id. at 653.

    Judge Parker also tried the cases of the nine class representatives.

    5. To illustrate Judge Parker's sampling procedure, suppose the total population consisted of 100 cases falling into two disease categories: 50 asbestosis cases and 50 lung cancer cases. Suppose further that the court decided to use a sample of ten cases drawn equally from each disease category—five from the asbestosis category and five from the lung cancer category. Assume the five sample asbestosis cases returned verdicts (in millions of dollars) of .5, .25, 1.5, .75, and .5, and the five lung cancer cases returned verdicts of .8, 1.5, 1.8, 2.0, and .8. Assuming no remittitur adjustments, Judge Parker's procedure would award the sample cases their actual verdicts, the remaining asbestosis cases $700,000 each (the average of .5, .25, 1.5, .75, and .5 million), and the remaining lung cancer cases $1,380,000 each (the average of .8, 1.5, 1.8, 2.0, and .8 million).

    6. Although all 2298 plaintiffs in *Cimino* agreed to the court's sampling procedure, defendants did not agree, and more importantly, there is reason to question plaintiffs' consent under these circumstances as well. See notes 110-20, 181-91 and accompanying text.

    7. Glen O. Robinson and Kenneth S. Abraham, *Collective Justice in Tort Law*, 78 Va. L. Rev. 1481 (1992); see also Kenneth S. Abraham and Glen O. Robinson, *Aggregative Valuation of Mass Tort Claims*, 53 L. & Contemp. Probs. 137 (Autumn 1990). While Robinson and Abraham believe their approach can help deal with the mass tort litigation crisis, this is not the primary purpose of their proposal. They seek more fundamental change in the common-law system, a shift away from what they believe is a misplaced preoccupation with individualism toward a more collectivist approach. See Robinson and Abraham, 78 Va. L. Rev. at 1488-96; Abraham and Robinson, 53 L. & Contomp. Probs. at 137-41.

individualized verdicts, and both distribute full litigation opportunities to fewer than all the plaintiffs.

Given the enormous volume of mass tort and mass accident litigation, it is understandable that judges, lawyers, and commentators find statistical modes of adjudication attractive. Although *Cimino* is the first case to award damages to individual tort victims based on a case sample, it is certainly not the last. Indeed, another federal district court judge, inspired by *Cimino*, has already indicated a willingness to use sampling to calculate a classwide punitive damages award.[8] Moreover, the Ad Hoc Committee on Asbestos Litigation, a group of judges appointed by the Judicial Conference to propose solutions to the asbestos tort crisis, recommended sampling in an early draft report.[9] Although the Committee did not include this recommendation in its final report, it did take note of the use of sampling in *Cimino* and proposed that Congress authorize "consolidation and collective trial of asbestos cases."[10]

Nor is sampling's appeal confined to tort litigation. In a pending case seeking recoupment of mistaken Medicare payments,[11] for example, the United States government is advocating judicial use of sampling instead of individualized adjudication to resolve the several

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8. See *In Re Shell Oil Refinery*, 136 F.R.D. 588 (E.D. La. 1991), aff'd sub. nom. *Watson v. Shell Oil Co.*, 979 F.2d 1014 (5th Cir. 1992) (class action to recover damages from an oil refinery explosion).

9. See Letter from Judith Resnik and Thomas Rowe to The Honorable Thomas M. Reavley, Chair, Ad Hoc Committee on Asbestos Litigation at 16 (March 8, 1991) ("Resnik and Rowe Letter") (noting that Committee Report recommended Congressional approval of "plaintiff sampling techniques") (on file with author). See also *Report of the Judicial Conference Ad Hoc Committee on Asbestos Litigation* 41 (March 1991) *("Ad Hoc Committee Report")* (Judge Hogan, dissenting, notes that Committee recommended sampling).

10. *Ad Hoc Committee Report* at 21, 36.

11. *Provident Life and Accident Ins. Co. v. United States*, 772 F. Supp. 1016 (E.D. Tenn. 1991). The United States brought suit against Provident Life and Accident Insurance Company to obtain reimbursement for Medicare payments that the United States erroneously made for items or services that were insured by Provident. The Medicare as Secondary Payer Act, 42 U.S.C. § 1395y(b)(2)(A) (1992), coordinates Medicare with coverage under other insurance programs. The statute does this by assigning primary coverage responsibility to insurers like Provident. When the United States government erroneously makes Medicare payments that should have been made by the primary insurer, the statute authorizes the government to bring an action against the insurer for reimbursement. Id. § 1395y(b)(2)(B)(ii).

The *Provident* case includes as many as four million individual recoupment claims that may have a total value close to $223 million. The district court granted partial summary judgment to the United States on liability, *Provident Life and Accident Ins. Co. v. United States*, 740 F. Supp. 492 (E.D. Tenn. 1990), and referred the damages issues to a special master. The special master rejected the government's sampling approach, choosing instead to adjudicate damages on a claim-by-claim basis. See *Special Master's Findings of Fact and Conclusions of Law Regarding Initial Designation and Statistical Approach Hearing* 124-36 (May 8, 1992). The district court judge adopted the special master's recommendation, and the government appealed the ruling on the sampling issue to the Sixth Circuit. The appeal is now pending.

million claims at stake.[12] Furthermore, Abraham and Robinson are not the only scholars urging the benefits of statistically based procedures.[13] In a recent article, Professors Michael J. Saks and Peter David Blanck defend *Cimino*'s sampling approach, arguing that sampling can produce more accurate decisions and enormous cost savings with only slight—and in their view eminently justifiable—sacrifices of individual participation opportunities.[14]

Despite this growing interest, many of the important normative issues raised by sampling have yet to be fully addressed.[15] These issues are complex; they implicate the most basic features of American adjudication and demand answers to some of the most challenging questions of procedure theory. This Article examines the normative stakes more closely.[16] Although the Article focuses primarily on *Cimino*-style sam-

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12. In fact, this case involves a much less problematic use of sampling than *Cimino* because all the recoupment claims involve the same plaintiff and the same defendant. As a result, sampling's effect on liability and entitlement is much less serious; in fact, as we shall see, sampling in a case with one plaintiff and one defendant can produce a more accurate total award than case-by-case adjudication. Furthermore, unlike *Cimino*, all parties in *Provident* have a chance to litigate the issues that arise in the sample cases.

Despite these differences, the *Provident* case still presents the thorny problem of mixing aggregative statistical techniques with an historically individualistic system of court adjudication. Indeed, the fact that *Provident* is a judicial proceeding against a party that itself is not a beneficiary of the regulatory scheme distinguishes it from precedents upholding an agency's use of sampling in an administrative setting to audit for overpayments or misuse of government funds. See, for example, *Chaves County Home Health Services, Inc. v. Sullivan*, 931 F.2d 914, 916-19 (D.C. Cir. 1991) (upholding agency's use of a sampling audit to identify overpayments in more than 13,000 Medicare claims); *Michigan Dep't of Educ. v. United States Dep't of Educ.*, 875 F.2d 1196, 1204-06 (6th Cir. 1989) (upholding agency's use of sampling to audit more than 60,000 payments for misuse of vocational rehabilitation grants).

13. For a proposal that is quite similar to the Abraham-Robinson approach, see James F. Blumstein, Randall R. Bovbjerg, and Frank A. Sloan, *Beyond Tort Reform: Developing Better Tools for Assessing Damages for Personal Injury*, 8 Yale J. Reg. 171 (Winter 1991) (emphasizing the benefits of increased outcome predictability and greater uniformity across cases rather than reduction in litigation and delay costs).

14. Michael J. Saks and Peter D. Blanck, *Justice Improved: The Unrecognized Benefits of Aggregation and Sampling in the Trial of Mass Torts*, 44 Stan. L. Rev. 815 (1992). See also Stephen Berry, *Ending Substance's Indenture to Procedure: The Imperative for Comprehensive Revision of the Class Damage Action*, 80 Colum. L. Rev. 299, 340-41 (1980) (recommending sampling to calculate individual damages in small-claimant, and to a lesser extent in large-claimant, class actions); David Rosenberg, *The Causal Connection in Mass Exposure Cases: A Public Law Vision of the Tort System*, 97 Harv. L. Rev. 849, 917-919 (1984) (recommending sampling to calculate damages in small-claimant class actions); David Rosenberg, *Class Actions for Mass Torts: Doing Individual Justice by Collective Means*, 62 Ind. L. J. 561, 586-93 (1987) (recommending sampling to calculate damages in large-claimant class actions).

15. There are helpful treatments of some of these issues in the literature. For the most recent examples, see Robinson and Abraham, 78 Va. L. Rev. at 1481 (cited in note 7), and Saks and Blanck, 44 Stan. L. Rev. at 815.

16. This Article offers a policy analysis with relevance for the constitutionality of sampling under due process norms and for the legislative design of an optimal sampling procedure. Even so, the Article's scope is limited. For example, I do not discuss (1) whether sampling in federal court

pling, its analysis applies more generally to all statistical approaches—including the Abraham-Robinson proposal—that award average rather than individual verdicts and deny full participation opportunities to at least some parties. Indeed, on the most general level, the analysis addresses a fundamental issue of procedural justice: the limits on judicial creativity in devising procedures under conditions of severe process scarcity. When there are not enough resources to provide each party with an individual trial, how should a court go about adjudicating the cases before it?

My argument proceeds in three stages. In Part II of the Article, I first evaluate the novelty of sampling and identify those factors that make the procedure so troubling. The analysis compares *Cimino*-style sampling, in which trials of sample cases determine individual issues for each case in a larger population, with two more commonly accepted aggregation techniques, class actions and mass tort settlements, that also rely on a few parties or cases to generate outcomes for a much larger group.[17] I conclude that sampling differs from these alternatives in critical ways demanding special justification, but I also suggest that recent

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alters state substantive law inconsistent with the commands of *Erie* and the Rules of Decision Act; compare *In re Fibreboard*, 893 F.2d 706, 711 (5tb Cir. 1990) (holding tbat a lump-sum damages approach implemented by Judge Parker ran afoul of *Erie*); (2) whether sampling denies parties their constitutional rights to trial by jury; compare id. at 712 (holding that a lump-sum damages trial violates defendant's jury trial right); and (3) whether sampling is expressly or implicitly prohibited by existing procedural rules. As to the first question, it is clear that *Erie* poses no obstacle to the use of sampling in state court. The second issue, sampling's impact on jury trial, is more troubling. But see Robinson and Abraham, 78 Va. L. Rev. at 1498-99 (cited in note 7) (arguing that the Seventh Amendment guarantee of jury trial is not offended by a procedure, such as sampling, that in effect holds a jury to determinations of issues previously made). Even so, sampling does not affect jury trial as seriously as the lump-sum damages procedure rejected by the Fifth Circuit in *Fibreboard*. Under sampling, some cases receive full jury trials, all defendants receive at least one trial of the legal and factual issues, and each case receives a verdict extrapolated from actual jury awards. Finally, if resolution of the third issue suggests that existing procedural rules bar sampling, tben those rules can be changed to accommodate the procedure, provided, of course, that sampling is consistent with due process, separation of powers, and Article III principles. See generally Charles A. Wright, Arthur R. Miller, and Mary K. Kane, 7B *Federal Practice and Procedure*, § 1784 at 86-88 (West, 2d ed. 1985) (arguing that federal courts have broad equitable power to devise novel remedial approaches in class actions). For an analysis of some of the legal objections to sampling, see Resnik and Rowe Letter (cited in note 9).

17.   These two procedures incorporate the main elements of current aggregation practice. The class action relies on consolidation and preclusion, and court-supervised settlement relies on consent. There are other devices for handling large-scale litigation, but these also differ from sampling in major respects. For example, multidistrict litigation uses interdistrict transfer and consolidation to adjudicate related suits, but it is supposed to apply only at the pretrial phase. See 28 U.S.C. § 1407 (1976). But see Judith Resnik, *From "Cases" to "Litigation"*, 54 L. & Contemp. Probs. 5, 29-35 (Summer 1991) (noting that transferred cases are seldom remanded to their original districts for trial). Furthermore, nonparty preclusion can prevent relitigation of common issues, but its scope under current law is extremely limited. See Robert G. Bone, *Rethinking the "Day in Court" Ideal and Nonparty Preclusion*, 67 N.Y.U. L. Rev. 193 (1992). Sampling is not confined to the pretrial phase, nor is it limited to common issues.

expansions of more established techniques raise similar justificatory problems.

Part III then examines the arguments for and against sampling from an outcome-oriented perspective, which assumes that the value of adjudication lies solely in the quality of the outcomes it produces as measured by closeness of fit with the substantive law and facts. I conclude, contrary to claims made by Professors Saks and Blanck,[18] that the use of sampling entails a significant sacrifice of outcome accuracy. But I also conclude that sampling can still be justified on outcome-oriented grounds in some situations, and I identify factors that should be considered in any outcome-oriented evaluation of sampling in a particular case.

Finally, Part IV examines the arguments from a process-oriented perspective, which assumes there is intrinsic value to adjudicatory participation inhering in the opportunity for individual input and control that participation makes possible. I assume, along with others, that trial opportunities for plaintiffs in large-scale mass tort cases are extremely scarce. By this, I mean that litigation and delay costs are so high that it is not possible to guarantee each plaintiff with a meritorious case an individual trial early enough to assure a positive net recovery or an amount of compensation above a minimally acceptable level.[19] Whereas previous commentators have assumed that scarcity itself justifies sampling's inroads on participation, I take scarcity as the starting point for an analysis of distributive justice. The critical question is how to distribute fairly a limited number of process opportunities among persons with equal participation rights.

Because it distributes by lottery, random sampling is justifiable on process-oriented grounds only if a lottery is a fair distributional scheme. This requires some argument, and the argument shows that sampling creates much greater tension between process and outcome values than previous commentators have realized.

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18. Saks and Blanck, 44 Stan. L. Rev. at 833 (cited in note 14).

19. For a more precise definition of scarcity, see notes 219-28 and accompanying text. Many believe that asbestos litigation has reached a condition of extreme scarcity. The Judicial Conference Ad Hoc Committee on Asbestos Litigation recently concluded: "It is unrealistic to believe that individual trials can provide relief. The local trial of an individual asbestos claim takes so long that trying each claim separately would require all the civil trial time for the foreseeable future to the exclusion of all other cases in districts with heavy asbestos caseloads." *Ad Hoc Committee Report* at 19 (cited in note 9); accord Jack B. Weinstein and Eileen B. Hershenov, *The Effect of Equity on Mass Tort Law*, 1991 U. Ill. L. Rev. 269, 295-96, 317. See also *Cimino*, 751 F. Supp. at 651 (noting that "[t]ransaction costs consumed $.61 of each asbestos litigation dollar" and that "the plaintiffs receive only $.39 from each litigation dollar") (citing Institute for Civil Justice, *Annual Report* (April 1, 1990-March 31, 1991)). For a description of the private and social costs of asbestos litigation and the inability of conventional procedures to cope with the problem, see *Ad Hoc Committee Report* at 7-27 (cited in note 9).

In the end, I do not reject sampling. Nor do I fault Judge Parker for using the procedure. Asbestos litigation and the mass tort phenomenon present horrendous problems for a heavily burdened judiciary. Indeed, Judge Parker may well be correct that sampling is the best way to handle this difficult situation within the constrained set of options available to district courts. My objective is to chart the normative landscape—to identify sampling's costs as well as its benefits and to suggest guidelines for deciding when a sampling procedure is appropriate and how it should be designed to work an acceptable compromise between outcome and process values.

II. Sampling in Perspective: Just How Radical Is It?

A. Sampling Compared to the Class Action

Sampling shares much in common with class actions brought under Rule 23(b)(3) of the Federal Rules of Civil Procedure.[20] In both procedures, the outcome of litigation involving a few parties is imposed on a larger group. In both, the purpose of adjudicating on a groupwide basis is to reduce the social and private costs of litigation and to facilitate suits that might not be cost-effective if brought separately.[21]

Moreover, when factual issues are identical throughout the class, the class action functions as a trivial form of sampling. The court in effect relies on a sample of one case, that of the representative plain-

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20. See F.R.C.P. 23(b)(3). In a sense, sampling bears some resemblance to the mandatory class action under Rule 23(b)(1) in that both respond to a felt necessity for aggregative treatment. But the two procedures involve different kinds of necessity. Rule 23(b)(1) seeks to avoid special unfairness associated with certain types of remedial externality, whereas sampling is designed to achieve judicial economy gains and facilitate lawsuits by reducing transaction and delay costs. This makes sampling a closer cousin of the Rule 23(b)(3) class action, which is also designed to promote judicial economy and facilitate non-cost-justified suits for individual damages.

It is also worth noting the similarity between sampling in a case like *Cimino* and a Rule 23(b)(2) class action for structural relief, such as a school desegregation or institutional reform suit. Although liability issues are common to the class in structural relief cases, there can be serious class conflict at the remedy stage. See, for example, Deborah L. Rhode, *Class Conflict in Class Actions*, 34 Stan. L. Rev. 1183, 1188-91 (1982). When a court invites intervention to canvas class members' views on relief, the court in effect uses a crude (and nonrandom) form of sampling. Even so, Rule 23(b)(2) provides little support for sampling in mass tort suits. In a Rule 23(b)(2) class action seeking structural relief, the legal wrong is a group wrong (the defendant must have acted on grounds generally applicable to the class), and the legal remedy is a group remedy (there can be only a single, unitary injunction that must direct its benefits toward the class qua class). Thus, even with the risk of intraclass conflict, the Rule 23(b)(2) class is a strongly homogeneous unit as a legal matter; all class members stand or fall together. By contrast, sampling is applied to damage actions which have traditionally been considered the quintessential form of individual suit; damage awards vary in amount across different plaintiffs and benefit each plaintiff as an individual rather than as a member of a group. Thus, once again, the better analogy is to the Rule 23(b)(3) class action for damages.

21. See Wright, Miller, and Kane, 7A *Federal Practice and Procedure* § 1777 at 517-18 (cited in note 16) (discussing policies behind F.R.C.P. 23(b)(3)).

tiff's, to adjudicate liability for the entire class.[22] And when issues vary but fall into a small number of homogeneous groupings, subclassing serves as a trivial form of stratified sampling. Each representative is in effect a sample from the subclass that she represents.[23]

Nevertheless, there is an important difference between the two procedures. The Rule 23(b)(3) damages class action is supposed to adjudicate only those questions of law and fact that are identical for all cases. As a result, large-damage class actions usually break up into separate suits after the liability phase unless individual damages can be determined within the class action structure.[24]

By contrast, sampling is useful precisely because it adjudicates issues that vary substantially over all group members. In *Cimino v. Raymark Industries*, for example, the amount of damages to which each plaintiff was entitled depended on a host of factors specific to her case, including the extent of the injury and its physical effect, the reasonable medical expenses incurred, the effect of the injury on employment opportunities and future earnings, and the degree of pain and suffering.[25] Judge Parker's stratified sampling procedure preserved gross distinctions of disease type, but averaged over all other variables.

It is true that courts occasionally determine damages on a class-wide basis, but these situations provide little support for sampling.[26] In some cases a court can determine individual damages with reasonable accuracy from defendant's records without much evidentiary input from individual plaintiffs. For example, in a price-fixing case, the court frequently is able to determine aggregate damages, as well as individual awards for each plaintiff, by relying on defendant's records, sometimes

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22. Of course, under the current federal class action rule, the class suit would have to satisfy other requirements, including typicality and adequacy of representation. See F.R.C.P. 23(a)(3), (4).

23. See F.R.C.P. 23(c)(4)(B).

24. See Herbert B. Newberg, 2 *Newberg on Class Actions* § 9.53 at 319-20 (McGraw-Hill, 2d ed. 1985); Wright, Miller, and Kane, 7B *Federal Practice and Procedure* § 1784 at 78-79 (cited in note 16).

25. 751 F. Supp. at 659, 665 (noting that a plaintiff's individual smoking history is relevant to damages because it affects factors such as quality of life and life expectancy, and listing a number of damage-related variables identified by defendants).

26. See *Bower v. Bunker Hill Co.*, 114 F.R.D. 587, 596 (E.D. Wash. 1986) (rejecting a collective damage award when damages were susceptible to individualized proof). For discussion of the existing class action case law on the subject, see Samuel Issacharoff, *Administering Damage Awards in Mass-Tort Litigation*, 10 Rev. Litig. 463, 470-80 (1991) (noting that "administrative models" of damage assessment have seldom been used); and Newberg, 2 *Class Actions* § 10.02 at 349-50 (cited in note 24) (stressing the impracticability of proving individual damages in collective damages cases).

supplemented by documentary evidence of purchases provided by plaintiffs.[27]

A few class actions have awarded a genuinely collective form of monetary relief, but these also differ from *Cimino*-style sampling. One example, on which Judge Parker relied in *Cimino*, is *Pettway v. American Cast Iron Pipe Co.*,[28] a Title VII class action case.[29] In *Pettway* a class of 2242 black employees succeeded in proving discrimination over an extended period with regard to promotion, tenure, and transfer opportunities. The problem for the court arose in the context of calculating backpay awards. The court was not able to determine the positions that each class member would have qualified for and obtained in a hypothetical workplace free of discrimination because all class members competed among themselves as well as with the white employees for scarce job opportunities. Calculating backpay awards on an individualized basis was conceptually impossible; it required describing in detail a counterfactual employment scenario in the face of complex interaction effects that undermined any hope of determinate causation.[30] Thus, the court had no choice but to use a collective, statistical approach.

The use of sampling in cases like *Cimino* responds to a different concern. The injuries of the *Cimino* plaintiffs are not causally intertwined and there are no extraordinary proof problems or conceptual obstacles to calculating damages on an individualized basis.[31] The problems are economic—high administrative costs and extreme delay due to budgetary constraints—and their solution presents the hard

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27. See Newberg, 2 *Class Actions* § 10.01 at 348; § 10.07 at 357; § 10.12 at 367-69 (cited in note 24).

28. 494 F.2d 211, 258-63 (5th Cir. 1974) (*Pettway III*); accord *Pettway v. American Cast Iron Pipe Co.*, 576 F.2d 1157, 1222 (5th Cir. 1978) (*Pettway IV*).

29. See *Cimino*, 751 F. Supp. at 663 (discussing *Pettway III*).

30. Advocating a classwide approach, including use of a comparable set of white employees as a reference group to calculate aggregate backpay, the *Pettway III* court of appeals summarized the problem in the following way:

When a court is faced with the employment situation like this case, where employees start at entry level jobs in a department and progress into a myriad of other positions and departments on the basis of seniority and ability over an extended period of time, exact reconstruction of each individual claimant's work history, as if discrimination had not occurred, is not only imprecise but impractical

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. . . While the district court is not limited to this particular alternative [i.e., actual advancement of a comparable group not discriminated against], it has more basis in reality than an individual-by-individual approach.

494 F.2d at 261-63. See also Newberg, 2 *Class Actions* § 10.09 at 361-65 (cited in note 24) (discussing the unusual proof problems that prompt use of statistical techniques to distribute damages in employment discrimination cases).

31. Compare *Bower*, 114 F.R.D. at 596.

question of when economic constraints can limit substantive and procedural rights.

Cimino-style sampling is also similar to fluid class recovery, another collective form of classwide monetary relief. Fluid recovery is a mechanism for distributing damages in small-claimant class actions, where the small amounts at stake make it administratively impractical to distribute on an individual basis.[32] The idea is to distribute aggregate damages in a less expensive way by distributing to a second-best class. In this way small-claimant class actions become feasible and can be used to hold defendants accountable for wrongdoing as well as to promote the deterrence goals of the substantive law.[33] The problem with fluid recovery, however, is that it tends to distribute damages imperfectly relative to individual entitlements. Persons who were never harmed may receive a benefit, while some class members who were actually injured may receive nothing at all.

To illustrate, suppose an attorney files an antitrust suit on behalf of a class of passengers overcharged by certain taxicab companies.[34] Suppose further that the total overcharge for each plaintiff amounts to only three dollars on average. The liability of defendants can be easily adjudicated on a classwide basis, and aggregate damages for the entire class can be accurately computed using taxi company records. Problems will arise at the distribution stage, however. The costs of identifying each class member, soliciting individual proof of injury, and mailing a check for individual damages are bound to exceed the three dollar average recovery. As a result, a class action is impossible unless the court is able to distribute damages in a less expensive way. Fluid recovery provides such an alternative. For example, the court might require that all defendants reduce fares charged to future passengers until the classwide damage award is used up. This approach makes the class action economically feasible, but it does so only by distributing damages imperfectly. The group of future passengers who benefit from the damages award is not likely to match the class of passengers who were injured by defendant's wrongful overcharge.

The similarity to sampling is obvious. As I discuss below, sampling can yield an extremely accurate average damage figure and thus an accurate total damage figure for the whole aggregation when the sample

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32. See Newberg, 2 *Class Actions* §§ 10.16-10.19 at 373-82 (cited in note 24) (discussing cy pres principles of damages distribution, which include fluid recovery); Wright, Miller and Kane, 7B *Federal Practice and Procedure* § 1784 at 81-85 (cited in note 16) (discussing fluid recovery).

33. See generally Berry, 80 Colum. L. Rev. at 299-300 (cited in note 14) (noting that small-claimant class actions serve deterrence rather than compensation goals).

34. This hypothetical is based on *Daar v. Yellow Cab Co.*, 67 Cal.2d 695, 433 P.2d 732 (1967).

average is multiplied by the total number of plaintiffs.[35] Like fluid class recovery, however, sampling imperfectly distributes this total relative to the expected outcome of an individual trial, giving some plaintiffs more and some less than their individual entitlements.

Fluid recovery is a highly controversial procedure in part because of its skewed effect on compensation, and sampling shares this feature.[36] Moreover, sampling has other characteristics that render it even more problematic than fluid recovery. Fluid recovery applies to class actions in which individual class members have only small amounts at stake and little interest in receiving compensation. Sampling, on the other hand, applies to mass tort cases in which individual plaintiffs have a great deal at stake and compensation entitlements are strong.

Sampling also has a more serious impact on participation values. Fluid recovery is used in class actions that have numerous common issues. Even the determination of aggregate damages involves issues that are the same for all class members. As a result, class representatives stand in for absentees in the strong sense of litigating the same issues with the same evidence as in an individual suit.[37] Furthermore, individual participation values are not particularly compelling in these cases because absentees have little, if any, interest in litigating their small claims separately.[38]

Sampling is different. Because factual issues vary among class members and cases are not homogeneous with respect to damages, sample plaintiffs do not represent those not sampled in the same way that plaintiffs in a small-claimant class represent absentees. Moreover, the amounts at stake are large, and participation values may be strong.

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35. See notes 49-50 and accompanying text.

36. Critics complain that fluid recovery sacrifices compensation to regulatory goals, while supporters point to the minimal compensation interest at stake and the deterrence benefits the procedure makes possible. See, for example, *Eisen v. Carlisle & Jacquelin*, 417 U.S. 156, 172 n.10 (1974); *Simer v. Rios*, 661 F.2d 655, 675 (7th Cir. 1981); *State v. Levi Strauss & Co.*, 41 Cal.3d 460, 715 P.2d 564 (1986); Newberg, 2 *Class Actions* §§ 10.20-10.24 at 382-92 (cited in note 24); Kenneth W. Dam, *Class Actions: Efficiency, Compensation, Deterrence, and Conflict of Interest*, 4 J. Legal Stud. 47, 63 (1975). Sampling is less troubling than fluid recovery in one respect: because mass tort cases like *Cimino* involve large damages, sampling achieves significant compensation goals for all plaintiffs.

37. Even so, the representation involved in the small claimant class action with fluid recovery differs from the type of representation that supported the class action historically. See Robert G. Bone, *Personal and Impersonal Litigative Forms: Reconceiving the History of Adjudicative Representation*, 70 B.U. L. Rev. 213 (1990). Indeed, modern Rule 23(b)(3) was created with the 1966 revisions to the Federal Rules of Civil Procedure and has been a source of much controversy ever since its adoption—in large part because it aggregates damages suits that have a distinctly individualistic quality. See id. at 290-304.

38. See Jonathan R. Macey and Geoffrey P. Miller, *The Plaintiffs' Attorney's Role in Class Action and Derivative Litigation: Economic Analysis and Recommendations for Reform*, 58 U. Chi. L. Rev. 1, 27-31 (1991).

These facts suggest that each plaintiff may have a powerful interest in litigating her own case in her own way.

B. *Sampling Compared to Mass Tort Settlements*

Settlement in mass tort cases resembles sampling in an important respect. Both procedures extrapolate from a subset of cases to generate outcomes for all cases in the larger population. The outcomes of mass tort cases that happen to settle or reach final judgment first shape future settlements by defining how much a plaintiff is likely to receive from trial, her so-called "nonagreement baseline," and by focusing parties on reasonable bargaining outcomes.[39]

Judges often exploit this settlement dynamic to facilitate—some would say engineer—settlements in large-scale mass tort and mass accident litigation. For example, in a currently pending class action involving nearly 20,000 victims of an oil refinery explosion in Louisiana, a federal district court judge plans to try cases in stages in order to generate a "reasonable judgment value for each category of claims that can facilitate settlement."[40] In some cases judges, with the help of special masters, have even compiled data on prior settlements and trial verdicts in order to provide the parties with information to assist in formulating reasonable settlement values.[41]

The similarity to *Cimino*-style sampling is obvious. The set of early cases constitutes a kind of sample (although not necessarily a random sample) of the overall population, and attorneys in later cases use a

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39.   Kenneth R. Feinberg, *The Dalkon Shield Claimants Trust*, 53 L. & Contemp. Probs. 79, 107-09 (Autumn 1990). See Deborah R. Hensler, *Resolving Mass Toxic Torts: Myths and Realities*, 1989 U. Ill. L. Rev. 89, 102; Francis E. McGovern, *Resolving Mass Tort Litigation*, 69 B.U. L. Rev. 659, 692-93 (1989). For a discussion of nonagreement baselines and bargaining theory, see Brian M. Barry, *Theories of Justice*, 3-142 (Univ. of Cal., 1989). For a mathematical treatment of two-player bargaining games, see Roger B. Myerson, *Game Theory: An Analysis of Conflict*, 370-416 (Harv., 1991).

40.   *In re Shell Oil Refinery*, 136 F.R.D. 588, 596 (E.D. La. 1991), aff'd sub nom. *Watson v. Shell Oil Co.* 979 F.2d 1014 (5th Cir. 1992).

41.   See, for example, *Ad Hoc Committee Report* at 16 (cited in note 9) (reporting favorably on Judge Lambros's case management program in the Ohio Asbestos Litigation). See generally McGovern, 69 B.U. L. Rev. at 670 n.55 (cited in note 39). Professors Abraham and Robinson would take this approach one step further and apply it to determine the amount of liability at the trial stage. See Robinson and Abraham, 78 Va. L. Rev. at 1489-90 (cited in note 7); Abraham and Robinson, 53 L. & Contemp. Probs. at 140-52 (cited in note 7). Under their approach, data on previous settlements and trial verdicts would be used to calculato damages by means of claim profiles constructed from damage-related variables (severity of injury, type of disease, and the like). The claim profiles would be used in one of two ways at trial: either as evidence of damages subject to the usual jury weighing, or as the actual measure of damages conclusive on jury deliberations. See Robinson and Abraham, 78 Va. L. Rev. at 1493-94. Both alternatives, and especially the latter, differ from settlement to the extent they force outcomes on the parties without their consent.

rough statistical method, such as weighted averaging, to infer settlement information from this sample group. Thus, parties to later cases receive settlements that depend on the statistical properties of a case sample. Furthermore, because future plaintiffs have no chance to influence the litigation of earlier cases, they have as little power over the nonagreement baseline or focal point that controls their settlement outcomes as plaintiffs not included in an adjudicative sample have over the outcomes of the sample cases that determine their verdicts.

Despite these similarities, sampling presents more serious problems than settlement. Settlement always requires consent. Parties bargain when they settle, and all must agree to the ultimate resolution. If a party believes that previous case outcomes are not representative of her case, all she need do is reject her opponent's offer and insist on a higher settlement figure. In contrast, consent is not analytically essential to sampling. A judge might require consent, as Judge Parker did for the plaintiffs in *Cimino*, but he need not do so. Furthermore, as discussed in Parts III and IV, consent to sampling, even when it is obtained, is likely to be more apparent than real given the scarcity of trial opportunities and the high delay costs in mass tort cases.

One should not make too much of this distinction between sampling and settlements, however. The same delay costs that undermine consent to sampling also undermine the consensual basis of settlements. In mass tort cases plaintiffs who file later often confront much longer trial delays and much higher delay costs. Higher delay costs reduce a settling plaintiff's nonagreement baseline; at the limit delay costs exceed expected trial recovery, and plaintiff's baseline drops to zero. By the same token, a defendant's baseline improves because a mass tort defendant normally benefits from longer delays. Bargaining power therefore becomes more asymmetric as delay increases, and a plaintiff becomes more willing to accept a settlement based on previous case outcomes even when she thinks that those outcomes do not accurately reflect the merits of her own case.

An individual mass tort plaintiff is not responsible for long trial delays, and she has no control over the length of the delay other than to file early and hope others do not. As a result, there is reason to disapprove of a settlement baseline significantly skewed in the defendant's favor by high delay costs. If one rejects the baseline, one must also reject the bargaining outcome. Stated differently, consent cannot legitimate a settlement when a plaintiff's fallback position is itself normatively flawed.[42]

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42. See Edward F. Sherman, *Aggregate Disposition of Related Cases: The Policy Issues*, 10 Rev. Litig. 231, 238-39 (1991).

Once one discredits consent as a legitimating factor, however, mass tort settlement takes on a coercive character similar to sampling. One has to answer the following question for each process: What justifies "forcing" case outcomes on a party who neither participated in litigating those cases nor effectively waived her participation right?

Even so, this question may pose more of a challenge for sampling than for settlement. Sampling reflects a deliberate institutional decision to impose outcomes on nonparticipants whereas settlement ordinarily takes place incidental to the adjudicative process.[43] It may be more troubling when the state acts affirmatively to create a burden than when the burden results incidentally from state decisions that are otherwise proper. Nevertheless, the current trend toward institutionalizing settlement in mass tort cases is undermining this distinction. If this trend continues, courts will have to confront the participation question with full force outside the sampling context.[44]

III. SAMPLING WITHIN AN OUTCOME-ORIENTED VIEW

The previous discussion identified two features that are more serious for sampling than for more conventional aggregation procedures: the systematic tendency to under- and overcompensate relative to substantive law entitlements and the adverse effect on participation values. Because of these features, sampling can create substantial social costs.

The following discussion analyzes the costs associated with sampling's impact on outcome. These costs fall into two categories: those directly caused by the sampling procedure itself and those indirectly caused by sampling's effect on litigation-related incentives.

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43. But see Judith Resnik, *Managerial Judges*, 96 Harv. L. Rev. 376 (1982) (discussing how judges pressure parties to settle in ordinary litigation).

44. In defending his use of sampling in the *Cimino* litigation, Judge Parker noted the widespread use of statistics to prove liability in many types of cases. His examples included projecting premerger and postmerger market share in antitrust cases, proving secondary meaning and confusion in trademark cases, proving discrimination in civil rights cases, and proving causation in tort cases. *Cimino*, 751 F. Supp. at 661-62. He also noted the use of statistical evidence to assess damages for shortened life expectancy and lost future profits or earnings. Id. at 662-63. Judge Parker's argument misses the point. The trouble is not that courts use statistical sampling; the trouble is the way courts use it. In all the examples that Judge Parker cites, statistics are used either to prove a liability element defined in aggregative statistical terms, such as in disparate-impact discrimination claims, or to satisfy a probabilistic burden of proof, such as in the tort examples. In all of these situations, the substantive right together with the burden of proof incorporates probabilistic elements suitable for statistical evidence. Thus, the use of statistics follows logically from the nature of the substantive right.

Sampling in a case like *Cimino* operates differently. Sampling is used as a trial technique, not as a way to estimate probabilistic variables relevant to recovery. For example, when the sample mean is less than the expected trial award, sampling in fact gives a plaintiff less than her substantive entitlement. And it does so not because of uncertainties in proof but because of a deliberate decision to forgo an individual trial in favor of an outcome averaged over the sample group.

A. The Direct Effects of Sampling on Outcome Accuracy

1. The Sample Average as a Measure of True Damages

For the following analysis I adopt the conventional approach that measures the quality of an outcome by its accuracy. By an "accurate" outcome I mean one that reflects a correct determination of the facts and the law and a correct application of law to fact. One outcome is more accurate than another if the error risk associated with the former is less than the error risk associated with the latter, where risk of error measures the probability that the outcome is erroneous.

One can expand on the concept of accuracy for those outcomes, such as damage awards, that vary across a continuous range. If a jury is unbiased, its verdict is as likely to be high as low relative to actual damages; and the more competent the jury, the closer its verdict will be to the correct amount. As a result, if the same case were tried to a jury over and over again, one should expect the damages verdicts to fall on a normal (that is, bell-shaped) distribution curve clustering more or less closely about a mean equal to the correct damages award. I shall refer to this distribution as the "error distribution" or "error curve" for the case.

Professors Michael Saks and Peter Blanck have recently argued, in defense of *Cimino*, that the average of sample case verdicts is likely to be more accurate than an individual trial verdict for many mass tort cases.[45] If this argument is correct, it should allay much of the concern about sampling. Unfortunately, however, the argument is flawed. Saks and Blanck do well to remind us that the results generated by individual trials, like the results from sampling, are merely approximations of actual damages for each case. But, as they also recognize, the important question is which approach—sampling or individual trial—gives a *better* approximation. The fact is that, in many mass tort aggregations, an individual trial will give a more accurate verdict than sampling for at least some cases. This is especially true for sample averaging discussed in this section. But it is also true for the more powerful—and more expensive—technique of regression analysis discussed in the following section, since any cost-effective regression procedure has to ignore many damage-related variables.

The normative significance of sampling's error depends, however, on the goals of the substantive law and the function of procedure. For example, if each plaintiff has a substantive right to compensation in the amount of actual harm, then sampling must be justified even if it increases error in only one case. These normative issues are addressed in

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45. See note 14 and accompanying text.

Part III.C. The purpose of the following discussion is to show that there is reason to reach the normative issues because of sampling's effect on the error rate.

The logic of the Saks and Blanck argument for the sample average can be summarized in the following way:[46]

1. If all cases in the larger population are identical, that is, perfectly homogeneous with respect to damage-related variables, then trying a sample of, say, 100 cases is equivalent to trying any individual case in the larger population 100 times.

2. If the same case were tried 100 times, the average of the 100 verdicts would more closely approximate the correct damages figure than any of the 100 verdicts taken separately. The reason is that the averaging process cancels out much of the extreme variation, eliminating unusually high and unusually low verdicts.

3. It follows that if the population is perfectly homogeneous, the average of the 100 sample verdicts will more closely approximate the correct damages figure for any case in the population than the verdict from an individual trial of that case.

4. If the case population is not perfectly homogeneous, the same conclusion holds true so long as the variation is not too great and the sample size is large enough. Furthermore, as a population's variance increases, a larger sample size can help offset the larger error.[47]

The problem with this argument is easy to see. The first three propositions, although true, are not significant because real case aggregations are not perfectly homogeneous and because sampling would be unnecessary if they were.[48] The fourth proposition does all the work, but it is incomplete at best and in some respects flawed. For a nonhomogeneous population, it does not take much variation before the sample average is likely to give an estimate of actual damages that is inferior to a trial verdict for at least one case.

This result follows from a straightforward statistical property of sampling: a sample average lies close to the population mean, and the

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46. For the clearest account, see Saks and Blanck, 44 Stan. L. Rev. at 833-37 (cited in note 14).

47. Unfortunately, Professors Saks and Blanck are not as clear as they could be about the precise effect of increasing sample size. They state that as population variance increases, sample size should be increased in order to "reflect the population accurately." Id. at 842, 847. The problem is that the representativeness of a sample does not necessarily have anything to do with the accuracy of the sample average as an estimate of actual damages. Nevertheless, in the context of the argument as a whole, it seems fair to conclude that Saks and Blanck believe there is some positive correlation between sample size and accuracy of estimate for heterogeneous populations.

48. If there were perfect homogeneity, there would be no problem with mass tort litigation from the point of view of outcome accuracy. If all cases were identical, then the trial of any one would be just as good as the trial of any other, and the aggregation could be easily adjudicated with a simple class action.

larger the sample size, the closer the average is to the mean.[49] Thus, the more distant a case is from the population mean on the distribution, the more likely it is that a trial verdict in that case will be a better estimate of actual damages than the sample average. A larger sample size makes matters worse by driving the sample average closer to the population mean and further from cases not lying at the mean.[50]

Courts can address this problem to some extent by sampling from more homogeneous subgroups and eliminating extreme cases from the aggregation. Gathering the necessary information is costly, however, and there are limits to how well a judge can determine actual damages and identify extreme cases without a trial. Thus, no matter how careful a judge is—and costs limit how careful she can be—she will seldom be able to guarantee that the sample average is at least as accurate as an

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49. For a discussion of the statistical properties of a sample average, see Paul G. Hoel, *Introduction To Mathematical Statistics* 101-08 (Wiley, 2d ed. 1954).

50. These points can be illustrated by a simple graph:
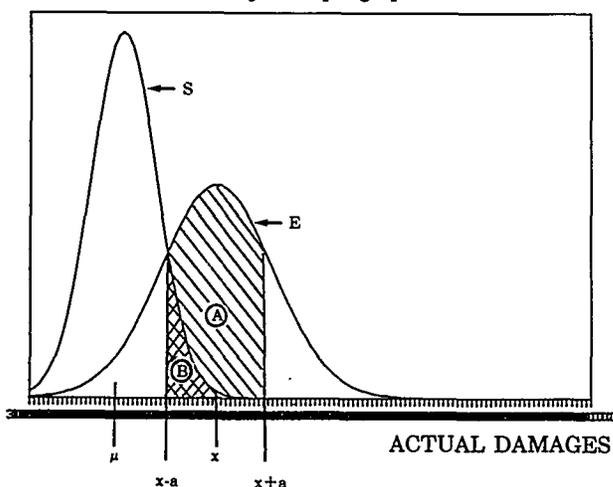
In this graph, "μ" is the population mean, and "x" is the actual damages figure for a case having damages above the population mean. "S" is the distribution curve of sample averages. The mean of the curve S is at μ, and the curve shows the probability of any sample average lying within a specified range of μ. S hugs the population mean, as it should for any sizable sample. "E" is the error distribution curve of trial verdicts for the case with actual damages x. In other words, E shows the probability of obtaining a verdict within any specified range of x.

A quick look at the graph clearly shows that a trial verdict in a case x is much more likely to come close to actual damages than the sample average. The area B under the curve S represents the probability that any sample average will fall somewhere between x − a and x+a. The area A under the curve E represents the probability that a trial verdict will fall somewhere in the same interval, x − a to x+a. Obviously, area A is much larger than area B, showing that an individual trial verdict is a much better estimate of actual damages than the sample average.

As sample size increases, S hugs μ ever more closely, which means that the area B gets smaller. The area A stays the same, however. Thus, the superiority of a trial verdict increases as sample size increases.

individual trial verdict for every case in the population. For sampling to
be useful in large-scale litigation, therefore, its tendency to under- and
overcompensate must be justified.

Saks and Blanck recognize this problem. They note that "at some
point along the heterogeneity-homogeneity continuum, aggregation
ceases to improve the accuracy of individual trials and becomes a vitia-
tion."[51] Given their broad accuracy claims, however, Saks and Blanck
must believe that few aggregations will reach this cutoff point and,
more importantly, that courts will be able to determine reliably and at
reasonable cost which cases do and which do not. But they give no rea-
son to accept these assumptions, and there are reasons to doubt that
the assumptions hold true very often.

To illustrate, suppose that there are 1000 cases in the total popula-
tion and that average damages equals $500,000 with actual damages
distributed as follows:[52]

Actual Damages (in 1000s of dollars)	Number of Cases
300	5
400	120
450	225
500	300
550	225
600	120
700	5
Total	1000

Suppose further that there is a ninety-five percent chance that a jury
verdict in any individual case will deviate from true damages by less
than $80,000 (that is, that the standard deviation of the error distribu-

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51. Saks and Blanck, 44 Stan. L. Rev. at 837 (cited in note 14); see also id. at 845-46 (offering
a more detailed discussion of this point).

52. This example assumes that all cases have nonzero damages. It is worth recalling, how-
ever, that Judge Parker in *Cimino* allowed the juries in the sample cases to adjudicate contributory
negligence issues, and he treated cases of contributory negligence as zero-damage cases when calcu-
lating the sample average. See 751 F. Supp. at 658-59. Including zero-damage cases reduces the
average and increases the variance, which further undermines sample accuracy. For example, sup-
pose that a population of 1000 cases includes two types of cases: 900 cases with true damages of
$500,000, and 100 cases with true damages of zero dollars due to contributory negligence. In this
example, the population is perfectly homogeneous but for the presence of 100 zero-damage con-
tributory negligence cases. Assuming a $40,000 standard deviation for the error distribution and a
sample size of 100 (the same assumptions used in the example given in the text), the probability
that a trial verdict in a $500,000, case will lie between $465,000 and $535,000 is roughly .61, and
the probability that the sample average will lie in the same range is only .16. Thus, the odds are
about eight times greater that the trial verdict will fall in this range. (Odds equal the ratio of the
probability of an event happening to the probability of it not happening.)

tion equals $40,000).[53] If a sample of 100 cases is drawn randomly from this population and each case is tried, it is extremely likely that the average of the trial verdicts will lie somewhere between $485,134 and $514,866.[54] This implies that there is a ninety-five percent chance that the sample average will be less accurate than an individual trial verdict for 250 cases—those with damages less tban or equal to $400,000 and

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53. I also assume that error is distributed independently of true damages so that the error distribution is the same for all cases. If this were not so—if, for example, a jury was able to determine damages more accurately in extreme cases—the risk of error would be lower for cases at the tails of the distribution and the superiority of an individual trial verdict would be even more pronounced for those cases than it is in my hypothetical.

My assumption of $40,000 for the standard deviation is to some extent arbitrary, but nothing much turns on the choice. As the analysis in this Part shows, even if the actual standard deviation is much larger than $40,000, there is still a significant probability that in many case populations an individual trial verdict will be more accurate than the sample average for at least one case, especially in view of the practical impediments to assuring population homogeneity. See notes 57-64 and accompanying text. In any event, a $40,000 standard deviation is intuitively plausible for a reasonably accurate factfinder. Although we do not know very much about jury performance, the evidence indicates that juries make a concerted effort to reach an accurate result and do a pretty good job in the process. See Kevin M. Clermont and Theodore Eisenberg, *Trial by Jury or Judge: Transcending Empiricism*, 77 Cornell L. Rev. 1124, 1151-55 (1992) (stating that "evaluated over the run of cases, juries are good factfinders"); Michael J. Saks, *Do We Really Know Anything About the Behavior of the Tort Litigation System—and Why Not?*, 140 U. Pa. L. Rev. 1147, 1236-39 (1992) (reviewing the data and concluding that "juries are one of our society's most reliable decision-making institutions"). While empirical evidence points to wide variation in jury verdicts and suggests that error is responsible for some of that variation, none of the evidence quantifies tbe precise magnitude of error in the sense that interests us—namely, the risk of deviating from "true" damages. See Blumstein, Bovbjerg, and Sloan, 8 Yale J. Reg. at 174-76 (cited in note 13); Randall R. Bovbjerg, Frank A. Sloan, and James F. Blumstein, *Valuing Life and Limb in Tort: Scheduling "Pain and Suffering"*, 83 Nw. U. L. Rev. 908, 919-24 (1989). See also Randall R. Bovbjerg, *Juries and Justice: Are Malpractice and Other Personal Injuries Created Equal?*, 54 L. & Contemp. Probs. 5, 35-39 (Winter 1991) (concluding that some of the variation in damage awards as between medical malpractice and other types of torts is due to "sympathy" factors); James K. Hammitt, Stephen J. Carroll, and Daniel A. Relles, *Tort Standards and Jury Decisions*, 14 J. Legal Stud. 751, 753-56 (1985) (concluding that juries return larger awards against "deep pocket" defendants). For example, a frequently cited study shows rather extreme variation controls for only one variable, severity of injury, and averages over other relevant factors such as age, jurisdiction, pre-injury earnings and the like. Bovbjerg, Sloan, and Blumstein, 83 Nw. U. L. Rev. at 923-24, 929, 938.

54. Using the formula for calculating standard deviation, it is easy to verify that the standard deviation of damages for the total population, call it σ_x, equals $62,650. Moreover, my hypothesized 95% accuracy rate for an individual trial verdict lying within $80,000 of the true figure implies that the trial error distribution has a standard deviation, call it σ_e, equal to $40,000. Part A of the Mathematical Appendix shows that the standard deviation of the distribution of sample averages, call it σ_s, is given by the following formula, where m is the sample size:

$$\sigma_s = \sqrt{\frac{\sigma_x^2 + \sigma_e^2}{m}}$$

Applying this formula to the hypothetical, in which m=100, gives a standard deviation of $7433 for the average of 100 sample verdicts. This implies that there is a 95% chance that the average of any set of 100 sample verdicts will lie somewhere between $485,134 and $514,866.

those with damages greater than or equal to $600,000.[55] In particular, this means that the sample average will almost certainly undercompensate those plaintiffs with $600,000 and $700,000 actual damages as compared to an individual trial verdict. Indeed, even if trial error increases from $80,000 to $178,000 (that is, the standard deviation of the error distribution increases from $40,000 to $89,000), there is still a ninety-five percent chance that a trial verdict will be more accurate for each of the ten cases at the extreme ends of the distribution.[56]

If one allows probabilities lower than ninety-five percent, the conclusion holds true for an even larger number of cases. For example, if one required only that it be more likely than not—i.e., greater than fifty percent—that a trial verdict be superior to the sample average, all the $450,000 and $550,000 cases would be included at the $80,000 error level.[57]

Because of uncertainty about the precise distribution of actual damages, one can never be absolutely certain that an aggregation is free of extreme cases. As a result, even for nearly homogeneous populations and very large trial error, there normally will be some positive probability that a trial verdict would be more accurate than the sample average for at least one case. Even a small probability means that par-

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55. The $40,000 standard deviation for the error distribution implies that there is a .9545 probability that an individual trial verdict will be within $80,000 of the true figure. Consider the cases with actual damages of $600,000. The probability of the sample average falling below $520,000 (and thus being more than $80,000 from the true damages figure) is about .9954. Thus, the probability of both events occurring, that is, the sample average being less than $520,000 and an individual trial verdict falling within $80,000 of the true damages figure (and thus being a better estimate than the sample average) is the product of the separate probabilities—.9545 x .9954 = .95 or 95%. Because the distribution is perfectly symmetric, the same is true for the $400,000 cases. Furthermore, in a similar manner one can calculate the corresponding probabilities for the $300,000 and $700,000 cases, which exceed .9999 or 99.99%.

Stated differently, for 250 cases, it is more than 200 times more likely that an individual trial verdict will fall somewhere within $80,000 of actual damages than that the sample average will.

56. As I am using the concept, a trial error of $178,000 for a $300,000 case means that there is a 95% chance that a jury will return a verdict somewhere between $122,000 and $478,000. In fact, even if trial error increases to $300,000, it will be roughly 12 times more likely that an individual trial verdict will fall within $175,500 of actual damages than the sample average for the ten extreme cases.

For this hypothetical I have chosen a distribution of cases that is reasonably homogeneous. The argument for using the sample average only gets weaker as the population variance increases and as sample size increases for any given population variance.

57. This means that individual trials would be superior for a total of 700 cases or 70% of the original population. Furthermore, trial error could increase to $177,540 (i.e., the standard deviation of the error distribution could increase from $40,000 to $88,770) without altering the superiority conclusion for 250 cases—those with actual damages greater than or equal to $600,000 and less than or equal to $400,000. The error risk could increase even more, of course, if we were concerned only about the 10 cases at the extreme ends of the distribution.

ties face a risk they would not have to face without sampling, and imposing that risk requires justification.[58]

Increasing sample size only exacerbates these problems by driving the sample average closer to the population mean. For example, if sample size is increased from 100 to 400 in our hypothetical, there is a seventy percent chance that an individual trial verdict would do better than the sample average for a total of 700 cases, including those with actual damages of $450,000 and $550,000.[59]

These problems can be reduced to some extent by the use of stratified sampling.[60] As Judge Parker did in *Cimino*, a court could divide the population into subgroups selected to minimize intragroup variance and sample from each subgroup separately.[61] Stratified sampling cannot cure all problems, however. As Saks and Blanck recognize, the approach requires a great deal of information about the distribution of damages in the overall population, and this information can be difficult and costly to obtain.[62] In our hypothetical, for example, a judge might be

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58. Furthermore, it is doubtful that sampling in a case like *Cimino* will eliminate much of the error caused by jury consideration of improper factors, such as deep pockets or sympathetic plaintiffs. See generally Bovbjerg, 54 L. & Contemp. Probs. at 5 (cited in note 53) (concluding that unobservable sympathy factors affect awards); Hammitt, Carroll, and Relles, 14 J. Legal Stud. at 751 (cited in note 53) (concluding that awards are larger for deep pocket defendants). These cases all involve the same injurious agent, the same general type of conduct on the part of defendants, and a similar set of causal events. Furthermore, all the defendants are major corporations with insurance and potentially deep pockets, and jury sympathy is likely to favor plaintiffs in most cases, although it might vary somewhat from case to case. This means that if improper factors affect jury awards in the sample cases, those factors are likely to skew all the awards in the same direction, thereby skewing the sample average as well. Thus, greater population homogeneity is likely to exacerbate rather than eliminate the influence of improper factors.

59. Fixing the population standard deviation at $62,650 and setting the standard deviation of the error distribution equal to $40,000, an increase in sample size from 100 cases to 400 cases reduces the standard deviation of the sample mean, $\sigma_{\bar{x}}$, from $7433 to $3716. Furthermore, with a $40,000 error standard deviation, there is a .7063 probability that an individual trial verdict for a $550,000 case will fall somewhere between $508,000 and $592,000 (that is, fall within $42,000 of the true figure). With a sample mean standard deviation of $3716, there is a .984 probability that the sample average will be less than $508,000 (that is, fall short of true damages by more than $42,000). Thus, the probability that both facts will hold true is .7063 x .984 = .695 or almost 70%. By symmetry, the same is true for the $450,000 cases.

60. Saks and Blanck, 44 Stan. L. Rev. at 844-47 (cited in note 14).

61. Saks and Blanck note the availability of statistical techniques such as cluster analysis that can minimize variance through stratification. Id. at 845.

62. Id. at 844. Before deciding on sampling, Judge Parker attempted a lump-sum damages procedure in the *Cimino* cases only to be reversed by the Fifth Circuit. See id. at 823 n.65 (describing these events). As a result, Judge Parker had collected extensive information on the characteristics of the overall case population that he could use when considering an appropriate sampling procedure.

At times, Saks and Blanck seem to assume that a court will be able to obtain extremely accurate information about individual cases in the population without conducting trials. I am not convinced. See, for example, id. at 845 n.190 (suggesting that zero-damage, no-liability cases could be handled by grouping them into a separate subgroup but leaving unexplained how a court is sup-

able to separate the $300,000 and $700,000 cases from the rest of the population if she could obtain enough information on individual case variables to identify extreme cases reliably, but she would have a great deal of difficulty distinguishing the $400,000 from the $450,000 cases and the $600,000 from the $550,000 cases.[63] In addition, the more subgroups the court creates, the smaller each subgroup must be. And the smaller a subgroup, the less reliable the sampling procedure and the larger a sample has to be to provide reliable information about the overall population.[64]

In sum, sample averaging is not a costless way to handle the mass tort litigation problem, even from the perspective of outcome quality. This is not to say that for particular damage and trial error distributions sampling might not improve on accuracy. In more situations than Saks and Blanck care to admit, however, sampling is likely to increase the error risk significantly for at least one case and often for many more. At the same time, of course, sampling reduces total litigation costs. Whether sampling is desirable on balance is a normative question that depends on the purpose of adjudication. I discuss this question in Part III.C. below after examining other features of sampling.

2. Linear Regression Over a Sample as a Measure of True Damages

Statistical theory provides more powerful instruments than averaging for extrapolating from a sample to a larger population. For example, some commentators recommend using regression analysis.[65] While it tends to generate results closer to actual damages, regression is similar to sample averaging in one respect: it purchases litigation economy at the price of larger error.

The statistical details of regression analysis are quite complex, but the basic concept is relatively simple.[66] I shall focus on the most com-

posed to determine which of the cases are no-liability cases); id. at 843 (noting that the relevant population parameters were known in *Cimino* and that they did not have to be inferred without explaining why then there was any need to sample at all).

63. Nor does this consider the possibility that a single decisionmaker, such as a judge or special master, might he less accurate than a multimember jury using a majority or consensus decision rule. Compare Lewis A. Kornhauser and Lawrence G. Sager, *Unpacking the Court*, 96 Yale L. J. 82, 97-100 (1986) (showing that a majority vote rule can make multimemher appellate courts more accurate than single decisionmakers).

64. See Saks and Blanck, 44 Stan. L. Rev. at 845 (cited in note 14).

65. Although Saks and Blanck defend use of the sample mean, they also note the availahility of regression techniques. See id. at 850-51. At the Litigation Section panel devoted to the *Cimino* case and sampling, held at the 1992 AALS conference in San Antonio, one of the commentators, Professor David Barnes, recommended using a regression model instead of sample averaging.

66. For a mathematical discussion of basic regression theory, see Hoel, *Mathematical Statistics* at 125-36, 147, 152-60 (cited in note 49); D. L. Harnett and A. K. Soni, *Statistical Methods For Business and Economics*, 443-84, 515-27 (4th ed. 1991).

monly used model, linear regression. Linear regression uses sample data to construct an equation that expresses a linear relationship between one variable, such as the correct damages amount, and other variables correlated with it, such as the plaintiff's age, previous health history, future lost earnings, and medical expenses. For example, a linear regression equation relating actual damages ("y") to plaintiff's age ("x_1") and prior health history (indexed by the variable "x_2" with higher values signifying better health) might look like this:

$$y = 50,000x_2 - 750x_1 + 125,000$$

According to this equation, actual damages decrease with increasing age and increase with better pre-disease health records. For example, assume that prior health is ranked on a scale from one to five and that a hypothetical plaintiff is ranked at two. If this plaintiff were fifty-five years old at the time her disease first appeared, the equation would give damages equal to $183,750.[67]

There are two crucial points to realize about any regression equation: (1) it can give a less accurate estimate of actual damages than an individual trial verdict; and (2) it works only if accurate values can be assigned to the independent variables (x_1 and x_2 in the hypothetical). Every regression equation contains two sources of error: sampling error and unexplained error.[68] Sampling error exists because regression relies on a sample rather than the entire population, and this error approaches zero as sample size increases. Unexplained error, on the other hand, is not affected by sample size. It exists because no set of independent variables can possibly explain all of the relevant variation.[69] One can reduce unexplained error only by including more variables in the regression equation. But there is a problem. The more variables one

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67. In other words, (50,000 x 2) - (750 x 55) + 125,000 = $183,750.

68. Statisticians refer to sampling error as the "explained deviation" and to what I call unexplained error as the "unexplained deviation." The statistical measure of sampling error is known as the "sum of squares regression" ("SSR") and the statistical measure of unexplained error is known as the "sum of squares error" ("SSE"). Total variation, or the "sum of squares total," is the sum of SSR and SSE. See, for example, Harnett and Soni, *Statistical Methods* at 465-69, 520-21 (cited in note 66).

69. As an example, consider our hypothetical regression equation. Because there are numerous variables other than age and prior health history that affect damages, this equation is likely to have a large unexplained error. In fact, there are two kinds of variables that can influence damages verdicts: those that correlate with actual damages (such as age and prior health history) and those that correlate with jury decisions in general (such as jury competence, attorney demeanor, and maybe even courtroom temperature). Because the goal is to measure actual damages, one should ignore the second set of variables when constructing a regression equation. If this is done, the regression estimate will average over the legally irrelevant variance. One should try, however, to include as many of the damage-related variables as possible. Ignoring even one of these variables introduces an error risk the magnitude of which depends on how strongly the excluded variable correlates with actual damages.

includes, the more measurements one must make, and the more mea-surements, the greater the measurement error and the higher the cost.

The fact that regression is not perfectly accurate is hardly signifi-cant standing alone. In order to evaluate regression relative to individ-ual trials, one must compare trial error to total regression error, which includes sampling error, unexplained error, and measurement error. Be-cause this comparison depends on the particular regression equation and the distribution of damages and trial error in the population, it is impossible to say with confidence that regression produces at least as accurate an outcome as an individual trial for all case aggregations. Fur-thermore, absent some way for a court to distingnish between those sit-uations in which regression is at least as good and those in which it is not, it is also impossible to defend regression as equivalent or superior to individual trials for any particular case aggregation.

'There is also reason to doubt the accuracy of regression in mass tort cases. Any regression procedure that significantly reduces costs would have to ignore variables that are difficult to measure without an expensive factual inquiry. If variables of this kind correlate strongly with actual damages—as is likely to be the case for serious forms of injury in mass tort cases—the regression equation will have a large un-explained error. In an asbestos case, for example, the amount of indi-vidual damages depends on a number of complex and often hotly contested variables, such as exposure to carcinogens other than asbestos and the degree to which they contributed to the injury, the degree of exposure to asbestos itself, the actual severity of the disease, the amount of future lost earnings, and the degree of mental anguish suf-fered by the plaintiff. If some of these variables are ignored because of cost, the resulting unexplained error, combined with sampling and mea-surement error, may well exceed individual trial error.

So far, we have examined regression in a case like *Cimino*, where the sample is drawn from an aggregation of pending cases. Regression can be performed on other databases as well. Whatever form it takes, however, the use of regression involves a potential tradeoff between economy and outcome accuracy.

For example, the proposal of Professors Abraham and Robinson[70] regresses over historical data consisting of settlements and jury verdicts reached in earlier cases. Once enough early cases have been adjudicated to comprise a statistically significant sample, Abraham and Robinson would construct claim profiles that specify damages (the dependent va-riable) for different types of cases defined by severity of injury, type of disease, type of occupation, and the like (the independent variables).

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70. See notes 7, 41 and accompanying text.

With claim profiles in hand, the task of a jury in a subsequent case would be greatly simplified. Under one version of the Abraham-Robinson proposal, the jury need only determine the appropriate claim profile for the particular case and then award damages equal to average or median damages for cases belonging to that profile.[71]

This proposal has much to commend it. Nevertheless, as Professors Abraham and Robinson themselves recognize,[72] the approach can adversely affect outcome accuracy compared to the result of an individual trial.[73] For example, there is no way to avoid the error inherent in measuring independent variables for a particular case, especially if the objective is to reduce litigation costs. Furthermore, in order to make a profile system workable, independent variables must be limited to a small and relatively manageable set. But then unexplained error can be quite large.[74]

B. The Indirect Effects of Sampling on Outcome Accuracy

Cimino-style sampling also can indirectly produce adverse outcome effects by distorting litigation incentives. Saks and Blanck ignore these possible effects and thus overlook an important source of outcome error. The problems arise because sampling creates free-rider effects and generates externalities that can affect litigation investment in an asymmetric way. Assuming, as is common in the literature, that differences in litigation investment favor the party who invests more, the resulting

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71. This is the variant of their proposal that would make the claim profile conclusive on the jury. See Robinson and Abraham, 78 Va. L. Rev. at 1494-95 (cited in note 7).

72. See id. at 1503-04, 1508-09.

73. Indeed, Abraham and Robinson defend their proposal on normative grounds that attempt to account for the potential skewing effect on outcome. Id. at 1507-17. I shall examine some of these arguments later in this Article.

74. The Abraham-Robinson proposal also suffers from some potential problems not shared by *Cimino*-style sampling. For one thing, it is not clear that the early cases will necessarily reflect a random sample of the larger case population. If factors such as severity of injury, amount of litigation resources, and likelihood of success correlate with early filing and disposition, then regression could produce skewed damage awards. Furthermore, the defendant may have strong incentives to skew the initial cases toward the low end, see note 76, thereby exacerbating the sampling problem.

In addition, mixing settlements and trial verdicts in the same database may create other problems. See Abraham and Robinson, 53 L. & Contemp. Probs. at 145-46 (cited in note 7) (noting some potential problems with mixing trial verdicts and settlements). Settlements are influenced by a number of factors other than the expected trial verdict, including the transaction costs of trial versus settlement and the parties' relative bargaining power and strategic skill. Thus, settlements and trial verdicts measure different things, and it is not at all clear that the two should be combined in the same database. But see Robinson and Abraham, 78 Va. L. Rev. at 1490-91 (cited in note 7) (justifying combination as a way to generate a market value for the claims). Indeed, it can be argued that the only proper measure of damages is the trial verdict because only the trial verdict reflects the considered judgment of neutral decisionmakers about "true" damages, those corresponding to the parties' legal rights.

asymmetry will increase the error risk by systematically skewing the outcome in favor of one side.[75]

I assume for purposes of the following discussion that the judge has decided to average sample verdicts, as Judge Parker did in *Cimino*. I focus on sample averaging rather than regression for several reasons. The points are easier to see with the more straightforward averaging technique; courts may continue to use averaging in view of regression's much higher costs, and as we shall see in Part III.C., some normative theories call for the use of sample averaging rather than regression. Nevertheless, regression also creates incentive problems. Although it can reduce free-riding by giving verdicts closer to actual damages, regression cannot eliminate free-riding completely, and it does nothing about the adverse incentive effects of the different cost allocation schemes discussed below. A court using regression over a *Cimino*-type sample, therefore, should be sensitive to the same risks and follow the same recommendations that are discussed below for sample averaging.[76]

The severity of the litigation incentive problem depends on two factors: whether the sampling procedure gives sample cases their own trial verdicts or the sample average and how the procedure allocates the total litigation costs incurred by sample plaintiffs. The following matrix distinguishes four different arrangements:

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75. For a general treatment of these effects, see Richard A. Posner, *Economic Analysis of Law* 532-33, 543-44 (Little, Brown, 3d ed. 1986); Stephen J. Spurr, *An Economic Analysis of Collateral Estoppel*, 11 Int'l Rev. L. & Econ. 47 (1991).

76. As Professors Abraham and Robinson recognize, their claim-profile approach can also generate adverse incentives. See Abraham and Robinson, 53 L. & Contemp. Probs. at 145 (cited in note 7). To see this, suppose that a company expects to be a defendant in most, if not all, asbestos suits, and suppose that this same company also expects that a claim profile approach will be used instead of individualized litigation, beginning at some future time. This company will have an incentive to conduct the early litigation in a way that minimizes its liability under the anticipated claim profiles. For example, the company will be inclined to delay high damage cases as long as possible by insisting on trial and refusing settlement, while at the same time settling the low damages cases for as little as possible. Of course, the company will face attorneys who are also likely to be repeat players with the opposite set of incentives. The resulting equilibrium is uncertain. The opposing strategies might counteract each other, or the impact on claim profiles may be too attenuated to justify large investments in strategic behavior. See id. (making these points). But neither of these results is certain. It is also possible that the equilibrium will result in claim profiles skewed in a low direction, especially in view of litigation asymmetries (in both access to resources and information) and the relative ease with which litigation can be delayed.

OUTCOMES

	All cases get sample average.	Sample cases get own trial verdicts; Others get sample average.
Each sample case bears its own costs.	I	II
Total costs averaged over all cases.	III	IV

LITIGATION COSTS

To begin the analysis, assume that sample plaintiffs are all represented by different attorneys and the attorneys litigate exclusively in their clients' best interests. (We shall modify these assumptions later to take better account of the realities of mass tort litigation.) Under these simplifying assumptions, Arrangements I and II skew litigation investment choices strongly in defendant's favor, whereas Arrangement IV skews the choices in plaintiff's favor. Arrangement III balances incentives across the party line and is likely to be the best of the four alternatives. These results suggest that a sampling procedure should average total litigation costs over the entire plaintiff population and give sample plaintiffs the average verdict rather than their own trial verdicts.[77]

To see why Arrangement I creates asymmetry, consider the impact of its damages and cost allocation rules on a plaintiff deciding how much to invest in litigation. The plaintiff knows that she cannot capture the entire marginal benefit from a unit of litigation investment unless all other sample plaintiffs invest at a similar level. Because she receives the sample average, any marginal increase in her own verdict will be averaged over all sample cases. The plaintiff is also aware that she benefits from investments made by other sample plaintiffs because larger verdicts in other cases produce a larger sample average. As a result of these factors, the plaintiff is likely to invest at a lower level than

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77. Although Judge Parker's opinion in *Cimino* makes clear that he gave each sample plaintiff her own trial verdict, see 751 F. Supp. at 653, the opinion does not reveal how the judge distributed litigation costs. If he forced each litigating plaintiff to bear her own costs, his approach would correspond to Arrangement II, which has serious drawbacks. On the other hand, spreading litigation costs would identify his approach with Arrangement IV, which although much better than II, may be inferior to Arrangement III, depending on contingency fee and multiple representation factors. See notes 82-86 and accompanying text.

she would if her case were not tied to other cases in the sample. Furthermore, the larger the sample, the lower her individual investment is likely to be.

Although the defendant's marginal benefit in any one case is diluted through sample averaging in the same way as plaintiff's, the defendant has an advantage. Because the defendant is a party to all the cases, its marginal benefit from investment in any one case is multiplied over all cases in the population. Thus, defendant should invest at a higher level than plaintiff.[78]

The precise magnitude of the investment differential depends on the strategic interaction between the two parties, which in turn depends on how the expected verdict varies with investment amount—in other words, on each party's payoff from litigation investment. For a large population these interaction effects should create one of two equilibrium outcomes depending on the payoff functions: (1) both parties invest at a low level relative to the amount at stake, and defendant invests more than plaintiff; or (2) plaintiff invests at a low level, and defendant invests at a high level.[79] In either case the error risk is likely to be much higher than it would be in an individual case not tied to others through sampling.[80]

Arrangement III eliminates this asymmetry and creates incentives in equilibrium for both parties to invest at a high level. To see why, consider how the change in approach alters the marginal benefit analy-

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78. The net effect is to increase defendant's marginal benefit relative to an individual trial by a factor equal to the ratio of the total number of cases (which multiplies the marginal benefit) to the number of cases in the sample (which divides the marginal benefit).

79. By "equilibrium" I mean the game theoretic concept of a Nash equilibrium, where each party's investment strategy is a best response to the investment strategies chosen by all other parties. See Myerson, *Game Theory* at 91-98 (cited in note 39). In the Mathematical Appendix, I model the investment problem with a simple payoff function that makes the amount of the verdict depend on plaintiff's fraction of total litigation investment. This model predicts that a defendant operating under Arrangement I will invest an amount in equilibrium equal to n times plaintiff's investment, where n is the total number of cases in the population. Thus, if there are 1000 cases, defendant will invest 1000 times the amount plaintiff invests. Moreover, this analysis also shows that, assuming all sample plaintiffs and the defendant are equally efficient and effective litigators (i.e., that $k = 1$ as k is defined in the Appendix), plaintiff will invest in equilibrium approximately 1/nm of the total amount at stake, where n is the size of the population and m is the size of the sample. Thus, for 200 cases each worth $1,000,000 and a sample size of 10, this analysis predicts that each of the 10 litigating plaintiffs will invest $495, and the defendant will invest $99,000 in each case. For a more extensive analysis of this example, see Part B of the Mathematical Appendix.

80. If all plaintiffs are risk neutral, have the same actual damages at stake, and are equally efficient litigators, they are identically situated and by symmetry they should all adopt the same low-investment strategy in equilibrium. If plaintiffs have different actual damages, those with more at stake ought to invest more in equilibrium, assuming that plaintiff and defendant have the same information about actual damages. However, defendant will also invest more in those cases that have more at stake, and therefore the asymmetry should persist.

sis. Because sample plaintiffs continue to receive the sample average and because the new cost allocation scheme does not affect the defendant, defendant's marginal benefit remains the same as in Arrangement I. Averaging litigation costs, however, multiplies plaintiff's marginal benefit by the number of cases in the population, giving each plaintiff exactly the same multiplier advantage as the defendant.

Furthermore, because each party receives more marginal benefit from a unit of litigation investment than if the case were adjudicated in isolation, each can expect the other to invest at a higher level than she would if the case were not tied to other cases. If each party responds by investing at a higher level, then expectations will match reality and the strategies will be in equilibrium. Thus, both parties should invest at a high level.[81]

The analysis changes when the initial assumptions about attorney representation and plaintiff control are relaxed. In large-scale mass tort litigation, attorneys take cases on contingency, and they are likely to run the litigation primarily with an eye toward maximizing their own fees net of costs, rather than their client's damage recovery.[82] Furthermore, attorney representation of plaintiffs often overlaps, as attorneys operating on contingency try to capitalize on expertise by taking large numbers of clients.[83] Thus, sample plaintiffs in these cases are likely to fall into different groups characterized by common representation. In-

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81. Using the same marginal benefit analysis, it is easy to see that Arrangement II skews litigation incentives in defendant's favor although less severely than does Arrangement I and that Arrangement IV skews incentives in plaintiff's favor. Even though both skew incentives, Arrangement II may be more troubling than Arrangement IV because II's allocation rules can encourage plaintiffs to invest at low levels relative to the amount at stake. By contrast, Arrangement IV's rules should encourage both parties to invest at a high level under most sampling scenarios. Thus, Arrangement IV's asymmetry may not seriously affect outcome accuracy if one assumes that litigation investment is subject to declining marginal returns. See Isaac Ehrlich and Richard A. Posner, *An Economic Analysis of Legal Rulemaking*, 3 J. Legal Stud. 257, 265 (1974); Thomas D. Rowe, Jr., *Predicting the Effects of Attorney Fee Shifting*, 47 L. & Contemp. Probs. 139, 143 (Winter 1984). If there is little to gain from more investment once one is already investing at a high level, asymmetries ought not affect error rate significantly. For an analysis, see Part B of the Mathematical Appendix.

A high level of litigation investment is not always desirable, of course. Investment in litigation is a social cost, and it is justified only to the extent it creates social benefits that exceed the cost. The analysis presented here focuses on avoiding serious asymmetries and undesirably low levels of litigation investment.

82. See Hensler, 1989 U. Ill. L. Rev. at 92-97 (cited in note 39); see also Macey and Miller, 58 U. Chi. L. Rev. at 12-27 (cited in note 38) (noting how attorneys control class actions as entrepreneurs furthering their own interests); John C. Coffee, Jr., *The Regulation of Entrepreneurial Litigation: Balancing Fairness and Efficiency in the Large Class Action*, 54 U. Chi. L. Rev. 877, 883-89 (1987) (same). Although the large amount at stake for each plaintiff makes client monitoring more likely in mass tort cases than in small-claimant class actions, there are other obstacles that make monitoring extremely unlikely even when the size of the claim is large. See id. at 877.

83. See Hensler, 1989 U. Ill. L. Rev. at 96-97 (cited in note 39).

deed, the *Cimino* litigation almost certainly involved contingency fee arrangements, and it was rife with multiple representation.[84]

Taking account of contingency fees and multiple representation alters the marginal cost-benefit analysis and thus also the relative merits of the different allocation schemes. Nevertheless, it is not likely to disturb the superiority of Arrangement III for many cases, and it certainly does not change the basic conclusion that sampling rules must be designed with incentive effects in mind.

To see these points, first consider the effect of adding only contingency fees and attorney control to the analysis (in other words, assume that all sample plaintiffs are represented by different attorneys). A contingency fee makes the attorney's marginal benefit from a unit of litigation investment less than plaintiff's, and thus the attorney's investment incentives lower. Lower attorney incentives have a different impact under the different Arrangements. They exacerbate the adverse outcome effects of Arrangement I and Arrangement II by enhancing defendant-favoring asymmetries, and they break the symmetry of Arrangement III, thereby giving an advantage to the defendant. But reduced incentives on plaintiff's side improve matters under Arrangement IV by mitigating the plaintiff-favoring asymmetry.

Nevertheless, for most contingency arrangements and for samples of a statistically significant size, Arrangement III should continue to be superior to Arrangement IV. This is so because Arrangement IV's asymmetry is a function of sample size reduced by the contingency factor, while Arrangement III's newly created asymmetry depends only on the contingency. With a sample size of sixty and a typical contingency of one-third, for example, Arrangement IV's residual asymmetry should depend on a factor of twenty (sixty multiplied by one-third), while Arrangement III's newly created asymmetry should depend only on a factor of three.[85]

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84. See Jack Ratliff, *Special Master's Report in* Cimino v. Raymark Industries, Inc., 10 Rev. Litig. 521, 524 (1991) (observing that the *Cimino* cases were controlled by a few law firms).

85. In Part B of the Mathematical Appendix, I show how a focus on the attorney alters incentives under a relatively simple litigation investment model. In particular, the model predicts that a one-third contingency will cause a plaintiff to invest one-third of what defendant invests in equilibrium if Arrangement III's rules are followed. However, under Arrangement IV, a plaintiff will invest m/3 times the amount defendant invests, where m is the sample size. To illustrate, suppose there are 1000 cases each worth $1,000,000 and a sample of 50 cases is drawn at random from the population. Suppose further that all sample plaintiffs and the defendant are equally efficient and effective litigators (i.e., assume k = 1, as k is defined in the Appendix). The model predicts that a plaintiff acting under Arrangement III will invest $1.25 million while a defendant will invest $3.75 million in equilibrium, and a plaintiff acting under Arrangement IV will invest $17.8 million while a defendant will invest $1.07 million in equilibrium. In this example Arrangement III encourages each party to invest at a high level and achieves greater equality across the

Adding multiple representation to the mix, however, can make Arrangement IV more attractive than Arrangement III for some cases. An attorney representing more than one sample plaintiff will manage her portfolio of sample cases as a unit and thus adopt a strategy that maximizes her expected net gain overall. This should not change the analysis for Arrangement III because the increase in total costs should offset the increase in stakes. But under Arrangement IV, multiple representation should reduce investment incentives on plaintiff's side, further mitigating the plaintiff-favoring asymmetry.

It follows that if multiple representation is pervasive enough, a combination of contingency fee and multiple representation might reduce Arrangement IV's asymmetry below that of Arrangement III without sacrificing a high level of investment on both sides. For example, assuming a sample size of 315 and a one-third contingency, Arrangement IV might be superior to Arrangement III if twenty-one attorneys each represented fifteen of the sample plaintiffs.[86]

In sum, the foregoing analysis suggests that for most large-scale aggregations, a court using *Cimino*-style sampling should choose between Arrangement III and Arrangement IV for its verdict and cost allocation rules. Indeed, because of Arrangement III's superiority in many situations, it might make sense to recognize a presumption in its favor, subject to rebuttal if a party can persuade the court that Arrangement IV would yield better results.

Litigation investment is not the only outcome-related variable likely to be affected by sampling. For example, incentives to file frivolous suits could increase if neither the defendant nor the court can detect instances of frivolous litigation.[87] Because a plaintiff can obtain substantial recovery without participating actively in the litigation or presenting anything about her case, sampling can make frivolous suits seem quite attractive unless cases are screened in some way before final

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party line than does Arrangement IV. For a more detailed discussion, see Part B of the Mathematical Appendix.

86. For an analysis, see Part B of the Mathematical Appendix.

87. The literature on frivolous litigation shows that a plaintiff has an incentive to bring a frivolous suit in order to extract a favorable settlement, especially under conditions of asymmetric information. See, for example, Avery Katz, *The Effect of Frivolous Lawsuits on the Settlement of Litigation*, 10 Int'l Rev. L. & Econ. 3 (1990); Lucian A. Bebchuk, *Suing Solely to Extract a Settlement Offer*, 17 J. Legal Stud. 437 (1988); David Rosenberg and Steven Shavell, *A Model in Which Suits Are Brought for Their Nuisance Value*, 5 Int'l Rev. L. & Econ. 3 (1985). In the sampling situation the frivolous plaintiff need not rely only on a settlement. She can also hope for a final judgment in the amount of the sample average. In a case like *Cimino*, for example, a frivolous plaintiff deciding whether to file suit will consider the possibility that she could proceed through the liability phase as an inactive class member and through the damages phase as a nonparticipating member of the larger group.

judgment.[88] A rise in frivolous litigation adds to court costs and increases the likelihood of erroneous outcomes.

C. The Case for Sampling

The discussion to this point has been descriptive: it has identified possible effects on outcome and associated costs. The following analysis is normative. It addresses the question whether sampling is justifiable given the costs. The answer depends on one's theory of adjudication and on a fundamental distinction between utilitarian and rights-based modes of analysis. If the goal of adjudication were simply to maximize utility, there would be little fuss about sampling. As discussed below, sampling produces efficient outcomes, and the litigation cost savings it creates should justify its frequent use on utilitarian grounds. Sampling is troubling primarily because of its impact on rights. Sampling risks giving plaintiffs with high damages less than their substantive entitlements, and it denies many the process opportunities they claim as a matter of right under the Due Process Clause.

The centrality of rights-based claims to adjudication complicates the sampling analysis because claims based on individual right have priority over claims based on maximizing utility or furthering aggregative social goals.[89] In effect, a rightholder can demand that her individual right be satisfied even if overall utility would suffer as a result. Thus, arguments based on general cost savings and aggregative accuracy that make sampling relatively easy to justify under a utilitarian theory have no weight under a rights-based theory. This fundamental distinction between right and utility is basic to the analysis that follows.

Another important distinction is between two different ways of justifying sampling. One approach shows that sampling is justified because it achieves the normatively ideal state of affairs, however defined. The other approach shows that sampling can be justified despite the fact that it falls short of the ideal in major respects. The efficiency-based

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88. Defendants could monitor for frivolous suits by conducting discovery in all cases. However, frivolous suits can be difficult to identify, and the cost of discovery might lead defendants not to use it in all cases. In addition, the court itself might assume the task of weeding out frivolous claims by, for example, appointing a special master to compile information on each case. Proof-of-claim forms could be sent to all plaintiffs, requiring them to provide detailed case information under oath. See, for example, *In Re Shell Oil Refinery*, 136 F.R.D. 588 (E.D. La. 1991). This procedure would increase court costs and erode some of the benefits of sampling, but it would also reduce the incentive to file frivolous suits.

89. See, for example, Thomas Nagel, *Mortal Questions* 112-15, 131-33 (Cambridge, 1979); Ronald Dworkin, *Taking Rights Seriously* 90-100 (Harv., 1977). This is not to say that rights-based claims are necessarily incompatible with utilitarianism. Rule-utilitarian theories, for example, justify rights by focusing on long-term utility maximization. My point is that the existence of rights, however generated, rules out those utilitarian justifications that seek to maximize aggregate or average utility at the expense of the rightholder.

analysis and the moral rights analysis outlined below employ the first approach and defend sampling as a means of achieving an ideal outcome. The legal rights analysis, as well as the process-oriented analysis in Part IV, are examples of the second approach. They justify sampling despite its adverse effects on outcome and participation by showing that sampling is a normatively defensible response to a condition of extreme scarcity.

1. An Efficiency-Based Analysis

An efficiency-based theory of adjudication assumes that the substantive law is designed to create incentives for socially efficient behavior and that the purpose of adjudication is to enforce the substantive law.[90] Under this view, accurate outcomes are important because they further the incentives that the substantive law creates. Erroneous outcomes distort incentives and can underdeter socially harmful or overdeter socially beneficial activity. Thus, an efficiency-based theory of adjudication is utilitarian in the sense that it focuses on aggregate welfare rather than on individual rights.

Using the sample average to set damages, as the court did in *Cimino*, is rather easy to justify within an efficiency framework.[91] Substantive rules regulate behavior by adjusting the expected utility parties gain from different activities, and expected utility is based on average quantities. Whenever firms or individuals decide whether to market a product and how much to invest in safety, they evaluate the anticipated costs and benefits in light of the average case. By giving all plaintiffs who establish liability the average damages verdict, sampling in effect treats every case as an average case. As a result, sampling should have no effect on expected utility payoffs in most situations and thus no effect on the ex ante investment choices of a risk-neutral firm or individual.

Sampling may even have a beneficial effect on risk-averse defendants by reducing the uncertainty associated with individual trial verdicts (although costs may increase for risk-averse plaintiffs).[92] Assuming a case aggregation is reasonably representative of the range of mass tort

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90. See, for example, Robert D. Cooter and Daniel L. Rubinfeld, *Economic Analysis of Legal Disputes and Their Resolution*, 27 J. Econ. Lit. 1067, 1086-87 (1989); Richard A. Posner, *An Economic Approach to Legal Procedure and Judicial Administration*, 2 J. Legal Stud. 399 (1973).

91. Sample averaging should usually be preferred to regression on efficiency grounds. Regression is more costly than averaging, and by giving verdicts close to actual damages, it may also undermine the benefit to risk-averse actors of giving ex post recovery in the amount of expected loss. If averaging generates perverse litigation incentives, however, regression might be a better choice.

92. See Robinson and Abraham, 78 Va. L. Rev. at 1509 (cited in note 7). The prevalence of first-party insurance should reduce the plaintiffs' risk-bearing costs considerably.

cases, an average over any sample should closely approximate mean damages for all possible cases. Thus, the sample average distribution has less variance about the mean than the distribution of trial verdicts. Because defendants rely on an estimate of this mean figure when making ex ante investment choices, sampling will give them more certainty about their expected liability and in this way help reduce the costs of risk-averse behavior.

The most serious efficiency objection to sampling is the possibility of overdeterring socially beneficial activity by making recovery too easy and encouraging too many plaintiffs to bring suit. Mass tort cases are difficult to settle in part because defendants fear the effect of massive liability on cash flow and prefer to stretch out payments by prolonging litigation.[93] Sampling accelerates liability and risks forcing productive firms into bankruptcy.[94] This potential for catastrophic loss is likely to induce risk-averse behavior and create incentives for firms to shun socially beneficial activity and invest excessively in risk avoidance measures.[95]

Although overdeterrence is an important concern, it ought not prevent the use of sampling. There is no indication that sampling, by reducing trial costs, increases enforcement in a way that runs counter to a decision to deal with underenforcement in other ways, such as by expanding tort liability or enlarging tort damages.[96] Furthermore, there is no reason to believe that defendants will create delays through strategic maneuvering that match the socially optimal payment schedule. If overdeterrence is a problem, it is more desirable to rely on a court to work out a sensible remedial scheme in each case or on a legislature or court to adjust substantive tort rules than to rely on the defendant to choose a socially desirable delay strategy.[97]

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93. See Mark A. Peterson and Molly Selvin, *Mass Justice: The Limited and Unlimited Power of Courts*, 54 L. & Contemp. Probs. 227 (1991); McGovern, 69 B.U. L. Rev. at 659 (cited in note 39).

94. See Weinstein and Hershenov, 1991 U. Ill. L. Rev. at 270, 290 (cited in note 19) (noting that in mass tort cases, "the defendants' liability exposure is also of an unprecedented magnitude that frequently threatens companies or even entire industries with bankruptcy"). More than half of all asbestos defendants have already turned to bankruptcy proceedings in an effort to manage the liability exposure. See *Ad Hoc Committee Report* at 30 (cited in note 9).

95. A similar concern has been noted in the class action setting. See Note, *Developments in the Law—Class Actions*, 89 Harv. L. Rev. 1318, 1362-65 (1976).

96. If tort liability had been expanded or damages enhanced in order to compensate for underenforcement, a procedural change, such as sampling, that removed obstacles to suit might result in overenforcement from an efficiency perspective. For a discussion of this problem in the class action setting, see id. at 1361-62.

97. There is also some risk that sample averaging will distort plaintiffs' incentives. Use of a sample average, for example, might encourage plaintiffs to underinvest in damage mitigation measures. If each plaintiff were certain her co-plaintiffs would invest at a reasonable level, she would do so as well. But plaintiffs cannot be certain of this because sample averaging gives each an

Although sampling fits an efficiency framework quite nicely, certain requirements must be observed in designing the procedure if it is to achieve efficiency goals.[98] The case aggregation must be large enough to justify the use of statistical techniques, and the aggregated cases must be related to one another closely enough so that the sample average corresponds to an individual's or firm's expected liability predictions ex ante.[99] Furthermore, as discussed in Part III.B., any sampling procedure should ensure a high level of litigation investment on both sides and rough parity across the party line.[100] In most cases this will call for giving each litigating plaintiff the sample average and spreading her litigation costs over the entire case population.

Finally, under current law sampling is a practical option only at the damages stage. There is no conceptual obstacle to using sampling to measure liability, but it would require a major change in tort law. Tort liability is binary: a defendant is either liable or not, and if liable, the defendant must compensate the plaintiff in full. At best, sampling applied to liability can only provide an estimate of the probability that defendant is liable to any plaintiff in an arbitrarily chosen case. This estimate equals the number of liability verdicts divided by the total number of sample cases. Thus, sampling could be used to determine liability only if the tort law recognized probabilistic liability measures.[101]

Current law prohibits this use of sampling, even in mass tort cases. The departure from existing practice is more extreme than for damages

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incentive to free-ride on others. This risk is not likely to be significant in mass tort cases, however, because plaintiffs usually suffer from serious physical injuries and are not likely to delay treatment in order to free-ride at the damages stage.

98. Professors Saks and Blanck discuss a number of useful design guidelines. See Saks and Blanck, 44 Stan. L. Rev. at 841-51 (cited in note 14).

99. The requirement of closely related cases does not refer to statistical properties of the case aggregation but instead refers to the expectations of those whose behavior is being regulated. Sampling is most appropriate when the case aggregation belongs to a single planning unit from an ex ante perspective. To illustrate, suppose that a company manufactured two products—the drug diethylstilbestrol and the chemical dioxin. Although it would be theoretically possible to determine average damages by sampling from an aggregation combining both types of cases, to do so would make little sense because firms are not likely to group drug and chemical projects together when making decisions about appropriate precautionary measures. Compare Restatement (Second) of Judgments § 24 (1982) (directing courts, when determining whether factual grouping constitutes a single "claim" for claim preclusion purposes, to consider "whether . . . treatment [of the facts] as a unit conforms to the parties' expectations or business understanding or usage").

100. See notes 77-86 and accompanying text.

101. Under a sampling system, for example, one might discount each plaintiff's damages by the likelihood of a liability finding and award fractional recovery. Thus, if liability were found in 100 of 200 sample cases, each case in the larger population would receive a verdict for only one-half of its actual damages. In fact, one could achieve exactly the same result simply by averaging the damage verdicts for all the sample cases, with those verdicts of no liability counting as zero damages.

sampling. Liability sampling shares much more in common with proposals to substitute a proportionality rule for the traditional preponderance-of-the-evidence rule in civil cases.[102] While some commentators have endorsed this reform, no court has ever accepted it.[103]

In sum, efficiency values support sampling in a wide range of situations so long as the total population is large and all cases are closely enough related. When deciding whether to use the procedure, courts must consider potential efficiency costs. Even when costs exist, however, the benefits of sampling are likely to exceed the costs, at least if the sampling procedure is properly designed to mitigate the more serious litigation incentive problems.[104]

2. A Rights-Based Analysis

A rights-based theory assumes that the purpose of adjudication is to determine each party's legal rights accurately. Because rights trump social utility, a deprivation of a right cannot be justified by direct appeal to the aggregate social benefits the offending activity makes possible. Thus, if an erroneous result counts as a deprivation of substantive right, procedures that increase error cannot be justified simply by citing the aggregate benefits to all resulting from reduced litigation and delay costs.

It is not readily apparent, however, why an erroneous result should count as a deprivation of right when the court finds the facts and applies the substantive law as accurately as possible within established procedures and when all parties have the usual opportunities to obtain appellate review. One possible answer is that a mistaken failure to provide what a legal right entitles constitutes a violation of that right. On this view the court need not purposefully or even inadvertently with-

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102. See, for example, Saul Levmore, *Probabilistic Recoveries, Restitution, and Recurring Wrongs*, 19 J. Legal Stud. 691 (1990); Rosenberg, 97 Harv. L. Rev. at 849 (cited in note 14.) See also Glen O. Robinson, *Probabilistic Causation and Compensation for Tortious Risk*, 14 J. Legal Stud. 779 (1985) (urging liability for risk creation based on probability of harm). Under the proportionality rule, a plaintiff receives a verdict whenever a jury finds that there is some nonzero chance of liability, but the verdict amount is discounted by the jury's probability judgment.

103. See, for example, Levmore, 19 J. Legal Stud. at 697-98 (cited in note 102); Rosenberg, 97 Harv. L. Rev. at 849 (cited in note 14).

104. The benefits of sampling include reduced litigation and delay costs. One must be careful, however, about estimating the magnitude of such cost reductions. By making litigation more attractive, sampling is likely to encourage the filing of lawsuits that would not otherwise have been brought and the litigation of suits that might otherwise have settled. The additional volume of litigation will generate costs of its own, which will offset some of the cost reduction benefits of sampling. The magnitude of these offsetting costs will depend on the equilibrium state of the system after the introduction of sampling. See George L. Priest, *Private Litigants and the Court Congestion Problem*, 69 B.U. L. Rev. 527 (1989) (analyzing the equilibrium effects of delay reduction measures).

hold the right from an entitled party. Assuming that error is symmetrically distributed about the correct result, each party's expected outcome would equal exactly the amount that his legal right guarantees. Yet, the mere possibility of error would violate the parties' rights.

To hold this view, one must believe that the substantive legal right guarantees not only a judicial decision based on substantive norms but also a perfectly accurate decision. There are obvious reasons to reject such an extreme position. Our current system tolerates procedural error even when expensive procedures might reduce it, and we do not believe that a moral wrong or a rights violation has occurred every time some procedure marginally increases the error risk. Furthermore, if a substantive right implied a right to a perfectly accurate outcome, parties would be entitled to demand that the community invest resources in procedure at a level that maximized accuracy regardless of cost.[105] Any system that recognized such a right could easily find itself morally committed to a disastrous level of financing for adjudication.

Even so, substantive rights must constrain procedural choices to some extent, and parties must have procedural rights to enforce those constraints in particular cases. Otherwise, courts could undermine substantive entitlements by limiting the procedures necessary to their enforcement.[106] To cite an extreme example, a court that ignored the substantive law completely and decided a case by simply flipping a coin would surely be held to have violated the parties' rights even if the savings funded other activities the community valued more.

It is not obvious, however, what procedural rights the substantive law entails. This Article is not the place to address this question in its general form.[107] Rather, this Article focuses on the question in the specific context of sampling, although even a focused analysis cannot avoid treating some of the more general points.

Sampling is especially troubling from a rights-based perspective because of its tendency to create biased error.[108] This effect is much stronger for sample averaging than for regression. Because the sample

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105. At least up to the point where such an investment endangered rights having the same moral weight.

106. See *In re Fibreboard Corp.*, 893 F.2d 706, 711 (5th Cir. 1990) (saying that "changes in substantive duty can come dressed as a change in procedure").

107. Professor Dworkin has given the most extensive treatment to date, and I rely to some extent on his analysis. See Ronald Dworkin, *Principle, Policy, Procedure*, in Ronald Dworkin, ed., *A Matter of Principle* 72 (Harv., 1985). I have discussed Dworkin's arguments elsewhere and applied them to nonparty preclusion law. See Bone, 67 N.Y.U. L. Rev. at 256-64 (cited in note 17).

108. Thus, it is not correct to compare the error created by sampling to the ordinary random error inherent in any litigation process. Compare Robinson and Abraham, 78 Va. L. Rev. at 1504 (cited in note 7) (making such a comparison). Sampling systematically biases outcomes in high-damage cases, thereby effecting a transfer from high to low damages plaintiffs.

average is close to the population mean, it is very likely to be less than actual damages for cases above the mean and greater than actual damages for cases below the mean.[109] In many situations sampling virtually guarantees that at least some high damage plaintiffs will receive verdicts substantially lower than the verdicts they would receive from an individual trial.

Defenders of sampling respond to these concerns in three ways. First, they argue that any objections are waived whenever plaintiffs consent to sampling. Second, they argue that an individual trial verdict is not the appropriate baseline when a trial is not a viable option due to high litigation and delay costs. And finally, they argue that sampling generates litigation cost savings that offset a low sampling verdict. Unfortunately, none of these arguments satisfactorily responds to rights-based concerns. I shall examine each in turn and then develop a more persuasive set of justifications that takes account of the nature of the rights at stake.

a. The Standard Arguments

i. The Consent Argument

First, consider the argument from consent.[110] If procedural rights are waivable, sampling should pose no normative difficulty when plaintiffs consent to the procedure, *provided* their consent qualifies as a voluntary waiver.[111] Although defendants are likely to object, as the defendants did in *Cimino v. Raymark Industries*, they have little cause for complaint. The sample average when multiplied by the number of cases in the aggregation produces an aggregate liability very close to total damages for the whole population, closer in fact than the total of individual verdicts had all the cases been tried separately.[112] Assuming that each defendant is liable for all damages in all cases, no defendant

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109. See notes 49-50 and accompanying text.

110. Professors Saks and Blanck rely heavily on plaintiffs' consent to address many of the normative objections to sampling. See Saks and Blanck, 44 Stan. L. Rev. at 829 n.102, 829-30, 837 (cited in note 14). Nevertheless, they also recognize the potential problems with relying on consent in mass tort cases. Id. at 825 n.77.

111. Plaintiffs consented in *Cimino*, for example. On the other hand, if sampling were antithetical to the fundamental nature of the judicial function, its use by a court might run afoul of separation-of-powers principles, and the procedure would be unconstitutional notwithstanding party waivers. See notes 163-67 and accompanying text.

112. This is so because, with a large enough sample, the standard deviation of the sample average distribution is less than the standard deviation of the error distribution for individual trials. See Mathematical Appendix, Part A.

could claim that sampling distorted its total liability in a significant way.[113]

The scarcity condition that triggers recourse to sampling in mass tort cases, however, also makes a voluntary waiver of procedural rights highly problematic. For consent to constitute a waiver, plaintiffs must have had a reasonable opportunity to exercise the procedural rights they waive; otherwise, consent cannot possibly reflect a deliberate decision to forego the right. The critical question for consent then is whether such an opportunity exists even in those mass tort cases in which anticipated delay costs consume most, if not all, of plaintiff's expected recovery. The answer depends on the way one views the procedural right and the conditions necessary to its reasonable exercise.

One could, for example, conceive of the right as guaranteeing only that level of process necessary to produce a reasonably accurate damages judgment. If one also found the conditions of reasonable exercise satisfied whenever a party had *formal* access to the required process, there would be no reason to be troubled about consent at all. Under this formal view, a plaintiff could always exercise her procedural rights simply by waiting long enough to receive a trial, for, by definition, delay costs could not affect the right or impede its exercise.

One who holds this view, however, has no reason to be troubled by litigation scarcity or the delay costs it generates. If all a plaintiff is entitled to expect from litigation is a trial at some indefinite future time, there is no reason to worry about delay and no reason to bother with sampling at all. The fact that courts and commentators today do worry about litigation delay and seriously consider sampling means that they must reject the formal view. If long delays are thought to be unfair to plaintiffs, it must be because procedure is supposed to guarantee not only a reasonably accurate judgment but also some minimally fair level of actual recovery net of litigation and delay costs.[114]

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113. See Robinson and Abraham, 78 Va. L. Rev. at 1504-05, 1508-09 (cited in note 7). A defendant might argue that because of the individualized focus of a rights-based theory, aggregation cannot cancel out violations of defendant's rights in individual cases. For example, the corrective justice theory of tort law endorsed by Professor Weinrib insists on a bipolar liability structure in which the wrongdoer compensates the person he wronged. See Ernest J. Weinrib, *Understanding Tort Law*, 23 Valp. U. L. Rev. 485 (1989). It may be inconsistent with Weinrib's theory for the defendant to pay in an aggregative way. In any event, one thing is clear: the statistical effects of aggregation make sampling much less troubling for a defendant than for a high-damage plaintiff, as long as the defendant is a party to all the aggregated cases and owes a duty to compensate for all the harm in each case.

114. Courts and commentators do not define the conditions for a minimally acceptable recovery, but the assumption that such a minimum exists is implicit in the various expressions of concern about the plight of mass tort plaintiffs. See, for example, *Cimino*, 751 F. Supp. at 651 (expressing concern about the impact of transaction costs on plaintiff's recovery); *Ad Hoc Committee Report* at 19 (cited in note 9) (noting that "[i]t is unrealistic to believe that individual trials

This more pragmatic view makes delay relevant to the exercise of a procedural right. When delay costs become so large that actual recovery falls below the minimum floor required by fairness, plaintiffs no longer have a reasonable opportunity to exercise their procedural rights. And without such an opportunity, a plaintiff's consent to sampling cannot support a voluntary waiver.[115]

There is a second reason to be skeptical about consent. In large-scale tort litigation, attorneys often conduct lawsuits for their own benefit rather than for the benefit of their clients.[116] Under these circumstances consent is more likely to be the attorney's than the client's. This is important because attorney preferences are not likely to match client wishes. For example, an attorney who represents a range of high- and low-damage plaintiffs on contingency often will find sampling quite attractive because of its cost savings.[117] On the other hand, a client with very large damages at stake may prefer an individual trial even in the face of long delays, provided delay costs do not exceed the reduction in recovery due to sampling.[118]

One cannot solve the consent problem by sending notice to plaintiffs and giving them an opportunity to opt out of the aggregation.[119]

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can provide relief"). See also *Los Angeles County Bar Ass'n v. Eu*, 979 F.2d 697, 707 (9th Cir. 1992) (noting in dictum that there may be a constitutional limit to permissible delay).

115.   This argument applies only when delay is so serious that it reduces expected net recovery below the minimally acceptable level. Thus, in the absence of extreme scarcity, delay usually will not present a problem for inferring a waiver from consent. For example, plaintiff's consent to settlement could be construed as a waiver of her trial rights even when delay costs reduce her expected trial recovery well below her legal entitlement.

116.   See note 82 and accompanying text.

117.   See also notes 189-90 and accompanying text (discussing how attorney preferences for sampling can differ from those of a high damages client). If an attorney has a diverse portfolio of cases that includes some with low and some with high damages, the sample average will yield in the aggregate what she could expect from individual trials. Cost savings then should make sampling seem very attractive.

118.   Expressing some doubts about the waivers in *Cimino*, Professors Saks and Blanck wonder whether attorneys would ever present the waiver choice to their clients, and they observe that high-damage plaintiffs might be inclined not to consent if they were fully informed. See Saks and Blanck, 44 Stan. L. Rev. at 825 n.77 (cited in note 14); see also id. at 839-40 (describing agency costs in mass tort cases). Of course, if the prospects for individual trials are as bleak as proponents of sampling contend, it may be perfectly rational for all plaintiffs to consent to sampling. But if the alternatives are really that bleak, the legitimacy of inferring a waiver from consent is in serious doubt.

119.   In a mass tort suit, such as *Cimino*, that is conducted as a Rule 23(b)(3) class action during the liability phase, reasonable notice must be sent to all class members informing them of their right to opt out. See F.R.C.P. 23(c)(2); *Eisen v. Carlisle and Jacquelin*, 417 U.S. 156 (1974). However, this notice is likely to be sent well before the sampling decision and thus usually will not inform plaintiffs of the sampling option. See Sherman, 10 Rev. Litig. at 266 n.141 (cited in note 42).

It is not clear whether current due process standards require notice and opt-out for a sampling procedure. The Supreme Court has never held that notice and opt-out are constitutional require-

The problem would still exist with notice and opt-out procedures be-cause the absence of reasonable alternatives precludes inferring a waiver from a decision not to opt out just as it precludes inferring a waiver from consent. Furthermore, in mass tort cases, the attorney is still likely to control the choice. And because incentives to opt out risk destroying the aggregation essential to sampling, it may be necessary to prohibit opt-out altogether.[120] Consent therefore offers no easy solution to rights-based concerns.

ii. The Baseline Argument

The second argument focuses on the choice of baseline. If there is no economically feasible alternative, the argument goes, then sampling's outcome should be compared to the zero amount net of litigation and delay costs a plaintiff can expect to recover under any other procedure. On this view sampling's bias is irrelevant because even a recovery skewed lower than actual damages is better than no recovery at all.

The problem with this argument is its assumption that procedural rights are contingent on economically viable alternatives. Procedural rights have bite as rights precisely to the extent they make demands on the public fisc in the face of utilitarian judgments about what is eco-nomically feasible. Suppose, for example, that procedural rights guaran-teed an error risk no more serious than that inherent in a normal trial. It would then be completely irrelevant that sampling offered a positive net recovery if its tendency to create biased error was foreign to normal trial process.

My point is not that resource scarcity and budgetary constraints are irrelevant; in fact, I argue exactly the opposite below.[121] My point is

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ments for all cases in which nonlitigating plaintiffs are affected by a judgment. See *Mullane v. Central Hanover Bank & Trust Co.*, 339 U.S. 306 (1950); compare *Phillips Petroleum Co. v. Shutts*, 472 U.S. 797 (1985) (holding that due process requires notice and opt-out whenever a state court exercises jurisdiction over out-of-state class members). For a discussion of these issues, see Sherman, 10 Rev. Litig. at 256-61 (cited in note 42); Resnik and Rowe Letter (cited in note 9). For a study of representation concepts in modern adjudication, see Bone, 67 N.Y.U. L. Rev. at 193 (cited in note 17).

120. Allowing plaintiffs to opt out can create serious collective action problems. A high dam-ages plaintiff may opt out because she expects that sampling over the rest of the aggregation will reduce her delay costs enough to make her better off with an individual trial. If she expects this to happen, however, then so will other high-damage plaintiffs. Furthermore, each such plaintiff will have to consider the risk that others will opt out, leaving her worse off than if she had exited too. This combination of expectations creates incentives for many plaintiffs to opt out, thereby destroy-ing the aggregation essential to sampling. In other words, allowing plaintiffs to opt out produces a situation similar to a Prisoner's Dilemma. As a result one may have to disallow opt-out altogether in order to hold the aggregation together. For a discussion of the Prisoner's Dilemma, see Dennis C. Mueller, *Public Choice II* 9-15 (Cambridge, 1989).

121. See notes 156-61 and accompanying text.

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that one cannot justify sampling by reference to scarcity and budgetary constraints without an argument showing why these factors are relevant, and any such argument requires an account of the procedural rights parties possess and the way those rights depend on resource limitations.

iii. The Net Recovery Argument

The third argument focuses on net recovery. It attempts to offset sampling's effect on high-damage plaintiffs by counting the savings in litigation costs that the procedure makes possible.[122] There are a number of difficulties with this argument. First, sampling might not save substantially on private litigation costs. Plaintiffs are likely to invest much more in each sample case than they would in separately tried cases because of the larger marginal return sample plaintiffs expect to receive.[123] Moreover, even if there are significant savings, it is not clear that the contingency fee arrangement will pass those savings on to plaintiffs. And even if savings are passed on, there is no assurance that they will be sufficiently large to offset the shift toward the population mean for all high-damage plaintiffs.

There is a deeper problem, however. The argument assumes that what counts in the rights analysis is the total actual benefit a party receives—her damages less attorney's fees and other litigation-related costs. But this assumption does not hold true for all conceptions of the party's substantive right. For example, the moral demands of corrective justice are not always satisfied simply by granting the plaintiff full compensation for her wrongful loss. Some theories hold that the defendant must pay the full measure of compensation to the plaintiff she has wronged.[124] On this view, the amount of the judgment is the relevant

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122. See, for example, David Rosenberg, *Of End Games and Openings in Mass Tort Cases: Lessons From A Special Master*, 69 B.U. L. Rev. 695, 704 (1989) (stating that "[a]veraging may undervalue a particular claim, but . . . [a]ny such diminution in value will be more than made up directly by the increase in compensation resources . . . generated by the reduction in litigation cost"); Weinstein and Hershenov, 1991 U. Ill. L. Rev. at 326 (cited in note 19) (noting that a lower gross award associated with a mass settlement "may be at least partially offset by a higher net to the plaintiff" due in part to reduced transaction costs).

123. In Part B of the Mathematical Appendix, I show that for a relatively simple model of litigation investment a rule giving sample plaintiffs the average verdict and spreading costs equally over the entire population—as Part III.B. recommends in order to equalize investment incentives—encourages litigating parties to invest in the aggregate at a level equal to the total investment if all cases had been tried individually. The model is highly simplified, however. Parties are likely to realize some cost savings from sampling, but these savings are not likely to be as large as one would expect considering the cost allocation rule alone.

124. See, for example, Weinrib, 23 Valp. U. L. Rev. at 485 (cited in note 113); Larry A. Alexander, *Causation and Corrective Justice: Does Tort Law Make Sense?*, 6 Law & Phil. 1, 4 (1987).

factor, and litigation cost savings are completely irrelevant.[125] Thus, the relevance of cost savings to a rights-based analysis depends on the nature of the right at stake.[126]

b. *The Argument From Rights*

If we are to square sampling's effects with rights-based theory, we have no choice but to inquire more deeply into the nature of procedural rights. There are two ways to approach this task. The first, which I shall call the "moral rights conception," derives procedural rights from the moral theory underlying the substantive law. The second, which I shall call the "legal rights conception," derives procedural rights from the legal rights that the positive law creates.

i. The Moral Rights Conception

The moral rights conception treats substance and procedure as a single mechanism that enforces whatever moral rights the law is meant to advance. Under this view sampling does not violate anyone's rights if the outcomes it produces are consistent with the moral theory that supports the substantive law.

For the following analysis, I focus on sample averaging rather than regression.[127] I also focus on corrective justice theories of tort law. Although a number of theories have been advanced to explain modern tort law,[128] corrective justice is the principal contender today for a

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125. I discuss below whether sampling can ever be consistent with corrective justice. See notes 127-55 and accompanying text.

126. For this same reason arguments that assume most cases settle and compare the outcomes from aggregation to those from settlement also miss the mark. See Saks and Blanck, 44 Stan. L. Rev. at 840 (cited in note 14) (suggesting that the reality of settlements in mass tort cases gives a reason not to use the results of full-fledged trials as the standard for evaluating procedural reforms); compare Rosenberg, 62 Ind. L. J. at 582-83 (cited in note 14) (suggesting that the prevalence of settlements in mass tort cases might square class action treatment with corrective justice norms). If an outcome based on previous settlements would violate the parties' rights when imposed by a court without the parties' consent, then settlement can hardly serve as a normatively acceptable baseline to evaluate sampling.

127. Regression gives an outcome closer to actual damages, but it is also more costly than sample averaging. Furthermore, if corrective justice supports an entitlement to compensation for ex ante risk rather than for actual harm, then averaging should be preferred over regression. See notes 135-46 and accompanying text.

128. A complete analysis would have to address all of these theories. For example, a compensatory justice theory might require that high-damage plaintiffs be compensated in full. See generally Gary T. Schwartz, *The Ethics and Economics of Tort Liability Insurance*, 75 Cornell L. Rev. 313, 328-31 (1990) (describing compensatory justice). To be a sensible interpretation of current tort law, however, such a theory needs the kind of connection to a wrongful act and causation that corrective justice supplies. Furthermore, a loss spreading theory based on fairness rather than efficiency might require full compensation for high-damage plaintiffs. On the other hand, the availability of insurance can make a verdict in the amount of the average loss fair to all. See Rosenberg, 62 Ind. L. J. at 590-93 (cited in note 14).

moral theory capable of grounding rights.[129] Corrective justice conceives of tort law as a system for correcting wrongs to plaintiffs caused by a defendant's wrongful conduct or a defendant's invasion of a plaintiff's rights.[130] Unlike more broadly distributive theories, such as loss spreading, corrective justice requires a wrong and focuses on restoring the moral equilibrium that existed between wrongdoer and wronged party before the wrong occurred.[131] Furthermore, unlike efficiency-based theories, corrective justice focuses on correcting a past wrong rather than deterring future wrongs.

Two questions must be addressed before sampling can be justified under corrective justice theory: first, whether there is a plausible version of corrective justice that can account for the outcomes produced by sample averaging, and second, if there is such a theory, whether it coheres with existing tort doctrine.[132] The first question is one that any sampling advocate bent on implementing corrective justice ideals must answer. The second question is less obvious. It presupposes an important distinction between the power of a court and the power of a legislature—a distinction that previous commentators have mainly ignored.[133]

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129. See Catherine P. Wells, *Tort Law As Corrective Justice: A Pragmatic Justification For Jury Adjudication*, 88 Mich. L. Rev. 2348, 2349-53 (1990) (arguing that the existing tort system cannot be justified as a device to regulate or compensate and that it best fits a corrective justice model); Christopher Schroeder, *Corrective Justice and Liability for Increasing Risks*, 37 U.C.L.A. L. Rev. 439, 439 (1990) (characterizing corrective justice as the most powerful theory of tort law in American legal thought today, other than law and economics); Weinrib, 23 Valp. U. L. Rev. at 485 (cited in note 113) (identifying elements of the current tort system that do not promote loss spreading or deterrence goals but cohere well with corrective justice principles); see also Robinson and Abraham, 78 Va. L. Rev. at 1507 (cited in note 7) (assuming that any substantive due process right to tort compensation would be based on a corrective justice theory). Corrective justice may have trouble accounting for strict liability torts. See Weinrib, 23 Valp. U. L. Rev. at 519-20 (cited in note 113). Many products liability claims, however, including the warning defect claims that frequently generate mass tort cases, are strict liability torts in name only; in reality, liability is based on negligence principles. See Kenneth W. Simons, *Corrective Justice and Liability for Risk-Creation: A Comment*, 38 U.C.L.A. L. Rev. 113, 136 n.90 (1990).

130. See Simons, 38 U.C.L.A. L. Rev. at 125-26. It is difficult to give a precise definition of corrective justice because of the large amount of confusion and disagreement over the concept. See id. at 125-27.

131. See Schroeder, 37 U.C.L.A. L. Rev. at 449 (cited in note 129) (stressing the importance of distinguishing between corrective justice and distributive justice).

132. In addressing corrective justice values, Saks and Blanck are led astray by their assumption that in many cases sampling promises a more accurate estimate of actual damages than an individual trial. See Saks and Blanck, 44 Stan. L. Rev. at 836 (cited in note 14). The analysis is much more complex and the conclusions more qualified than they realize.

133. Professors Saks and Blanck overlook this distinction when they suggest that judicial use of statistical methods might be no more "radical" than legislative removal of cases from the tort system. See id. at 819 n.22. If the judiciary has a more limited power to alter procedure, then it may be more "radical" for a court to implement sampling than for a legislature to remove cases from adjudication and assign them to an administrative forum. Professors Abraham and Robinson also ignore the distinction when they analogize judicially designed statistical approaches to legislatively created compensation systems, such as worker's compensation, and also when they invoke

Courts must attend to precedent, and this obligation limits judicial power to alter existing substantive and procedural law. A court can change features of tort law, of course, but it cannot do so in a way that runs counter to the law's fundamental character—at least not without demonstrating a link to more attractive norms operating in closely analogous legal areas. By contrast, a legislature is not constrained by precedent, and as a result, it has much more freedom to define and alter legal rights and to create and fund procedural systems in ways that best serve its vision of good social policy.[134]

This means that the second question—the fit between corrective justice and tort precedent—is particularly salient for a court designing a sampling procedure without legislative approval. By the same token, the question may be much less relevant for a legislature deciding whether to authorize sampling in general. Nevertheless, even a legislature may be well-advised to heed existing tort doctrine for pragmatic reasons, even if it is not obliged to do so as a matter of principle. After all, tort law reflects the efforts of many over a long period of time to work out the moral and practical demands of a compensation system, and for that reason alone, it deserves considerable weight in any legislatively motivated reform effort.

Turning now to the first question, whether sampling's outcomes fit some plausible theory of corrective justice, it is useful to highlight at the outset the more obvious points of contact between sampling and

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the government's supposedly broad power to modify the goals of tort law without specifying which branch of government is involved. See Robinson and Abraham, 78 Va. L. Rev. at 1508-09 (cited in note 7). But see id. at 1510 (recognizing that their examples focus on reforms "outside the common law").

134. See Dworkin, *Matter of Principle* at 93-94 (cited in note 107) (noting that a legislature has much broader power over procedure than a court acting in an adjudicative capacity). But see Weinstein and Hershenov, 1991 U. Ill. L. Rev. at 270-77 (cited in note 19) (noting the power of Congress to enact major procedural reform, and arguing that courts also have expansive equity power to innovate, at least in the absence of contrary legislation). Legislatures exercise broad power whenever they remove claims from the courts and remit them to an administrative forum, thereby adjusting the package of substantive and procedural entitlements that the parties enjoy. Worker's compensation is a familiar example. See *New York Central R.R. v. White*, 243 U.S. 188 (1917) (upholding constitutionality of New York State's worker's compensation law). But there are others. See, for example, Black Lung Benefits Act, 30 U.S.C. § 901 (1988). In the past, Congress has considered, but never adopted, bills to deal with the asbestos problem that would have provided compensation to asbestos victims through an administrative mechanism modelled on the workmen's compensation system. See, for example, Occupational Disease Compensation Act of 1985, H.R. 3090, 99th Cong., 1st Sess. (1985); Asbestos Workers' Recovery Act, H.R. 1626 & S. 1265, 99th Cong., 1st Sess. (1985). For a general analysis of congressional power to assign adjudicative tasks to administrative agencies and other non-Article III bodies, see Richard H. Fallon, Jr., *Of Legislative Courts, Administrative Agencies, and Article III*, 101 Harv. L. Rev. 916 (1988); and Judith Resnik, *The Mythic Meaning of Article III Courts*, 56 Colo. L. Rev. 581 (1985). For a discussion of these topics in the aggregation setting, see Resnik and Rowe Letter at 2-3 (cited in note 9).

corrective justice ideals. Under sample averaging, defendants are liable only if they cause some harm. Furthermore, plaintiffs receive compensation in an amount that bears some relationship to defendant's wrong. Each plaintiff is in effect awarded damages in the amount of the ex ante expected loss to all persons who suffer harm from exposure to the defendant's risk-creating activity. This is not the same as the expected loss to all those exposed to the risk. It focuses instead on loss to a subset of this larger group: those who are exposed *and* who actually suffer some compensable harm from their exposure. If the total number of cases is large and the plaintiff population is representative of the range of persons likely to be injured by defendant's activity, mean damages for the aggregation—which is closely approximated by the sample average—should roughly equal this expected loss figure.[135]

To illustrate, suppose that defendant creates a risk with a .04 chance of causing a compensable loss of $100,000, a .01 chance of causing a loss of $500,000, and a .95 chance of causing no loss at all to someone exposed to the risk. The expected loss to any exposed person is just the sum of all the possible losses discounted by their respective probabilities or (.04 x 100,000) + (.01 x 500,000) + (.95 x 0), which equals $9000.

The sample average does not correspond to this $9000 figure. Instead, it equals the expected loss to the five percent who actually suffer some harm. In this example, a person who suffers some type of harm has a .8 probability (in other words, .04/(.04+.01)) of incurring a $100,000 loss and a .2 probability (.01/(.04+.01)) of incurring a $500,000 loss.[136] The expected loss to a harmed person, therefore,

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135. The two assumptions are crucial. The number of aggregated cases must be large in order to reflect the proportion of persons with various types of loss existing in the overall population. The court must also try to form as representative an aggregation as possible in order to assure that the sample average closely corresponds to expected loss. This may not be an easy task. There are practical obstacles to achieving a representative collection of cases. For example, adverse selection can create problems if sampling increases the incentive to bring frivolous suits. See notes 87-88 and accompanying text. When frivolous suits are chosen for the sample, they contribute zero damages to the sample verdicts, which can skew the sample average lower than the expected loss figure. Nevertheless, a court should be able to control for this effect to some extent by using summary judgment and directed verdict to weed out frivolous cases from the sample at the damages stage. Of course, even if the sample is cleansed of frivolous suits, the defendant will still have to pay damages to frivolous plaintiffs not selected for the sample. This is also a problem with settlements in individual litigation, however, and can be controlled to some extent by the techniques discussed in note 88.

136. In the language of probability theory, these are all "conditional probabilities." They represent the probability of a person suffering particular losses conditional on the person being exposed to the risk and suffering some type of compensable harm from the exposure. Technically, these probabilities are derived from the original set by using Bayes's Formula. See Howard Raiffa, *Decision Analysis: Introductory Lectures on Choices Under Uncertainty* 17-21 (Addison-Wesley, 1968).

equals (.8 x 100,000) + (.2 x 500,000), or $180,000, and it is this figure that the sample average closely estimates.[137]

Although no corrective justice theorist has yet endorsed an expected loss approach of this kind, some have proposed measures similar to it, and their arguments, taken together, provide the elements of a justification from corrective justice principles. For example, Professor Christopher Schroeder has recently developed a corrective justice rationale supporting tort liability based on expected loss rather than actual harm.[138] He reasons from what he calls the norm of "action-based responsibility":[139] an agent is morally responsible only for the choices she makes, not for the harm she unintentionally creates. Since no one can know beforehand the harm that others will suffer as a result of her activity, the argument goes, moral responsibility and hence legal liability should not depend on whether harm actually occurs or how severe it happens to be.[140] According to Schroeder, the moral wrong inheres in the actor's choice and arises, if at all, at the moment the actor chooses to engage in the risk-creating activity. Any resulting harm is purely fortuitous and therefore of no moral consequence.[141]

Schroeder applies his expected loss argument only to the liability side of the tort ledger, however. When it comes to compensation, he retains the traditional approach that measures damages by actual harm. Under Schroeder's scheme, defendants make expected loss payments into a fund whenever they create an unreasonable risk, and plaintiffs who suffer actual harm recover from the fund in an amount sufficient to compensate for the harm they suffer.[142]

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137. To see this, suppose that 100,000 persons are exposed to defendant's risk. The loss probabilities in the text predict that 95% of the 100,000, or 95,000, will suffer no loss at all; 4%, or 4000, will suffer a $100,000 loss; and 1%, or 1000, will suffer a $500,000 loss. Suppose that those persons who suffer no loss either do not sue or lose on liability. Suppose further that one-half (randomly distributed) of those who actually suffer loss sue and that all plaintiffs in this group win on liability. On these assumptions there should be 2000 cases with $100,000 actual damages each and 500 cases with $500,000 actual damages each that remain to be adjudicated at the damages stage. The mean damages for this total population of 2500 cases, which is closely estimated by the sample average, equals $180,000, which is the same as the ex ante expected loss figure.

138. Schroeder, 37 U.C.L.A. L. Rev. at 439 (cited in note 129).

139. Id. at 450.

140. Id.

141. Id. at 451-60. For a similar argument, see Robinson, 14 J. Legal Stud. at 789-91 (cited in note 102). See also Schwartz, 75 Cornell L. Rev. at 323-24 (cited in note 128) (urging the moral irrelevance of actual harm to support the fairness of spreading risks among defendants through liability insurance). While this argument is a powerful one in the corrective justice literature, it is also important to note that not everyone agrees with it. See generally Glen O. Robinson, *Risk, Causation, and Harm*, in R.G. Frey and Christopher W. Morris, eds., *Liability and Responsibility: Essays in Law and Morals* 317, 331-41 (Cambridge, 1991) (discussing Professor Thompson's views about moral luck).

142. Schroeder, 37 U.C.L.A. L. Rev. at 468-69 (cited in note 129).

In a recent comment on Schroeder's proposal, Professor Kenneth Simons takes issue with this asymmetry between liability and compensation.[143] Simons argues that Schroeder's principle of action-based responsibility together with the corrective justice requirement of a close fit between liability and compensation would justify a risk-based approach to compensation as well as to liability.[144] According to Simons, under a defensible theory of corrective justice, all persons exposed to an unreasonable risk should be compensated in an amount equal to expected harm.[145]

Schroeder's argument, as extended by Simons, justifies the most important feature of sampling's compensation principle, its reliance on expected loss rather than actual harm. But there is a difference between sampling's compensation measure and the one Simons supports. Sampling compensates for expected loss only to those who are actually harmed, whereas Simons's extension of Schroeder's proposal compensates for expected loss to all those exposed to the risk.

This difference in expected loss measures can be explained by the different conditions for liability and a right to compensation under the two approaches. In Simons's proposal, defendant is liable whenever he creates a risk, and plaintiff receives compensation whenever he is exposed to the risk. It makes sense, therefore, to measure damages by the expected loss to all persons placed at risk. In a sampling case like *Cimino*, on the other hand, defendant is liable only when he causes harm, and plaintiff receives compensation only when he suffers harm. Since defendant owes no liability to those he places at risk but does not harm and they in turn have no compensation right, it makes sense to exclude this group from any liability and compensation measure based on ex ante risk. Stated differently, the conditions for liability and compensation imply that defendant commits a wrong only to those he harms, and on a corrective justice view, the measure of liability and compensation ought to fit the wrong as so defined. It follows then that

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143. Simons, 38 U.C.L.A. L. Rev. at 122-25, 128-29 (cited in note 129).

144. Id. at 122-25, 129.

145. In reply to Simons, Professor Schroeder defends harm-based compensation by arguing that a compensation right arises only when plaintiff's autonomy is invaded and that creation of a risk is not enough to constitute such an invasion. Christopher Schroeder, *Corrective Justice, Liability for Risks, and Tort Law*, 38 U.C.L.A. L. Rev. 143, 160 (1990). While this argument may challenge Simons's risk-based approach, it is perfectly consistent with a sampling scheme that compensates only when a person is harmed and then only in an amount equal to the expected loss to those harmed. Such a compensation principle respects autonomy at the same time as it recognizes that the specific kind and degree of harm should be irrelevant to moral responsibility and to compensation. See note 146.

the expected loss formula in a sampling regime should focus only on those persons who are actually harmed.[146]

The second issue—whether the corrective justice theory we have just constructed coheres with current tort doctrine—is more challenging. Tort law, after all, compensates for actual harm, not expected loss. How can a theory that treats the degree of harm as morally irrelevant

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146. A more complete normative account should also explain why defendant's liability and plaintiff's compensation right should depend on harm rather than on risk. In a recent article on corrective justice, Professor Heidi Hurd offers one possible explanation. Heidi M. Hurd, *Correcting Injustice to Corrective Justice*, 67 Notre Dame L. Rev. 51, 79-84 (1991). Hurd argues that a harm-based liability requirement can be derived from the principle of liberty: "[s]ince even unreasonable risks frequently fail to materialize, [a harm-based rule] provides individuals with the liberty to gamble . . . the freedom to act unreasonably, so long as [they] do not harm others." Id. at 82. By combining Professor Hurd's principle of liberty with Professor Schroeder's principle of action-based responsibility, one can account for all elements of the sampling scheme. (One might object that these two principles are logically incompatible since one principle requires precisely what the other denies is morally relevant. However, it should be possible to embrace both principles without risking a logical fallacy—although not without risking a moral conflict—provided the liberty principle is justified on grounds independent of corrective justice; for example, by its tendency to maximize overall freedom.)

Because it finds liability only when harm is caused, the sampling approach respects the principle of liberty in a manner consistent with Hurd's argument. All persons are free to act unreasonably provided they cause no harm to others. Furthermore, by requiring the defendant to compensate in the amount of expected loss rather than actual harm, sampling excludes chance from the moral calculus in the way demanded by the principle of action-based responsibility. Even so, some harm dependence remains, since liability turns on the chance event of harm creation. But this is required by the principle of liberty. The virtue of the sampling scheme is that it gives each principle some room to operate.

The sampling approach also creates the kind of close fit between liability and compensation that many corrective justice theorists consider essential to the ideal of a wrongdoer restoring a moral equilibrium. See Simons, 38 U.C.L.A. L. Rev. at 122-23 (cited in note 129). Because the existence of liability depends on causing harm, the existence of an entitlement to compensation should also depend on harm, as it does in the sampling approach. Moreover, the scope of liability matches the scope of compensation; the measure of each is the same, the expected loss to those harmed by exposure to the risk. Finally, because the existence of both defendant's liability and plaintiff's entitlement to compensation depends on harm, it makes sense to measure the expected loss by reference to the group of persons harmed rather than the much larger group of persons exposed.

This analysis can be summarized in matrix form as follows:

	LIABILITY	**COMPENSATION**		
EXISTENCE	Harm	Harm	****	Liberty Principle
SCOPE	Risk (to harmed)	Risk (to harmed)	****	Action-based Principle

As this matrix shows, the liberty principle is satisfied by the conditions for existence of defendant's liability and plaintiff's compensation right, while the action-based responsibility principle is satisfied by the scope of liability and compensation. Furthermore, the symmetry between liability and compensation in each of the existence and scope categories is consistent with corrective justice's aspiration for a close correspondence between liability and compensation. Finally, limiting scope to the risk created to the class of persons who are harmed is a logical entailment of the harm-based existence conditions.

support a tort system that bases compensation on actual harm?[147] There may be no satisfactory answer to this question, in which case sampling's fate will depend on the argument from the legal rights conception presented in the following section. On the other hand, an explanation might be possible if compensation for actual harm is not an essential element of the current tort system.[148]

This could be so if the conventional approach to damages developed as a pragmatic response to practical limitations on measurement rather than as a principled articulation of the moral requirements of tort compensation. Computing expected loss in individual cases is bound to be a costly and difficult enterprise. A court would have to compile evidence of risks and harms in comparable situations and apply statistical techniques to infer an expected loss figure. For this reason it makes practical sense in most cases to focus on actual harm instead of expected loss. An expected loss formula is likely to be judicially manageable only in those situations, such as mass tort litigation, in which enough cases can be aggregated to support statistical analysis without a costly search for exogenous risk information. But mass tort litigation is a relatively recent phenomenon. Whenever widespread injuries occurred in the past—and they seldom did—the procedural system did not usually permit the kind of large-scale case aggregation that is common today.[149] As a result, the existing harm-based compensation scheme may have developed because of practical difficulties with implementing an expected loss formula.

Furthermore, the tort system took shape at a time when people did not view the world in statistical terms and did not have access to the mathematical tools necessary to implement a statistical approach.[150] In a world of discrete and nonprobabilistic events, it would have made

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147. Of course, the current tort system does not compensate for actual harm in all situations. For example, the practice of giving a lump-sum recovery for future loss rather than periodic damages almost certainly compensates imperfectly, and caps on awards also assure a shortfall in some cases. See Robinson and Abraham, 78 Va. L. Rev. at 1512 (cited in note 7) (noting that "corrective justice has always been subject to compromise in the service of other goals"). But these examples do not show that tort compensation is based on some principle other than actual harm. They effect relatively minor alterations in the overall tort scheme. Furthermore, many of the recovery caps are statutory, and, as we have seen, legislatures have much more power than courts to change the common law. See notes 133-34 and accompanying text.

148. For a similar distinction between features that are part of "the basic structure" of tort law and those that are not, see Weinrib, 23 Valp. U. L. Rev. at 493-95 (cited in note 113).

149. Compare Schroeder, 37 U.C.L.A. L. Rev. at 470-71 (cited in note 129) (arguing that traditional bipolar litigation explains the failure of tort law to recognize the advantages of a risk-based approach).

150. These tools have been developed only in the past 175 years. For a brief summary of the history of statistical theory, see *Cimino*, 751 F. Supp. at 659-660. For a similar explanation of why current law does not incorporate a risk-based approach, see Schroeder, 37 U.C.L.A. L. Rev. at 472-73.

sense to equate wrongful loss with actual harm; in fact, it may have been impossible to imagine anything else. Thus, the reason actual harm remains the touchstone of compensation may have less to do with its strong link to tort principle and much more to do with its close connection to outdated tort precedent.

If administrative costs and the force of precedent explain the current system, then compensating for expected loss would do no violence to current tort principles. Indeed, whenever costs are manageable and precedent is clearly out of date, as in mass tort litigation, corrective justice might require precisely the sort of compensation that sampling provides.

Assuming that our corrective justice approach fits current tort doctrine, one additional piece is needed to complete the argument from moral rights. The argument so far shows that sampling's apparently biased effect on outcome is not biased at all, but rather a good estimate of the correct—expected loss—damages amount within a rights-based theory. It remains to show that ordinary random error is consistent with corrective justice principles.

If corrective justice required a perfectly accurate result in every case, none of the outcomes from the current system of individual trials would be free of condemnation on moral grounds. It is extremely doubtful that any corrective justice theorist would hold a procedural system to such an impossible accuracy standard.[151] To do so would commit the theorist to the absurd position that *all* practical legal systems must be morally deficient in a pervasive way. But how can corrective justice account for random error?

Initially, it is important to note that nothing in the structure of corrective justice itself necessarily requires perfect accuracy. Furthermore, corrective justice theory in most of its contemporary forms treats background risks as morally legitimate; only "unreasonable" risks qualify as wrongful.[152] Background risks are those risks that all persons can fairly be required to bear as part of the morally just baseline distribution of benefits and burdens that corrective justice is meant to preserve.

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151. Professor Weinrib has argued that the famous case of *Summers v. Tice*, 33 Cal.2d 80 (1948), is consistent with a corrective justice commitment to causation, provided the case merely shifts the burden of proof. Weinrib, 23 Valp. U. L. Rev. at 494-95 n.25 (cited in note 113). Because burden of proof allocates the risk of error and because shifting the burden makes the consequences of error fall more heavily on defendants than on plaintiffs, Weinrib must believe that procedural error, possibly even error that is asymmetrically distributed, is compatible with corrective justice principles.

152. See, for example, Jules L. Coleman, *Moral Theories of Torts: Their Scope and Limits*, 1 L. & Phil. 371, 390 (1982); Weinrib, 23 Valp. U. L. Rev. at 518-19 (cited in note 113); George P. Fletcher, *Fairness and Utility in Tort Theory*, 85 Harv. L. Rev. 537, 550 (1972).

Thus, background risks are defined by whatever theory of justice allocates initial benefits and burdens.

It is sensible to include as part of the baseline distribution, and thus within background risk, not only "real world" risks but also ordinary error risks associated with existing systems of procedure.[153] This Article is not the place to discuss in detail how this might be done, but it is worth noting that this justification of procedural error is consistent with the various justifications for tolerating background risk, including justifications based on regard for the value of individual liberty, respect for the moral legitimacy of action, and concern for the value of equal personal security.[154]

If the error ordinarily associated with individual trials defines the morally acceptable baseline of procedural risk, the random error created by sampling should easily pass muster. As we have seen, with a large enough set of cases, the sample average gives a more accurate estimate of the population mean than an individual trial verdict gives of actual damages for a single case.[155] Thus, because the population mean is the ideal liability measure under our corrective justice theory, sampling's error is less than that ordinarily associated with the trial of individual tort cases.

To recap the argument of this section, we set out to find a defense of sample averaging within the moral rights conception of procedural rights. This conception treats procedural rights as checks on forms of process that subvert the moral theory underlying the substantive law. We saw that sampling's outcomes are consistent with a plausible version of corrective justice theory and that this theory might cohere with current tort doctrine. Nevertheless, in view of the entrenched nature of harm-based compensation, one may well question the closeness of fit with settled tort principles. The next section considers the fate of sam-

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153. Professor Wells has argued for a "pragmatic conception" of corrective justice that justifies tort outcomes in part by reference to the existing practice of tort adjudication. Wells, 88 Mich. L. Rev. at 2348 (cited in note 129). To the extent her approach vests established modes of procedure with normative weight simply because they are conventional, it can easily square ordinary random error with corrective justice. See id. at 2361-63, 2382-83, 2393-95. Random error, after all, stems from procedures conventionally understood to be fair and consistent with minimal requirements for practical deliberation.

154. See Hurd, 67 Notre Dame L. Rev. at 81-83 (cited in note 146) (discussing the value of individual liberty); Weinrib, 23 Valp. U. L. Rev. at 518-19 (cited in note 113) (discussing the legitimacy of action); Fletcher, 85 Harv. L. Rev. at 550 (cited in note 152) (discussing the value of equal personal security). One general principle that might justify both extra-litigative and procedural risks is that those risks of harm necessarily associated with a morally acceptable social practice are themselves morally acceptable. So long as the ordinary risk of error is a necessary part of an adjudicative system, a court does nothing morally wrong by following normal adjudicative practice in rendering a judgment that may be erroneous.

155. See notes 49-50 and accompanying text.

pling if the plaintiff has a moral right to compensation for actual harm or if the plaintiff has a legal right that guarantees this compensation measure even if her moral right does not.

ii. The Legal Rights Conception

The legal rights conception treats procedural rights as safeguards against process choices that sacrifice a party's substantive rights in the name of aggregate utility. Whereas the moral rights conception stresses procedure's impact on *moral rights*, the legal rights conception stresses its impact on *legal rights*. This distinction reflects different attitudes toward the constraining force of precedent.

The moral rights conception approves a procedure whenever it is consistent with the underlying moral theory even if it is inconsistent with some of the more concrete rules and principles of settled law. The legal rights conception gives more weight to the extant rules and principles. It assumes that moral theory and legal precedent play distinct, if mutually interacting, roles in shaping judicial decisions. In particular, existing precedent may have such force that a court cannot change a rule without violating a party's legal rights even if the change implements an attractive moral theory.[156] It follows that the force of the legal rights conception operates most strongly on *judicial* decisions to innovate with sampling and much less strongly, if at all, on *legislative* decisions to authorize sampling in general.[157] Accordingly, the following discussion assumes that the legislature has neither authorized sampling nor done anything else to respond to conditions of severe process scarcity, and it focuses on a court's obligations in the face of resulting budgetary constraints.[158]

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156. One way to make sense of this is to suppose that any area of the law is shaped by a number of different and possibly inconsistent principles and that uncertainty always exists about what those principles are. The only way a court can discern the principles is by inferring them from precedent through a process similar to reflective equilibrium. Under this view strong precedential support for a particular rule is a powerful indication that the rule embodies an important normative principle. As a result, given the everpresent uncertainty, a court should not radically change a well-supported rule unless there is strong evidence that the change would better comport with the general goals the law is supposed to serve. Compare Ronald Dworkin, *Law's Empire* (Belknap, 1986) (describing a theory of adjudication that supposes judges interpret precedent in a way that shares many of these features).

157. Moreover, the legal rights conception may impose weaker pragmatic constraints on a legislature than the moral rights conception does. See notes 133-34 and accompanying text.

158. Even though the legislature enjoys extensive power over procedure, it is conceivable that a party's procedural rights might prevent a legislature from funding adjudication below a level necessary for persons with substantial damages to recover minimally acceptable compensation. If so, plaintiffs in mass tort cases subject to huge litigation and delay costs might be able to invoke the constitution to force the states to fund better procedures. See generally David Hittner and Kathleen W. Osman, *Federal Civil Trial Delays: A Constitutional Dilemma?*, 31 S. Tex. L. J. 341 (1990) (analyzing potential constitutional violations triggered by severe litigation delays, including

The distinction between a moral rights and a legal rights conception makes a difference to our sampling problem only if the substantive tort law gives plaintiffs a legal right to compensation for actual harm and only if that right is strong enough to prevent a court from shifting to an expected loss formula in mass tort cases even if the shift would be more consistent with the plaintiff's moral rights.[159] In this situation we cannot defend sampling by arguing, as we did under the moral rights conception, that it furthers the moral goals of tort law, for those goals are not relevant except as they are embodied in legal rights. A more promising approach treats sampling as a procedural device that yields as good an estimate of actual harm for each plaintiff as is economically practical. This approach, however, returns us to the question that began our discussion of rights-based theories: how can we reconcile a procedure that systematically undercompensates a class of plaintiffs for economic reasons with procedural rights that protect the utility-trumping nature of a substantive right?

Because of the priority of right over utility, procedural rights should prevent a court from using a more error-prone procedure in some cases simply in order to save funds for other cases that promise a greater social gain from improved enforcement. This is not the case with sampling, however. Sampling seeks to protect rights rather than to maximize utility: its purpose is to provide meaningful relief to individual plaintiffs within severe budgetary constraints.

The question then is whether a plaintiff's procedural rights prevent a court from achieving this compensation goal with a sampling procedure that skews recovery. A court that used sampling in order to produce skewed outcomes would violate a plaintiff's procedural rights, but this is not why courts use sampling today. The ideal remains actual damages for each plaintiff, and sampling is desigued to achieve that ideal as closely as possible.

Sampling also does not single out any special class of persons for unfavorable treatment, at least not if everyone has a roughly equal chance over a lifetime of suffering greater than average damages as a result of exposure to mass tort risks. Procedural rules inevitably draw distinctions among persons, and those distinctions are fair if the risk of

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those based on equal protection, due process, and jury trial rights). But see *Los Angeles County Bar Ass'n v. Eu*, 979 F.2d 697, 705-08 (9th Cir. 1992) (holding that delay in Los Angeles Superior Court does not violate the Due Process or Equal Protection Clause, but suggesting in dictum that delay might be unconstitutional in a suitable case). However, if the legislature has no such obligation or if it chooses not to act, one must then consider a court's duties in the face of severe and possibly legitimate budgetary constraints.

159. The following analysis also bears on the question of justification within a moral rights conception when the underlying moral theory requires compensation for actual harm rather than expected loss.

receiving relatively unfavorable treatment is randomly distributed ex ante and thus falls equally on all.[160]

Under these conditions, it is difficult to see how the use of sampling can possibly run afoul of procedural rights. But the conditions are stringent ones. The court must assure itself that budgetary constraints are severe, that sampling is necessary to provide meaningful relief to high-damage plaintiffs, and that the particular sampling technique actually employed minimizes the bias effect. These conditions are not precisely defined, and courts and parties may disagree about their implications in particular cases. Nevertheless, they are sufficiently clear to impose significant constraints on sampling.

In particular, high-damage plaintiffs should have a procedural right to the best sampling technique practicable and an opportunity to object to any sampling procedure that falls short. In many cases this right will require the use of regression rather than sample averaging. If a regression model takes account of enough variables, it is likely to come closer to actual damages than sample averaging for all plaintiffs.[161] Regression is more expensive, however, and sample averaging may be preferable if budgetary constraints permit only a crude regression model.

These conclusions differ from those derived from the moral rights conception. The moral rights argument defended sample averaging as the best procedure in all cases because it compensated for ex ante expected loss and perfectly satisfied plaintiffs' moral entitlement. The argument from legal rights, on the other hand, defends sampling as a second-best procedure warranted only because of extreme scarcity. It makes a difference, therefore, whether one adopts a moral rights or a legal rights conception; even if both can reconcile sampling with a rights-based theory of adjudication, they impose different requirements on its use.

IV. SAMPLING WITHIN A PROCESS-ORIENTED VIEW

The strongest objections to aggregative procedure have nothing to do with outcome accuracy. They concern instead the extent to which aggregation departs from the traditional adjudicative paradigm.[162] Some critics focus on the nature of the proceeding itself, arguing that aggregation, if taken too far, can strip adjudication of what they consider its most essential attribute—a trial of factual and legal issues in

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160. See Dworkin, *A Matter of Principle* at 84-89 (cited in note 107).

161. See notes 65-69 and accompanying text.

162. See, for example, Robinson and Abraham, 78 Va. L. Rev. at 1507 (cited in note 7) (noting that process-based objections seem to dominate what little discussion of aggregative techniques appears in the cases).

the context of an individual dispute.[163] These critics fear that mass processing of claims will turn adjudication into administration and violate separation-of-powers and Article III principles.

Given that class actions and court supervised settlements are acceptable,[164] however, it cannot be essential to adjudication that each individual case receive its own separate trial. On the other hand, a statistical procedure that based decision only on aggregate information for all cases and did not actually submit any individual case to a formal trial might offend separation-of-powers principles.[165] Sampling lies somewhere between this extreme and traditional tort adjudication. Sample cases are actually tried on their own facts and jury verdicts returned.[166] The proceeding does not end in a collective award; rather, individual judgments are entered in all cases based on the sample verdicts. Furthermore, regression even makes it possible to tailor awards to some of the unique features of each separate case.

Even so, sampling departs significantly from the traditional adjudicative paradigm, and it is unclear whether the procedure is consistent with separation-of-powers and Article III principles.[167] If it is, sampling

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163. See *In re Fibreboard Corp.*, 893 F.2d 706, 712 (5th Cir. 1990) (concluding that "[w]e are persuaded on reflection that the procedures here called for comprise something other than a trial within our authority. It is called a trial, but it is not").

164. For a discussion of the similarity between these procedures and sampling, see notes 20-44 and accompanying text.

165. Judge Parker's original proposal to adjudicate the *Cimino* cases by lump-sum damages came close to this aggregative extreme, although the Judge still allowed some individual trials. See *Fibreboard*, 893 F.2d at 711-12. Judge Parker had intended to hold full trials of liability and damages for 11 class representatives and to collect aggregate information about damage-related variables for the entire class. The jury would never have entered a verdict in any individual case, however, not even in the 11 cases that were actually tried. Instead, the jury would have relied on all the information—information from the individual trials, expert testimony comparing the tried cases with others in the class, and aggregate data on class members—to calculate a lump-sum damages award for all the plaintiffs in each disease category. The lump-sum awards would then have been distributed among individual class members without the aid of a trial or a jury. See id. at 708-09 (describing this procedure).

166. Judge Parker may have been responding to separation-of-powers and Article III concerns when he decided to give each sample case its own jury verdict. See *Cimino*, 751 F. Supp. at 653. The proceeding more closely resembles ordinary adjudication if at least some cases receive ordinary jury verdicts. If separation of powers requires this much, however, it might also require some sacrifice of outcome accuracy, because giving sample cases their own verdicts risks creating an asymmetry of litigation incentives. This problem can be reduced somewhat by spreading litigation costs over all plaintiffs. See notes 77-86 (discussing the impact of sampling on the parties' incentives to invest in the litigation).

167. Institutional reform litigation offers a helpful analogy. Some commentators have argued that a federal court's active involvement at the remedial stage exceeds the proper scope of judicial power and offends separation-of-powers principles. See Susan P. Sturm, *A Normative Theory of Public Law Remedies*, 79 Georgetown L. J. 1355, 1358-59 & n.9, 1403-06 (1991) (noting this criticism and citing to some of the critics). These critics point to, among other things, the largely political and administrative nature of the court's role in these suits. Yet, federal courts continue to engage in this kind of remedial activity despite the separation-of-powers objections. This provides

faces a second and potentially more troubling process-oriented objection. Sampling seems to deny most plaintiffs their right to a personal day in court at the damages stage and does so for individualized issues that are not suitable for conventional class action treatment.[168] The "day in court" ideal in American adjudication is linked to a process-oriented view of adjudicative participation that values participation for its own sake, not just for its impact on outcome quality. Participation is important because it gives individuals a chance to make their own litigation choices.[169]

Although reasons may exist to doubt the coherence of a process-oriented participation right in adjudication,[170] such a right is an important part of the American litigation system and continues to survive, at least on a rhetorical level, despite inroads made by the class action, large-scale consolidations, and court-supervised settlements. To motivate the following analysis and to address the strongest plausible case against sampling, I assume that the parties to mass tort cases have process-oriented participation rights that can trump utility and that those rights guarantee a robust form of individual control, including control over litigation of *all* significant issues relating to the determination of individual damages.[171] I also assume that the intrinsic value of partici-

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some support for an interpretation of separation-of-powers and Article III principles that allows court adjustment of procedure to the demands of a particular case (at least so long as the resulting process does not violate any formally promulgated procedural rules). See generally id. at 1427-44 (defending a deliberative model of remedial decisionmaking in public law cases).

168. For recognition of the right to a day in court, see *Martin v. Wilks*, 490 U.S. 755, 762 (1989); and *Parklane Hosiery Co. v. Shore*, 439 U.S. 322, 327 n.7 (1979).

169. I have attempted to establish these propositions in earlier articles. See Bone, 67 N.Y.U. L. Rev. at 193 (cited in note 17); Bone, 70 B.U. L. Rev. at 213 (cited in note 37).

170. For a more detailed discussion, see Bone, 67 N.Y.U. L. Rev. at 279-88. While I agree that participation has intrinsic value that can count in favor of a participation right in some situations, I am not persuaded by the usual justifications for process-oriented participation because they ignore the fact that adjudication is an institution designed primarily to produce quality outcomes.

171. While it is true that most statistical procedures give everyone some opportunity to participate, they also deprive parties whose cases are decided by statistical extrapolation of a chance to litigate important factual and legal issues critical to individual recovery. Under the stratified sampling procedure used in *Cimino*, for example, those not selected for the sample can litigate the propriety of sampling and presumably also the proper classification of their cases. By the same token, the claim-profile approach advocated by Professors Abraham and Robinson gives at least some of the parties an opportunity to challenge the statistical methodology used to generate the profiles, and gives each party a chance to litigate the choice of claim profile for her case. However, both approaches leave those outside the sample with severely limited litigation opportunities, since, as we have seen, any statistical approach must average over many damage-related variables if it is to succeed in cutting back substantially on litigation costs.

There is a possible exception to these process-oriented concerns, however. If each plaintiff's substantive right guaranteed only the statistically generated outcome, then it might follow that no plaintiff has a process-oriented right to a trial on individual injury, since individual issues would be legally irrelevant to her claim. This might be true, for example, of the corrective justice argu-

pation is historically tied to respect for individual autonomy: allowing a person to participate before subjecting him to the coercive power of the state respects his dignity as an autonomous moral agent.[172]

These assumptions pose two problems for sampling. First, sampling deprives many plaintiffs of a full trial opportunity. But this is an inevitable result of scarcity. Judges have no direct control over the legislature's budget, and they must work with the resources at their disposal. Thus, the second problem is the more serious for the judiciary—how to justify the way sampling distributes trial opportunities.

Large-scale mass tort litigation produces conflicts among process-oriented participation rights because of the scarcity of litigation resources. If there is not enough to go around, the justification for sampling must turn on the answer to a question of distributive justice: What is a fair way to distribute limited litigation opportunities? This question is complicated by the fact that each party has an equal claim of right to the process goods[173] being distributed.[174] Consequently, certain utilitarian solutions are ruled out. In the absence of party consent, for example, it would not be proper to distribute litigation opportuni-

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ment for the sample average outlined in Part III.C. since that argument defends a substantive right to compensation only in the amount of expected loss. In any event, it is clear that one must deal with process-oriented concerns as long as one recognizes a right to compensation for actual harm and uses sampling as a measuring device.

172. See Bone, 67 N.Y.U. L. Rev. at 265 (cited in note 17). I should make clear that I, for one, do not necessarily endorse all of these assumptions as a prescriptive matter. I believe there are good reasons to stop short of recognizing an expansive process-oriented participation right in adjudication. I make these assumptions because they seem necessary to explain the way current procedural law treats litigative participation. In addition, these assumptions create the most difficulties for sampling, and it makes sense in defending sampling to deal with the most forceful opposing arguments that can plausibly be made. If sampling can survive a challenge based on broad process-oriented participation rights, as I argue it can, then it should pass muster under less expansive views of individual participation.

173. By the term "process goods," I mean any kind of participation opportunity traditionally associated with American adjudication. The characterization of participation opportunities as "goods" is justified by the assumption that participation is a consumption good for the parties to the litigation. Process goods therefore include individual control over one's own suit as well as control shared with co-parties in a multi-party suit. Control is, of course, limited by the background rules that regulate litigation, but the participation right guarantees a level of participation that constrains the choice of background rules.

174. Professors Abraham and Robinson recognize the underlying equality of participation right. Robinson and Abraham, 78 Va. L. Rev. at 1503 (cited in note 7) (noting that "if there is a due process right to individualized adjudication, it must be in recognition of an equal right enjoyed by other, similarly situated claimants"). They do not recognize its full implications, however. They use equality to argue that no claimant can insist on individualized adjudication to the detriment of another claimant with an equal right. I dispute this proposition later in this Article. See notes 253-56 and accompanying text. For now, it is enough to note that even if the proposition were true, the question of distribution would still remain, and a court would still have to determine which method fairly distributes the available process opportunities in view of the nature of the participation right.

ties only to those who are likely to litigate most efficiently because such a distribution fails to respect the underlying equality of right.

Sampling distributes by random lottery.[175] Each party receives the same chance at a full trial and an expectation equal to the total number of trials divided by the total number of cases in the sample. A lottery has much to commend it. Everyone receives the same good—a certain probability of a full trial opportunity. To be sure, not just any sampling procedure will do. By using stratified sampling in *Cimino*, for example, Judge Parker constructed a lottery that gave different chances to plaintiffs with different diseases.[176] An unequal distribution of this sort will offend equality of right if the strength of a participation right remains the same across disease types.[177] If all persons with equal rights get equal chances, however, what could possibly be wrong with a lottery?

The problem is that we do not usually associate lotteries with adjudication. If neighbors choose conflicting land uses and each asserts an abstract right to freedom of use in a nuisance action, we would think it wrong for a court to resolve the dispute by flipping a coin, even though this procedure gives each claimant an equal chance to enjoy her preferred use.[178] A judge must reason to a decision, and not just any reason will do. Normally we think that reasons count only if they appeal to morally relevant considerations and provide moral grounds for the losing party to accept her loss. Unless chance has moral significance, a coin flip cannot possibly satisfy this requirement.[179] If this is true of deci-

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175. The claim-profile approach of Professors Abraham and Robinson appears to distribute on a first-come, first-served basis. However, their approach may actually be equivalent to a lottery if each plaintiff has an equal ex ante chance of being one of the first to litigate her case.

176. The *Cimino* sampling procedure gave the following chances to the following disease categories (the ratios are computed by dividing the sample size by the size of the total population for each disease category):

Mesothelioma — 15/32 = .47

Lung Cancer — 25/186 = .13

Other Cancer — 20/58 = .34

Asbestosis — 50/1050 = .05

Pleural Disease — 50/972 = .05

See *Cimino*, 751 F. Supp. at 653 (listing sample size and population size for each disease category).

177. For the distribution of chances in *Cimino* to be justifiable, participation rights would have to vary in a completely implausible way. For example, participation rights would have to be much stronger for mesothelioma than for lung cancer victims. See note 176.

178. See generally Judith Resnik, *Precluding Appeals*, 70 Cornell L. Rev. 603, 610-11 (1985) (describing events in which a judge was censured for flipping a coin to decide whether a criminal defendant should serve 20 or 30 days in jail).

179. In the hypothetical nuisance suit, for example, the court might reason on the basis of a social contract theory that absolute property rights must be qualified in order for all to share in the mutual advantages of organized society. Along these lines a reciprocity norm might justify enjoining the party who creates an interference substantially in excess of the prevailing level in the surrounding community. For the different types of argument used in nuisance cases historically,

sions regarding conflicting substantive rights, however, why is it not equally true of decisions regarding conflicting procedural rights?

The following discussion first reviews the standard arguments used to defend aggregation against process-oriented objections and then examines the distributional problem in the sampling context.

A. *The Standard Arguments*

Aggregation proponents often respond to the challenge from process-oriented participation with three types of argument: an argument based on consent, an argument that equates process value with psychological states, and an argument that dismisses the participation right as having no practical reality in actual litigation practice. None of these arguments, however, is entirely satisfactory.[180]

1. The Consent Argument

If defendants have an opportunity to present evidence and argument on all the critical issues in the course of adjudicating a representative sample of cases, they have little reason to object to sampling on participation grounds.[181] Consent, therefore, is significant primarily for plaintiffs.

With no realistic alternatives available, it is hardly surprising that plaintiffs consent to sampling. Sampling's defenders then invoke this consent to justify the impact on participation values.[182] We have already examined the difficulties with using plaintiffs' consent to justify sampling's effect on outcome.[183] Similar problems plague its use on the process side as well.

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see Robert G. Bone, *Normative Theory and Legal Doctrine in American Nuisance Law: 1850-1920*, 59 S. Cal. L. Rev. 1101 (1986).

180. Nor does an argument based on representational adequacy fare any better. As we have already seen, the idea of interest representation embodied in the modern class action would have to be stretched quite far to justify the coercive imposition of sampling in large damages suits. See notes 20-38 and accompanying text. Furthermore, even if courts were willing to expand representation, the distributional justice question would still remain. So long as parties retain background process-oriented rights to *actual* participation even when special circumstances demand that they settle for representation, there is still a question of how to decide *which* plaintiffs should serve as the "representative parties" entitled to litigate their own suits.

181. Unless they have some reason to relitigate these issues in each individual case, defendants have no basis to complain about lack of participation. See *Parklane Hosiery v. Shore*, 439 U.S. 322 (1979) (holding that defendants can be barred from relitigating issues that they have already litigated and lost). Defendants may have cause for complaint only if they do not get a chance to litigate factual or legal issues that are unique to cases outside of the sample. For a discussion of the due process and jury trial issues involved, see Resnik and Rowe Letter at 16-19 (cited in note 9).

182. See, for example, *Cimino*, 751 F. Supp. at 665-66; Saks and Blanck, 44 Stan. L. Rev. at 825, 829 n.102 (cited in note 14).

183. See notes 110-20 and accompanying text.

Consent figures in the analysis of sampling's impact on process-oriented participation rights in two ways: it can be used to justify a court's distribution of less than full participation opportunities to everyone, and it can be used to justify the particular distribution a court makes of those limited participation opportunities that are available. The problem with using consent in the first way is similar to the problem discussed in the outcome section.[184] If delay costs force actual recovery below a fair minimum, plaintiffs have no chance to seek a meaningful remedy through individual adjudication and thus no reason to choose this form of participation.[185] A plaintiff's consent to sampling under these circumstances cannot possibly count as a waiver of an individual trial because the plaintiff has no reasonable opportunity to obtain an individual trial in the first place.

It is not clear that individual waivers should be required, however, before a court distributes in some manner the limited process goods that it has at its disposal. If there are not enough process goods to go around, it would seem more sensible for the court to distribute what is available than to leave plaintiffs to endure the consequences of severe delay and the effective denial of meaningful relief.[186] For the remainder of Part IV, I shall assume that the court can distribute through an aggregation and need not remit plaintiffs to individual trials.

Nevertheless, the fact that some kind of limited distribution can be made does not mean that just any kind of distribution is permissible. The existence of participation rights constrains the court's choice of distribution scheme. Consent, therefore, enters the analysis in a second way, as a means of justifying a particular distribution as against alternative possibilities.

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184. See notes 110-15 and accompanying text.

185. Participation has intrinsic value only if there is something to gain in the way of outcome from participating, and the state hardly respects the dignity of those it affects through adjudication when it gives them only an opportunity to participate for its own sake. The notion that process-oriented participation depends on outcome to this extent is not inconsistent with the assumption of process value. It does assume, however, that process value is secondary to outcome value in the sense that a nonnegative expected outcome is necessary to a plaintiff's deriving intrinsic value from participation. This is a reasonable assumption. No rational person is likely to pay simply to litigate for the sake of litigating. Furthermore, this degree of outcome-dependence is not unusual in other areas of social life. A person playing a carnival game, for example, may value the experience of playing the game only if there is some chance that she will win a prize in the end.

186. Requiring waivers can also create a collective action problem similar to the one discussed in the outcome section. See note 120. Plaintiffs who anticipate that sampling will ease the congestion problem have an incentive to decline a waiver and insist on an individual trial. If all plaintiffs in the aggregation act in this way, however, it will not be possible to keep the aggregation together, and a court will not be able to provide meaningful relief. Under these circumstances, all plaintiffs would agree to distribute the opportunities that are available if only they could be sure their co-plaintiffs would agree as well.

For consent to justify a particular distribution, however, plaintiffs must have access to a range of distribution schemes, be aware of the alternatives, and make an informed choice among them. Consent cannot justify the choice of random sampling over other distribution methods if, for example, the court allows no other alternative, or the parties are unaware of the alternatives and thus cannot select among them.[187] Under these circumstances random sampling must be justified independently of consent.

Mass tort litigation presents special problems in this regard. Attorneys rarely communicate with their clients in these cases, and to the extent the attorney controls the litigation primarily for her own benefit, there is no guarantee that her decision about random sampling or any other distribution scheme will reflect her client's wishes.[188] Even if a plaintiff cares deeply about individual participation, the attorney is not likely to care at all unless her fee depends on participation in some way.

To illustrate, suppose that an attorney receives the same contingency fee whether or not she actually litigates. Suppose further that the court gives all plaintiffs, including those in the sample group, the sample average and spreads total litigation costs equally over the entire plaintiff population.[189] Unless the attorney doubts the litigating incentives or wherewithal of other counsel, she will want to minimize the chance of being selected for trial, since she incurs opportunity costs in trying a case and gains nothing as a result.[190] This means that the attor-

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187. For example, it is unlikely that the plaintiffs in *Cimino* had any opportunity to make an informed choice among alternatives. Indeed, there is no evidence in the *Cimino* opinion that Judge Parker placed any weight on the plaintiffs' participation rights when designing his sampling approach. The opinion focuses on outcome and assumes that consent vitiates all of the plaintiffs' concerns.

188. See authorities cited in note 82.

189. This is the approach recommended in Part III.B.

190. Of course, attorney incentives depend on the starting assumptions about fees. But agency problems are likely to remain under any plausible arrangement. For example, consider a class action where the judge has power to review fees for class counsel. See *Venegas v. Mitchell*, 495 U.S. 82 (1990); *Dunn v. H. K. Porter Co.*, 602 F.2d 1105 (3d Cir. 1979); Coffee, 54 U. Chi. L. Rev. at 881 nn.11-12 (cited in note 82). If the judge scales down the fee for those attorneys who do not actually litigate, an attorney will have something to gain if her case is chosen for the sample. On the other hand, trials are costly and the attorney absorbs that cost under a contingency arrangement. Thus, even if the total cost of all trials is spread over the entire plaintiff population, the attorney may still have an incentive to minimize the size of the sample, although the strength of her incentive will vary with the magnitude of the contingency factor.

Similarly, changing the verdict and cost-allocation rules is not likely to eliminate agency problems. In the *Cimino* case, for example, Judge Parker gave the sample plaintiffs their own verdicts rather than the sample average. Under these circumstances, an attorney who represents a high-damage plaintiff receives some benefit from being chosen to try that case. But she also stands to lose if her clients include plaintiffs with below-average damages who are also chosen for the sample. If her case portfolio is randomly distributed over all types of cases (or because of uncertainty about other cases, she assumes that it is), she can expect actual damages to average out to

ney is likely to consent to the smallest possible sample and to the least expensive distribution scheme, even if there are enough resources for a larger sample and even if her client would prefer some other distribution method that gives the client a greater chance at trial. Furthermore, an overburdened judge is not likely to object if the plaintiffs' attorneys agree, provided minimum outcome standards are satisfied. Thus, plaintiffs may end up with a sampling procedure that distributes an unnecessarily small number of trials and does so without regard to how plaintiffs actually value participation.

Unfortunately, individual notice cannot solve this problem. Even if notice informs all plaintiffs of the different sampling options, the ultimate choice cannot be left to the plaintiff group because any effective sampling procedure requires the involvement of all plaintiffs. But, as we shall see, those procedures on which all plaintiffs can agree include some distribution methods, such as an auction, that sacrifice outcome quality to an unreasonable extent.[191] To justify sampling's impact on participation values, therefore, we must look beyond consent.

2.   The Psychological Argument

Some argue that participation's intrinsic value is purely psychological: those who participate are likely to be more satisfied with the outcome and the process that produced it. According to this view, sampling is justified because it improves overall satisfaction by making meaningful recovery possible. Although the procedural psychology literature supports a correlation between participation and positive litigation experience,[192] there is a problem with this argument. A psychological theory of process value cannot possibly account for the historical commitment to individual participation and control in American adjudication. A strong participation right can be justified only by a normative theory of process value that grounds the value of participation in the conditions of adjudicative legitimacy, such as respect for a party's dignity or autonomy.[193]

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the mean, and as a result, she will gain nothing from a trial. Furthermore, even if the attorney represents just high-damage plaintiffs, she will make her decision about sampling by considering only outcome variables and will not consider the process value associated with an opportunity to participate directly in the litigation, even if her client values that opportunity very highly.

191.   See notes 246-52 and accompanying text.

192.   See, for example, E. Allan Lind and Tom Tyler, *The Social Psychology of Procedural Justice*, 26-40, 61-127 (Plenum, 1988); John Thibaut and Laurens Walker, *Procedural Justice: A Psychological Analysis* (Laurence Erlbaum, 1975); E. Allan Lind, et al., *In the Eye of the Beholder: Tort Litigants' Evaluations of Their Experiences in the Civil Justice System*, 24 L. & Soc'y Rev. 953, 967-87 (1990).

193.   See Bone, 67 N.Y.U. L. Rev. at 233-36 (cited in note 17).

A concern with litigant satisfaction by itself leads naturally to a utilitarian approach that is inconsistent with the status of participation as a utility-trumping right. Satisfaction, after all, is a measure of utility, and no individual plaintiff has any better claim than anyone else to have her utility counted. Thus, the best way to decide whether plaintiffs should be allowed to participate is to evaluate the consequences for aggregate utility.

Not surprisingly Professors Saks and Blanck, after equating participation value with satisfaction, find it easy to endorse a utilitarian justification of sampling.[194] They argue that sampling maximizes plaintiffs' total satisfaction as compared to individual trials and bilateral settlements.[195] What they do not realize, however, is that utilitarianism, once unleashed, can cut deeply into participation opportunities in a wide array of cases.

Saks and Blanck would confine the domain of utility maximization to the set of plaintiffs belonging to a single mass tort aggregation.[196] But they offer no justification for stopping at this point. Why not count the utility that other parties derive from being able to adjudicate their cases more quickly due to a reduction in mass tort trials? And why not count the utility that taxpayers and others receive when resources committed to adjudication are redirected to other productive uses? If utility is allowed this wide a range, however, it is difficult to defend the strong preference for individual participation that has been central to American adjudication and difficult to limit sampling to situations of severe budgetary constraint.[197]

3. The Practical Argument

The third argument discounts the participation right by denying the reality of actual participation.[198] Saks and Blanck make this argument when they observe that plaintiffs in individual tort cases rarely exercise control at all and that most tort cases usually settle before trial.[199] The point of these comparisons is to show that there is no ac-

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194. See Saks and Blanck, 44 Stan. L. Rev. at 838-39 (cited in note 14). But see id. at 832 n.129 (recognizing the moral dimension of participation but giving it short shrift).

195. Id. at 839.

196. Id.

197. Compare Bone, 67 N.Y.U. L. Rev. at 238-56 (cited in note 17) (discussing the effect of an efficiency-based theory on the participation right).

198. See, for example, *Cimino*, 751 F. Supp. at 666; Hensler, 1989 U. Ill. L. Rev. at 92-99 (cited in note 39); Rosenberg, 69 B.U. L. Rev. at 702 (cited in note 122). It is worth noting that evidence suggests that lack of party control is not the result of party choice but of attorney domination. See Hensler, 1989 U. Ill. L. Rev. at 95 (noting that parties who claimed lack of control attributed it to their attorney's conduct not their own choice).

199. See Saks and Blanck, 44 Stan. L. Rev. at 839-41 (cited in note 14).

tual value in participation because there is no actual participation in ordinary litigation.

This argument suffers from the same problem as the previous one to the extent it assumes that participation is about satisfaction and concludes that aggregative procedures are not likely to reduce satisfaction below its current level. The argument has an even deeper flaw, however. If parties have rights to participate derived from the moral requirements of adjudicative legitimacy, procedural arrangements that deny participation require explanation just as much as sampling, and it makes no sense to justify sampling by comparing it to procedures that require justification themselves.

The prevalence of settlement in mass tort cases supports a somewhat different version of this argument.[200] Given the likelihood of settlement, it is reasonable to assume that sampling, by reducing delay costs and thus defendant's incentive to hold out, will increase the frequency of mass tort settlements rather than clear the way for actual trials. If trials are not likely to take place, the argument goes, there is no reason to worry about trial participation at all.[201]

There are three problems with this argument. First, even if settlements are inevitable, courts still must consider participation values. If the prospect of settlement allowed courts to ignore participation altogether, there would be no reason for many of the existing limitations on nonparty preclusion and the class action.

Second, not all cases settle. Even when both parties desire a settlement, negotiations can break down due to strategic interaction effects.[202] When settlement efforts fail and sampling must be implemented, the rules should assure a fair distribution of participation opportunities.

Finally, even if a case settles, the settlement amount should reflect the value of going to trial. This value includes two components: the expected value of the trial outcome and the expected value of trial participation. But participation value depends on how the sampling procedure distributes trial opportunities. Thus, the fairness of the settlement depends on the fairness of the distribution scheme even if that scheme is never actually implemented.

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200. See, for example, Saks, 140 U. Pa. L. Rev. at 1212-13 (cited in note 53) (collecting data showing high rates of settlement).

201. For an example of this argument, see Weinstein and Hershenov, 1991 U. Ill. L. Rev. at 325-26 (cited in note 19).

202. See Rohert Cooter and Thomas Ulen, *Law and Economics* 487-92 (Scott, Foresman, 1988) (explaining how the choice between hard and soft bargaining strategies can create an equilibrium in which some cases still go to trial).

B.   *The Circumstances of Justice*

In his monumental work on social justice, David Hume defined circumstances of justice as those social conditions, like selfishness and scarcity, that bring distributional fairness concerns into play.[203] Two circumstances of justice frame the fairness analysis for sampling: the process-oriented participation right and the scarcity of process goods.

1.   The Nature of the Process-Oriented Participation Right

Three features of the participation right are critical to the evaluation of distributional schemes: scope, strength, and commensurability. Scope defines the kind of entitlement the right confers. In an illuminating treatment of distributional lotteries, Professors Lewis Kornhauser and Lawrence Sager distinguish three kinds of entitlement: those that guarantee treatment as an equal, those that guarantee equal treatment, and those that guarantee access to the good itself.[204]

The participation right obviously guarantees much more than treatment as an equal. Treatment as an equal requires no particular level of participation. Indeed, it makes no demand on distributional outcomes at all. It only requires that each person's interests be fairly considered in the distribution process.[205] So long as this condition is satisfied, any distributional scheme, even one that distributes only to those who litigate most efficiently, would be perfectly consistent with the right.

Furthermore, the participation right entitles its holder to more than just equal treatment. Equal treatment is a comparative norm; it gives person A a benefit only if person B receives the benefit as well.[206] Thus, equal treatment would be perfectly satisfied if no one received anything at all. The participation right is not contingent in this way; its guarantee of litigation control does not depend on the participation opportunities others receive.[207]

On the other hand, there is a way in which the right is contingent. No one could insist on the robust form of control associated with an adversarial trial, for example, if American adjudication had always been

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203. See David Hume, *A Treatise of Human Nature* 494-95 (Clarendon, 2d ed. 1978).

204. Lewis A. Kornhauser and Lawrence G. Sager, *Just Lotteries*, 27 Soc. Sci. Information 483, 493-95 (1988). In framing the circumstances of justice I rely to a considerable extent on the analytical framework outlined in this essay. Kornhauser and Sager also consider situations in which no one has a moral entitlement at all, but these do not apply to our problem.

205. Id. at 495.

206. See Kenneth W. Simons, *Equality as a Comparative Right*, 65 B.U. L. Rev. 387 (1985).

207. For example, a party could claim a violation of due process if a court denied her all opportunity to call and cross-examine witnesses, and this is so even if the court denied the opportunity to everyone.

based on a judge-centered, inquisitorial model.[208] Thus, the participation right confers an entitlement to the process good itself, but the scope of the right depends to a significant extent on conventionally accepted procedural norms.

If conventional norms supported a participation right that only guaranteed an opportunity for input into a lawsuit, the scarcity problem could be easily solved. For example, a court could litigate sample cases with a committee of lawyers representing different plaintiffs or hold a fairness hearing at which plaintiffs could air objections about the sampling procedure and the appropriateness of their individual verdicts.[209] The participation right, however, extends beyond limited input; the "day in court" ideal has traditionally gnaranteed a large measure of individual control over litigation strategy.

The second question concerns the strength of the participation right and in particular whether all parties have equally strong rights. This consideration is important because a lottery that gives all plaintiffs equal probabilities might be unfair if some plaintiffs have stronger rights than others. As used here, the "strength" of a right is a comparative notion. While all participation rights guarantee the same degree of individual control, stronger rights deserve greater weight when there is a rights conflict, and they entitle their holders to some form of priority in a distribution scheme.[210]

Some commentators argue that participation rights are stronger for personal injury than for property damage cases, but precedent offers little support for this position.[211] One might be tempted to draw a simi-

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208. The inquisitorial system currently in operation in Germany and other civil law countries gives the judge and judicial officers broad power over the investigation and presentation of a case and leaves parties with only very limited control opportunities. See John H. Langbein, *The German Advantage in Civil Procedure*, 52 U. Chi. L. Rev. 823 (1985); Benjamin Kaplan, *Civil Procedure—Reflections on the Comparison of Systems*, 9 Buff. L. Rev. 409 (1960).

209. For background on litigation committees, see *Manual for Complex Litigation* §§ 20.21-20.225 (West, 1986). Courts hold fairness hearings when reviewing class action settlements. These hearings involve relatively informal procedures and give class members an opportunity to voice objections to the settlement. See id. § 30.44 at 159-61; see also Peter H. Schuck, *Agent Orange on Trial: Mass Toxic Disasters in the Courts* 173-74 (Belknap, 1986) (describing fairness hearings conducted by Judge Weinstein in the Agent Orange litigation).

210. For example, a lottery might have to allocate chances proportional to relative strength if participation rights varied in strength. Alternatively, it might be necessary to distribute process goods in lexical order with the strongest rights receiving full satisfaction before lesser rights received anything at all. In either case the resulting distribution may not be sufficiently random to assure a reasonably accurate sampling procedure from an outcome point of view, forcing a court to resolve the tension between process and outcome values. I discuss a similar problem later in this Article. See notes 239-42, 250-52 and accompanying text.

211. See Roger H. Trangsrud, *Joinder Alternatives in Mass Tort Litigation*, 70 Cornell L. Rev. 779, 816-31 (1985); Roger H. Trangsrud, *Mass Trials in Mass Tort Cases: A Dissent*, 1989 U. Ill. L. Rev. 69 (1989). For a criticism of this argument, see Bone, 67 N.Y.U. L. Rev. at 265 n.245 (cited in note 17)

lar distinction by focusing on the severity of the injury, arguing, for example, that cancer victims have stronger participation rights than those who suffer from less severe forms of injury. Distinctions of this kind might make sense if the participation right depended on psychological factors that varied with the degree or kind of harm. But this is not the case. The right protects autonomy and dignity values that assure fair treatment at the hands of the state, and those values do not depend on the nature of mass tort injury.[212] Thus, I shall assume that the strength of the right is the same for all cases.

The final dimension that needs clarification is commensurability and in particular whether the participation right can be valued in terms of the rightholder's preference for participation. Some rights are valued independently of preference; either preferences are treated as infinite, or subjective valuation is thought to be inconsistent with the moral character of the right.[213] For example, someone contemplating suicide may prefer to die than to continue living, but her preference is irrelevant to the value society places on her right not to be killed.[214]

The participation right is not this kind of right. Parties routinely place a monetary value on the right whenever they settle cases, and the procedural system, by facilitating settlement, even encourages them to do so.[215] Furthermore, it is possible in theory to give a finite value to a preference for participation.[216] Suppose, for example, that there is an

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212. Under this view, a pleural disease victim would be entitled to tbe same degree of respect from the state and thus the same level of participation as a mesothelioma victim. I have argued elsewhere that American adjudication recognizes some distinctions among participation rights, but those distinctions do not generally apply to mass tort cases. See Bone, 67 N.Y.U. L. Rev. at 264-79 (cited in note 17) (discussing the principles of remedial homogeneity and litigative autonomy).

213. See Guido Calabresi and Phillip Bobbitt, *Tragic Choices* 39 (Norton, 1978); Kornhauser and Sager, 27 Soc. Sci. Info. at 508-09 (cited in note 204). See also Margaret Jane Radin, *Market-Inalienability*, 100 Harv. L. Rev. 1849 (1987) (noting how the market tends toward commodification and recommending that some choices be excluded from the market in order to preserve their noncommodified value).

214. This statement should be qualified somewhat given that society routinely tolerates and even encourages socially beneficial activities, such as industrial employment and mass product marketing, that are virtually certain to kill or seriously injure someone. Risk is inevitable and with a large enough group of risk bearers, someone is bound to suffer barm. Most people feel differently, however, when the activity is certain to cause serious harm to a victim known in advance. Thus, in a real world version of the Trolley Problem, it would not be morally acceptable to turn the trolley toward five people on one track just because the switch controller knows that those people wish to die and that the one person on the other track wishes to live. See generally Judith Jarvis Thompson, *The Trolley Problem*, 94 Yale L. J. 1395 (1985).

215. See notes 39-41 and accompanying text.

216. The approach described in the text may elicit a low value for the participation right due to the influence of the so-called "endowment effect." The endowment effect describes the tendency of people to value the loss of something they already have more highly than the gain of something they have yet to receive when loss and gain have the same objective value. The method in the text elicits a value for a gain because it asks the party how mucb she would be willing to pay in order to acquire a participation right. By changing the starting point, it would be possible to elicit a value

aggregative procedure that gives the same expected outcome as an individual trial but no chance to control the litigation. Suppose further that each plaintiff is given a choice whether to accept the aggregative procedure or hold out for a trial. Depending on the magnitude of the delay cost and the strength of her preference for individual participation, a plaintiff should be willing to wait some period of time, and no longer, to receive an individual trial. The maximum delay cost the party is willing to incur can be used to measure the value she places on participation.[217]

More importantly, taking account of individual preference fits the moral character of the participation right. Participation derives intrinsic value from an autonomy norm—the individual gets a chance to make her own choices about litigation strategy. If the right protects individual autonomy, it makes sense to credit preferences and autonomous choice when deciding how to distribute participation opportunities. It would not promote autonomy in anything but a purely symbolic way to give a litigation opportunity to someone who placed zero value on participation or to force a trial on someone who would rather not control her own suit. Nor would it promote autonomy if a court were to disregard a mutual agreement among the plaintiffs specifying a distribution scheme, assuming the agreement was consistent with outcome values.[218]

2. The Nature of Process Scarcity

As we saw in the discussion of consent, the idea of process scarcity depends on an assumption about minimally acceptable outcomes.[219] If all parties eventually get a chance to litigate their cases, the adjudication system does not deny anyone a formal opportunity to control her own suit. Furthermore, complaints about limited resources and litiga-

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for a loss by asking the party how much she would be willing to receive in order to give up a participation right she already had. If the endowment effect literature is correct, the former measure should be less than the latter. See generally Herbert Hovenkamp, *Legal Policy and the Endowment Effect*, 20 J. Legal Stud. 225 (1991) (discussing the endowment effect).

217. This method works only for those who place a positive or zero value on the participation right. It is possible that some parties value adversary participation negatively and would be willing to pay something for the opportunity to receive damages without having to litigate. Of course, if everyone placed a negative or zero value on participation, it would be difficult to justify a participation right. One might argue that the right was nonetheless compelled by some natural law of process, but the fact that no one valued the right should raise serious doubts about its natural law pedigree.

218. Later in the Article, I present a defense of the random lottery based on a hypothetical agreement. See notes 260-76 and accompanying text.

219. See notes 114-15, 185 and accompanying text.

tion delay are chronic features of the litigation system.[220] If scarcity triggers special obligations to distribute process goods fairly, there is sound reason to confine the concept to extraordinary situations. Thus, to make sense of extreme scarcity, we need some way to set a maximum limit on permissible delay that separates the extraordinary from the routine.

One way to do this is to link scarcity to outcome quality.[221] As litigation delay increases, a plaintiff's expected recovery net of delay costs decreases. At some point on the delay continuum, expected recovery falls below some minimally acceptable level, which depends on one's view of what is required for individual litigation to be a practical alternative. One might set the minimum at zero, for example, by reasoning that the participation right is eviscerated only when no person can expect to gain anything from exercising it. Alternatively, someone concerned with fairness could defend a minimum level above zero by arguing that compensation below that minimum is morally unacceptable.[222]

For purposes of the following discussion, I assume that a maximum limit to lawsuit duration has been set by reference to some minimally acceptable floor to expected recovery. In order to conclude that process scarcity exists, we need to clarify two additional items: how to determine the units used to count available process goods, and how to determine the number of cases that those goods must service.

In order to compare the number of process goods to the number of rights claims, process units must correspond to the kind of participation that the right guarantees. If, as we have assumed, the participation right guarantees control opportunities associated with conventional forms of tort litigation, then process units should include the bipolar suit in which each party exercises broad control over litigation strategy,

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220. See Robert G. Bone, *Mapping the Boundaries of a Dispute: Conceptions of Ideal Lawsuit Structure from the Field Code to the Federal Rules*, 89 Colum. L. Rev. 1, 3-4 & passim (1989).

221. Another way is to set a limit on permissible delay directly. For example, the Civil Justice Reform Act of 1990 suggests that district courts set a target for civil cases of 18 months from filing to the beginning of trial. 28 U.S.C. § 473(a)(2)(B) (Supp. 1990). If this target were enforceable as an absolute limit (which it is not), the sheer volume and complexity of mass tort litigation would probably make it impossible to comply within existing budgetary constraints, and a condition of scarcity would surely exist. See *Ad Hoc Committee Report* at 10-11 (cited in note 9).

222. For an argument that procedures should be designed to take account of unfairness to third parties affected by serious delay costs, see Jon O. Newman, Comment, *Rethinking Fairness: Perspectives on the Litigation Process*, 94 Yale L. J. 1643, 1649-52 (1985). Furthermore, a utilitarian could argue that the substantive law's deterrent effect would be unacceptably compromised if expected recovery fell below some positive amount. In fact, although it is more difficult to see, there is no conceptual obstacle to deriving a delay limit from some ideal view of the institution of adjudication supporting a norm of reasonably prompt judgments.

as well as the traditional multiparty suit in which a few parties share the litigation stage but retain considerable freedom to make their own strategic decisions.

At the same time, it is important to note that process goods are not indivisible.[223] Control is a continuous variable, and while scarcity must be evaluated in terms of process units that reflect broad control, it is at least possible to design procedures that give much less.[224]

The final issue concerns the proper definition of the domain over which available process goods must be distributed. For example, the distribution could take place over a single aggregation of asbestos cases such as the 2298 cases in *Cimino v. Raymark Industries*, over all asbestos cases, over all mass tort cases, or even over all cases. The choice is critical because it specifies the parameters for deciding which cases have equal claims on a single bundle of process goods and how many process goods there are in the bundle.

Because of its broad power over procedure, a legislature's choices should normally control.[225] If a legislature appropriates funds specifically for the adjudication of asbestos cases, for example, then courts ought to treat asbestos cases separately from other types of cases. Similarly, because distinct sovereignties are involved, federal cases ordinarily should be treated separately from state cases and cases from different states separately from one another.[226]

Without more specific legislative direction, however, I see no principled way to limit the distributional domain to anything less than all cases in a particular jurisdiction. This does not mean that a federal judge has to count all the litigation opportunities available nationwide and consider the effect on all federal court litigants every time she decides on a fair distribution in a particular case. Distributional fairness should be addressed by a legislature or other rulemaking body at the stage of designing general procedural rules, and to the extent an individual judge follows those rules, she should be immune from criticism on distributional grounds.[227]

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223. On the importance of indivisibility to a lottery distribution, see Kornhauser and Sager, 27 Soc. Sci. Information at 504-05 (cited in note 204).

224. I discuss below whether procedures offering less than the normal range of control opportunities can partially satisfy the participation right and whether, if they can, it is better to distribute process goods by giving some form of truncated participation to everyone rather than giving full trials to some. See notes 231-42 and accompanying text.

225. See notes 133-34, 158 and accompanying text.

226. I will not address the issue of whether similar deference is ever owed to an administrative agency charged with allocating funds pursuant to legislative direction.

227. Relevant rules include those dealing with consolidation, joinder, transfer, and venue. See, for example, 28 U.S.C. §§ 1391, 1404, 1406 (1988); F.R.C.P. 18-20, 42(a).

On the other hand, a judge has an obligation to attend to fairness norms whenever she exercises discretion. In mass tort cases, for example, a judge has considerable discretion to affect the size of a case aggregation. The larger the aggregation, the more rights claims will be included in one distribution and the fairer the resulting distribution will be. Manageability criteria and outcome standards place limits on feasible size, of course, just as venue and consolidation rules limit the number of cases available for aggregation at any one time.[228] Yet, within these limits, a judge should construct as large an aggregation as possible. The choice of aggregation size and the number of process goods to be distributed is a matter of judgment and should be left largely to the discretion of the individual trial judge. But the judge should be required to assess the relevant factors, including process and outcome variables, and publicly justify the choices she makes.

With a minimally acceptable floor to expected recovery, a definition of process units, and a definition of the appropriate distributional domain, it is possible to determine whether there are enough process goods to give everyone an individual opportunity to litigate. If there is not enough to go around, a condition of scarcity exists, and cases must be aggregated to distribute the available process goods fairly.

C. *Distributional Solutions*

In this section I assume that the circumstances of justice are satisfied: participation rights are as I have defined them, and a condition of scarcity exists for mass tort cases. Furthermore, I assume that a judge has assembled the largest aggregation practicable and determined the proper number of process goods to distribute. To make the problem more concrete, imagine that Judge Parker, after considering the effects on other litigation, has decided to aggregate 2298 cases and distribute 160 individual damage trials,[229] and imagine that he has justified his choices publicly.[230]

The problem that we now address is how Judge Parker should distribute the 160 trials among the 2298 cases. There are two general approaches to solving this problem. One, which I call the "comprehensive

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228. Some cases must be litigated individually in order to assure a proper outcome. For example, it would not be proper to aggregate entirely unrelated automobile negligence suits, select a random sample, and give each plaintiff the average damages figure because there is no legally relevant relationship between the statistical average and any plaintiff's individual entitlement.

229. In fact, Judge Parker certified a class action in *Cimino* that aggregated all cases pending in the Beaumont Division of the District Court for the Eastern District of Texas as of February 1, 1989. See Linda S. Mullenix, *Beyond Consolidation: Postaggregative Procedure in Asbestos Mass Tort Litigation*, 32 Wm. & Mary L. Rev. 475, 493-94 (1991).

230. It appears that Judge Parker made his decision solely on the basis of outcome criteria. We shall suppose, however, that he also considered participation values.

approach," distributes process resources comprehensively by giving some form of limited participation to everyone. The other, which I call the "selective approach," distributes process goods selectively by giving full individual trials to only some of the parties.

1. The Comprehensive Approach

If it is possible to divide process goods into smaller units, there are strong reasons to use a comprehensive rather than a selective distribution. Comprehensive distribution respects the underlying equality of right in a way that a selective approach cannot. Giving some parties nothing and others everything does not treat all equally if each can receive some satisfaction of her right.[231]

Several conditions must be met, however. First, in order for comprehensive distribution to have any normative payoff at all, the participation right must be capable of partial satisfaction. This depends on the nature of the legitimacy norm that supports the right.[232] If a form of adjudication can assume only one of two states—either "legitimate" or "illegitimate"—then compliance with the requirements of legitimacy must be complete in order to count at all. Under these circumstances giving anything less than the full measure of litigant control would contribute nothing toward satisfaction of the participation right.

We usually treat legitimacy, however, not as a two-valued but as a many-valued norm capable of assuming degrees. Even though we condemn governments as politically illegitimate, we also praise or blame them for being more or less legitimate depending, for example, on how accountable they are to their citizens. Adjudicative legitimacy works in a similar way. A procedure that affords no party a chance to say anything is likely to be considered more illegitimate than a procedure that offers some opportunity for input and control. In addition, the more participation the procedure allows, the less moral condemnation it is likely to receive.[233] If legitimacy is a matter of degree, then it must be morally preferable to provide some participation than to provide none at all, and it should be possible to satisfy the participation right in a partial way.

Assuming that a comprehensive distribution can partially satisfy the right, it also must be possible to offer roughly equivalent, limited litigation opportunities to everyone within budgetary constraints, man-

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231. See John Broome, *Selecting People Randomly*, 95 Ethics 38, 47 (1984).

232. Compare Kornhauser and Sager, 27 Soc. Sci. Information at 505 (cited in note 204) (noting that the divisibility of a good depends on its moral value).

233. This point is consistent with the autonomy and dignity values underlying the participation right. The limited form of control made possible by even a restricted opportunity to participate provides at least some measure of autonomy to the party involved.

ageability requirements, and outcome quality standards. One way to do this is to give each party an opportunity to litigate her own case individually through some kind of truncated process such as a minitrial, summary jury trial, or administrative-type proceeding.[234] Although a legislature has power to implement this approach to some extent, provided it complies with constitutional requirements,[235] a court does not have such power in the absence of explicit statutory authority. Summary forms of process like minitrials and summary jury trials are beyond the power of courts to force on parties when later recourse to a full trial is completely foreclosed.[236]

A more promising approach is to select a sample of cases for full adjudicative treatment, but choose several parties to litigate each case jointly through a litigation committee.[237] In this approach, all parties, through their attorneys, have input into choice of strategy and share control over a sample case, and all sample cases are litigated with the full panoply of adjudicative procedures. Because only one of the committee members litigates her own case and all others assist, this procedure differs from the usual committee approach in which all the lawyers cooperate in litigating issues relevant to their own cases.[238] Nevertheless, it should be possible to adapt existing practice to assure roughly equal participation opportunities for all.

The problem is that adjudication by litigation committee is bound to be more costly than individual suits. In particular, the trial judge will have to monitor the procedure to prevent unfair domination by the party whose case is being litigated.[239] Furthermore, private litigation

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234. On minitrials, see Ronald L. Olson, _Dispute Resolution: An Alternative for Large Case Litigation_, 6 Litig. 22 (Winter 1980). On summary jury trials, see Thomas B. Metzloff, _Reconfiguring the Summary Jury Trial_, 41 Duke L. J. 806 (1992).

235. See note 134 and authorities cited therein.

236. See _Kurtz v. Kurtz_, 538 So.2d 892 (Fla. Dist. Ct. App. 1989) (relying on the nonhinding nature of mediation to hold that compulsory mediation does not violate due process); compare Richard L. Marcus and E. F. Sherman, _Complex Litigation: Cases and Materials on Advanced Civil Procedure_, 1026-30 (2d ed. 1992) (noting case conflict regarding the power of a court to require alternative dispute resolution as a pre-condition to a trial).

237. See generally _Manual For Complex Litigation_ at §§ 20.221-20.225 (cited in note 209) (describing litigation committee and lead counsel procedure). For an example of the committee approach applied to mass tort litigation, see Mullenix, 32 Wm. & Mary L. Rev. at 529-31 (cited in note 229).

238. See _Manual for Complex Litigation_ at §§ 20.221-20.222 (cited in note 209).

239. In the past lead counsel and committee practice involved a great deal of strategic maneuvering that often resulted in domination by subgroups of attorneys. See Coffee, 54 U. Chi. L. Rev. at 907-09 (cited in note 82). The most recent edition of the _Manual for Complex Litigation_ recommends that the court oversee the committee process more actively and in particular that the judge make her own independent judgment about the fairness of the organizational structure proposed by the parties. See _Manual for Complex Litigation_ at § 20.224 (cited in note 209) (describing court's responsibilities in a committee system).

costs will be higher, and the time required to adjudicate a more complicated case will also add to delay costs.

If costs are too high, comprehensive distribution might not be feasible within budgetary constraints, or even if feasible, the court might have to use a less accurate sampling technique than is possible with a selective distribution scheme. The more resources the court commits to managing the litigation of each sample case, the less resources it has for the sampling itself. Thus, a court might have to use a smaller sample or include fewer variables in a regression model. In this case participation for everyone is purchased at the cost of a less accurate outcome. The fate of comprehensive distribution then hinges on the proper way to balance process and outcome values.

One way to strike this balance, what I shall call the "strong priority principle," gives outcome accuracy lexical priority over participation whenever there is a conflict. According to this principle a court first must apply scarce resources toward designing the most accurate sampling procedure possible, and only then toward assuring roughly equal participation opportunities through litigation committees. Under the strong priority principle, therefore, a court must employ selective rather than comprehensive distribution whenever use of a committee procedure increases error by even a small amount.[240]

A second way to strike the balance, what I shall call the "weak priority principle," allows tradeoffs between outcome accuracy and participation, but only to a limited extent. The weak priority principle sets a threshold that all outcomes must meet before tradeoffs can be made. Below this threshold outcome quality has absolute priority over participation, but above the threshold tradeoffs are possible. Although people will disagree over the proper threshold since it depends on one's normative view of acceptable outcomes, there are bound to be easy cases. For instance, a sampling procedure that virtually guaranteed a level of recovery for high-damage plaintiffs far below their entitlements would be unacceptable even if it made committee participation possible for everyone. On the other hand, the weak priority principle, unlike the strong principle, can tolerate a somewhat smaller sample or perhaps fewer regression variables if participation would greatly increase as a result.

The feasibility of comprehensive distribution depends on which principle controls. The strong priority principle has much to commend it. There is little question that achieving quality outcomes is the pri-

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240. Subordinating participation to outcome in this way does not collapse the participation right into utilitarian judgments about desirable social policy. The strong priority principle focuses on outcome accuracy not aggregate utility.

mary concern of American adjudication.[241] Furthermore, the strong principle is attractive on fairness grounds. All citizens benefit from an institution that enforces substantive rights and from procedural rules that ensure outcome accuracy. Not all persons necessarily benefit from rules designed to enhance the intrinsic value of participation, however. Thus, persons in a Rawlsian-style "original position" charged with adopting general principles for adjudication would be likely to agree on the strong priority principle and thus favor procedures that maximize outcome accuracy before satisfying process-oriented participation rights.[242]

On the other hand, the strong priority principle leaves little room for the independent satisfaction of participation rights. The participation right acts mainly as a tie-breaker under this view; the right gives a reason to choose one procedure over another when both assure the same degree of outcome accuracy. Such a limited role seems hard to square with the historical commitment to individual participation embodied in the "day in court" ideal.

It does not seem possible to make a clear choice between these two principles on the basis of either precedent or theory. As judges grapple with the suitability of comprehensive distribution in particular cases, they will have to make their own choices clear, and an approach should emerge over time. Whatever the approach, there are bound to be cases in which comprehensive distribution is not desirable, and in any such case it will be necessary to use a selective distribution scheme.

2. The Selective Approach

In the abstract there are as many ways to distribute undivided trial opportunities selectively as there are potentially relevant attributes of the parties or their cases. One might, for example, distribute to those who are likely to be the best litigators; to those who filed their cases first and have waited the longest for relief; to those who have the most

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241. See Bone, 89 Colum. L. Rev. at 12-26, 88-89, 96-97 (cited in note 220) (noting that the nineteenth-century code reformers and the twentieth-century federal rule drafters both viewed procedure as instrumental to substantive law). See also Richard L. Marcus, *Completing Equity's Conquest? Reflections On the Future of Trial Under the Federal Rules of Civil Procedure*, 50 U. Pitt. L. Rev. 725, 755-56 (1989) (noting that "[our system] relegates procedural rules to the secondary role of Handmaid to Justice, important only insofar as they promote substantively correct outcomes" and that the system has a "central commitment to promoting accurate decisions").

242. On contractarian theories of fairness and the idea of an original position, see the classic treatment in John Rawls, *A Theory of Justice* (Belknap, 1971). For a critical yet sympathetic discussion, see Barry, *Theories of Justice* at 179-254, 320-53 (cited in note 39). The argument also can be made without the device of an original position by appealing directly to the norm of fair reciprocity if benefits are fully reciprocal only with respect to outcomes. For one view of the connection between fair reciprocity and contractarian theory, see Allan Gibhard, *Constructing Justice*, 20 Phil. & Pub. Aff. 264 (Summer 1991).

severe injuries; or to those who value participation the most. Of course, one also might ignore all these criteria and distribute by lot, giving each party some chance at a process good.

Not all of these options are permissible. Some, such as distributing to the best litigators or to those who have waited the longest, are ruled out because they do not sufficiently respect the equality of right.[243] Others, such as distributing to plaintiffs with the most severe injuries, are also unacceptable because they skew the sampling outcome to an undesirable extent.

After eliminating alternatives in this way, two general types of selective distribution remain: distribution by participation preference and distribution by lot. Preference-based distributions are acceptable because of the close connection between participation and autonomy,[244] but the underlying equality of right means that any such distribution must treat all parties equally. Thus, it is impermissible to distribute to those who have the strongest preferences without also compensating those who are left out.[245]

Because the participation right is commensurable with money, however, an auction might be the fairest way to distribute process goods.[246] Notice could be sent to all parties describing the auction and

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243. In particular, the policies supporting these two approaches bear little or no relationship to the participation right. Distributing to the best litigators is justified by outcome accuracy values. Distributing to those who have waited the longest can only be justified by some kind of fairness norm unrelated to the values underlying the participation right.

The proposition that extraneous policy factors should not be used to resolve a rights conflict does require a defense. Kornhauser's and Sager's analysis of lotteries is helpful in this regard. They distinguish between two different ways of viewing a rights conflict: the "tie-breaker view" and the "dominant rights view." See Kornhauser and Sager, 27 Soc. Sci. Information at 496-501 (cited in note 204). The tie-breaker view treats a rights conflict as a tie between equal rights that cancels each of the rights completely, allowing appeals to social policy to resolve the conflict. By contrast, the dominant rights view rejects the proposition that rights can cancel each other. This view holds that a right retains its moral force and utility-trumping character even in situations of conflict, and as a result, policy factors unrelated to the right cannot be considered in resolving the conflict. The dominant rights view better fits the problem of accommodating competing participation rights because the autonomy and dignity values underlying the participation right are not affected by the existence of a conflict, and themselves call for equal treatment of all rightholders. See id. at 500.

244. See notes 215-18 and accompanying text.

245. Moreover, only a utilitarian principle could justify unequal treatment of this sort, but utility maximization is not an acceptable reason to deny a claim of right under the dominant rights view. See note 243.

246. It may seem odd to propose that a court conduct an auction of trial opportunities. But see *In Re Oracle Securities Litigation*, 131 F.R.D. 688 (soliciting bids for class counsel), 132 F.R.D. 538 (N.D. Cal. 1990) (discussing standards for selecting class counsel by soliciting bids from interested lawyers); Macey and Miller, 58 U. Chi. L. Rev. at 105-16 (cited in note 38) (describing a court-supervised auction procedure in which bidders bid for claims in a small claimant class action). But the auction need not include any actual exchange of money among plaintiffs if payments are deducted from and credited to damage awards. Moreover, auctions are routinely conducted under court supervision as part of the remedy in some property disputes, and courts sometimes

inviting bids. Trial opportunities could then be allocated to the highest bidders and the auction proceeds distributed among those who bid and lost, with each losing bidder receiving an amount proportional to her bid.[247] In order to reduce the 'effects of wealth inequality, the court could require that bid payments be made out of plaintiff's expected net recovery. Because no plaintiff is likely to pay more for participation than she could hope to recover from a trial, an expected-recovery rule would not artificially depress bid amounts.

An auction respects both autonomy and equality values by replicating the results of market trades from an initial position of equality.[248] Suppose that all parties start with equal chances in a lottery for the limited process goods, and each is allowed to sell her chance to other parties. Those who have the most to gain from trying their own cases would purchase enough chances so that each was assured one trial opportunity. If no party valued participation negatively, all the other parties would end up with payments corresponding to their valuations. The auction achieves the same outcome because bids reflect individual trial values and payments are linked to bid amounts.[249]

There is a serious problem with an auction, however.[250] Auctions are likely to distribute process goods nonrandomly, thereby interfering with the outcome efficacy of a sampling procedure. The reason is easy to see. A plaintiff's gain from having her case tried depends on two vari-

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accommodate competing rights by replicating the results of market trades. In nuisance cases, for example, courts sometimes deny injunctive relief conditioned on the defendant paying the plaintiff damages to cover her loss. See *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 257 N.E.2d 870 (1970) (denying injunctive relief but granting damages). See also *Spur Industries, Inc. v. Del E. Webb Development Co.*, 108 Ariz. 178, 494 P.2d 700 (1972) (granting injunction but requiring plaintiffs to compensate the defendant for its loss).

247. Assuming that the class of bidders includes all those and only those who place some positive value on participation, it makes sense to leave nonbidders out of the distribution. It also makes sense to distribute auction proceeds in proportion to losing bids because a party's bid is likely to reflect the value she places on participation. See notes 248-49 and accompanying text.

248. Not all distribution problems lend themselves to market solutions. Many would not consider it appropriate, for example, to use an auction to distribute scarce life-saving medicine. This is because of a belief that the underlying moral entitlement cannot be compared to money. By contrast, parties routinely trade participation rights for monetary recovery whenever they settle cases and our system of adjudication approves and even encourages this practice.

249. This analysis ignores the effect of strategic behavior on auction results. See generally Myerson, *Game Theory* at 132-36 (cited in note 39) (discussing these complexities).

250. Other problems are not likely to be as serious. The administrative costs of running the auction should be manageable. There might be some difficulty in assuring that bids accurately reflect plaintiff preferences, since a plaintiff is likely to rely on her attorney to recommend a bid amount. The attorney has an incentive to persuade her client to enter a bid in line with the attorney's preferences, which, as we have seen, do not necessarily match those of her client. See notes 188-90 and accompanying text. On the other hand, one should not necessarily disregard a plaintiff's choice of bid just because she reached it after consultation with her attorney, even if the bid amount changes in response to the attorney's wishes.

ables: the value she places on participation and the increase in net damages she can expect by having her case included in the sample. High bidders in the auction should be those with the largest totals summed over these two variables, and high-damage plaintiff are likely to be disproportionately represented in this group.

This is especially true if plaintiffs with extremely severe injuries place a higher subjective value on controlling their own lawsuits than those with much less to lose. With this kind of correlation between participation value and actual damages, those with very high damages will have the most process value to gain from participating, and their cases will also have the largest marginal impact on the sample outcome.[251] As a result, high-damage plaintiffs are much more likely to win the auction than those with low damages, thereby skewing sampling outcomes toward the high end.

The viability of an auction, therefore, depends on the magnitude of the skewing effect, which may be quite large in many cases. The stronger the correlation between damages and participation value, the closer the auction will resemble a distribution strictly according to amount at stake, which is unacceptable no matter what view of the balance between process and outcome one adopts.[252] For weak correlations, however, the viability of an auction turns on whether the strong or weak priority principle applies. The strong principle rules out auctions entirely because any significant correlation is bound to sacrifice outcome quality to some extent. The weak principle, on the other hand, could tolerate auctions that have relatively minor effects on outcome, but given the strong influence damages alone have on bid amounts few situations are likely to qualify.

Because of the defects with an auction, a court will have to consider distribution by lot in many cases, bringing into full focus the problem of mixing lotteries with adjudication. How can a judge justify relying on chance to choose among rights claims with equal weight? Must she be content with justification by default, there being no other method that assures a sufficiently accurate outcome, or does a more compelling argument recommend a lottery? I believe one does.

Nothing can be done about a lottery's randomness, of course, but randomness in itself is not the major problem. The problem is that the

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251. This is clearly the case if sample plaintiffs receive their own verdicts. It also is true if sample plaintiffs get the sample average. As far as the magnitude of the verdict is concerned, those with high damages will have most to gain from inclusion in the sample even though the marginal benefit of inclusion will decrease due to the averaging effect.

252. In such a distribution defendants would end up paying as if all plaintiffs had high damages, and defendants' total liability would greatly exceed their substantive obligation—a clearly unacceptable result.

most obvious justification for a lottery—that it respects the equality of all claimants by giving each an equal chance—does not give a party who loses the lottery a sufficiently good reason to accept her loss. This justification respects the equality of all claimants, but it ignores the rights-based nature of their claims. It requires each rightholder to accept limitations on her right for the good of all. But the fact that a party has an individual right entitles her to demand satisfaction without regard to the overall consequences, unless there is some reason she should exercise restraint that is consistent with her status as a rightholder.[253]

I have in mind here a distinction in moral philosophy between "agent-relative" and "impersonal" reasons for action.[254] An agent-relative reason for action is one that necessarily refers to the person acting. Thus, it is an agent-relative reason for A to assist B, who is in need of help, that A is the father of B, or just that A owes B a duty.[255] On the other hand, an impersonal reason for action is a reason that does not refer to the person acting. For example, it is an impersonal reason for A to assist B that to do so would maximize aggregate utility or minimize disregard for moral principles in general.

An impersonal reason for action requires that the person acting adopt a detached viewpoint, consider not just her own situation but the situations of all others, and assess the overall consequences of her actions. My argument is that an impersonal reason, standing alone, cannot oblige a party to accept less than full satisfaction of her participation right and that a justification based solely on scarcity and equal claims offers only an impersonal reason. Thus, it is not enough to argue that a lottery, by giving everyone an equal share, maximizes equality overall. What is needed is an argument of principle showing either that a party's right is itself limited under scarcity conditions or

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253. Thus, I disagree with Professors Abraham and Robinson if they mean to argue that mere equality of participation right by itself makes it improper for a plaintiff to insist on full participation under conditions of scarcity. See Robinson and Abraham, 78 Va. L. Rev. at 1503 (cited in note 7). When a person makes a demand on the state to honor her right, it does not follow that she must believe that her right has some kind of priority over the rights of others. There is no logical inconsistency between believing that all participation rights are equal and insisting that one's own right be satisfied—even when there is not enough to satisfy all. The mere existence of scarcity, standing alone, does not create duties between rightholders. However, if, as seems more likely, Abraham and Robinson mean to focus on the *state's* duty to distribute scarce process goods fairly, I agree that the state owes such a duty. But I also believe that in discharging that duty, the state must choose a distribution scheme that is consistent not just with the status of plaintiffs as equal claimants but also with their status as rightholders.

254. For a discussion of agent-relative and impersonal reasons for action, see Nagel, *Mortal Questions* at 128-41 (cited in note 89); Thomas Nagel, *The View From Nowhere*, 138-88 (Oxford, 1986). See also Samuel Scheffler, ed., *Consequentialism and Its Critics* 1-13 (Oxford, 1988).

255. See, for example, *State v. Zobel*, 134 N.W.2d 101, 109 (S.D. 1965) (holding that a parent "cannot stand passively by and refuse to help [her child] when it is reasonably within [her] power" to render assistance).

that the party owes a duty to others that takes priority over her right and calls for distribution by lot.[256]

It will not do to argue that the losing party had an equal chance. Although this is an agent-relative reason, it is not an agent-relative reason that' explains why the loser must accept her loss. If the participation right conferred only an entitlement to equal treatment, this reason would be adequate because an equal lot provides equal treatment. But the participation right confers an entitlement to the process good itself.

It might be possible to derive an agent-relative reason from the institution of adjudication itself. The difference between a participation right and a substantive right is that the former depends completely on the institution of adjudication to give it meaning and force. Because of this institutional dependence, one might be justified in requiring that a party, who benefits from an opportunity to participate in adjudication, abide by those norms that make adjudication beneficial for all, including norms of fair regard for other litigants.[257]

The question is, however, whether fair regard for other litigants imposes a duty on a party to accept less process control than she would otherwise be entitled to receive simply because there is not enough to go around. There is some evidence to support such a duty. Courts, for example, sometimes certify mandatory class actions or compel the joinder of numerous parties to a single lawsuit in order to distribute a limited fund fairly among competing rightholders.[258] Because class actions and multiparty suits offer less control than an individual trial, this

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' 256. If courts are supposed to adjudicate rights and if rights-based claims are claims of principle, then a court must provide a principled reason for its decision rather than impose a burden merely to further some impersonal aggregative good. See Dworkin, *Taking Rights Seriously* at 81-130 (cited in note 89) (arguing that courts determine parties' rights rather than further general social goals). One might argue that there is an obvious principle justifying the lottery — the principle of equal treatment. However, it is not enough to cite a principle. One must also show that the principle is capable of limiting the participation right. This requires that the principle be recognized within the institution of civil litigation as a valid ground for limiting participation rights. If this can be established, then one may have an agent-relative reason for imposing the lottery results on all plaintiffs by virtue of their voluntarily participating in the institution. But it is not obvious at first glance that the equal treatment principle has the requisite status, and hence the defense of the lottery requires more argument.

257. This is an argument for reciprocity as fairness. See, for example, Gibbard, 20 Phil. & Pub. Aff. at 264 (cited in note 242). It is fair to impose obligations on someone who voluntarily takes part in an institution when that person derives reciprocal benefits from others' assumption of the same obligations toward her and the resulting system of mutual obligations makes the institution as a whole work better for everyone.

258. See *In re Bendectin Products Liability Litigation*, 749 F.2d 300, 306 (6th Cir. 1984) (expounding standards for limited fund class action); F.R.C.P. 19(a)(2)(i), 23(b)(1)(A); James W. Moore and J. E. Kennedy, 3A *Moore's Federal Practice*, ¶ 19.07 (2d ed. 1992) (discussing limited fund in the context of Rule 19 compulsory joinder); Wright, Miller and Kane, *Federal Practice* at §§ 1772-74 (cited in note 16) (discussing the limited fund in the context of Rule 23 class actions).

practice is some evidence of a principle that allows concerns of distributional equity to limit litigant control.

On the other hand, one must stretch this principle quite far to justify distribution by lot. Parties forced to join a suit at least have an opportunity to litigate their own cases, as do the original parties who share the litigation with the newcomers. Moreover, absent class members often have some chance to intervene and participate personally in a class suit.[259] In neither case is the interference with litigant autonomy as severe as it is for the losing parties in a lottery, and the strong historical tradition of litigant control cautions against extending the principle very far from the precedent that supports it.

There is another possible source for an agent-relative reason, however. Although it is impractical and undesirable to expect all plaintiffs in large-scale mass tort litigation to agree on a distribution formula in view of transaction costs, agency costs, free-rider problems, and adverse outcome effects, it is nonetheless possible to construct a hypothetical agreement under a fair set of initial bargaining conditions. According to this contractarian argument, the reason a plaintiff must accept the results of a lottery is because someone representing her participation preferences would have agreed to do so under bargaining conditions that are fair to all.

This argument does not depend on what actual plaintiffs in a particular case would accept in the absence of bargaining obstacles. It resembles an "original position" argument in that it asks how parties would agree to resolve a rights conflict if they were designing rules for adjudication under conditions of severe scarcity and had limited knowledge about the actual circumstances of any particular case.[260]

To see how such an agreement might be formed, we must first construct the hypothetical bargaining situation.[261] To make the analysis concrete, suppose that 1000 persons, all of them risk-neutral, are assembled to bargain over how best to distribute scarce trial opportunities in future asbestos cases. Each bargainer represents future plaintiffs who value participation in a particular amount and thus each knows her own

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259. See Moore and Kennedy, 3B *Moore's Federal Practice* at ¶ 23.90.

260. See authorities cited in note 242.

261. In the language of game theory, the following analysis models the bargaining situation as a cooperative game with nontransferable utility, and uses the solution concept known as the "core." See Myerson, *Game Theory* at 456-77 (cited in note 39). The core is attractive from a fairness point of view because it includes only those distributions that are strongly Pareto-efficient, meaning that no party can do any better without another party doing worse, and because it includes only the distributions that all parties could unanimously accept. For an application of cooperative game theory and the solution concept of the core to the fairness of class action settlements, see Lewis A. Kornhauser, *Control of Conflicts of Interest in Class-Action Suits*, 41 Pub. Choice 145 (1983).

participation value. However, no bargainer knows the actual damages of those she represents, although she is aware of the expected damage figure for asbestos sufferers overall.

The constraint on information about actual damages assures that bargaining takes place only over participation values. The purpose of the bargaining is to distribute trial opportunities in a way that fairly reflects the different values litigants place on participation for its own sake. From the perspective of this bargaining situation, the amount of damage a plaintiff suffers is purely fortuitous, without any relevance to the fairness of the trial distribution scheme. Allowing damages to be used as bargaining chips would give someone with higher damages an advantage over someone with lower damages even if the two valued individual participation identically.

All bargainers are told that whatever distribution formula they accept will apply to a condition of extreme scarcity and will be used to distribute 100 damages trials over 1000 plaintiffs with each trial controlled by a single plaintiff. Finally, they are told that any agreement must be unanimous and that no one can make side payments to obtain the consent of the other parties. The unanimity condition ensures that the final agreement will benefit all future asbestos plaintiffs. And the prohibition on side payments makes it possible to avoid the auction result, which jeopardizes outcome quality by distributing all trials to those who value them most.

Of course, 1000 bargainers cannot possibly represent the full range of possible participation values nor will there always be 100 trials to distribute. These figures are chosen only for purposes of illustration. The following argument does not depend on the number of bargainers, the total number of trial opportunities, or the particular distribution of participation values. Thus, the conclusion is perfectly general. One might imagine that a bargaining group is set up for each possible aggregation of mass tort plaintiffs and bargainers decide on a distribution formula for all future cases of that kind.

Is an agreement possible under these conditions and what distribution formula would the 1000 plaintiffs adopt? We begin by noting that a bargainer will not agree to a distribution formula if the future, hypothetical plaintiff she represents would be worse off compared to her nonagreement alternatives. It follows that the bargainers could agree on any distribution if the only alternative were an individual trial and scarcity meant that a plaintiff with average damages expected a negative net recovery due to high litigation and delay costs. Assuming that no one would want to litigate just for the sake of litigating without the possibility of some outcome benefit, a rational bargainer would even

agree to a formula that gave the future plaintiffs she represented no chance at all of being included in the sample.

Because any distribution is possible, there is no way to be sure that bargainers would choose a random lottery.[262] From a fairness perspective it is still significant that rational bargainers could agree on a random lottery and that they could do no better by refusing to agree if the lottery were the only distribution option. Of course, it is not the only option, and some parties might hold out for an unequal distribution that is to their advantage.

This scenario, however, is not a realistic model of the hypothetical bargaining situation. It ignores an alternative that is available to future plaintiffs aside from individual litigation. A group of plaintiffs could form a coalition, break away from the large aggregation, and petition the court to litigate as a smaller unit.[263] If a rational bargainer believes that the plaintiff she represents could obtain a better chance at an individual trial, and thus a higher expected utility from participation, by forming a coalition with other plaintiffs, then the bargainer would not agree to the proposed distribution.

How well plaintiffs can do in coalitions depends on how many trials a coalition gets to distribute. There are strong reasons to favor a rule that allows a coalition to appropriate a number of trials proportional to its size. Thus, a coalition of 200 plaintiffs would be entitled to 200/1000, or one-fifth, of the 100 trials allotted to the larger aggregation; in other words, twenty trials.[264] This rule has attractive properties. It treats all plaintiffs equally in keeping with the underlying equality of right. Furthermore, it takes account of the practical reality that a judge cannot know subjective participation values—parties, after all, have incentives

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262. In the technical language of cooperative game theory, the core of this simple bargaining game includes all possible distributions of 100 trials over the set of 1000 players. It is worth noting, however, that one particularly attractive solution concept, the Nash Bargaining Solution, predicts that the parties would agree on a random lottery. See generally Myerson, *Game Theory* at 417-18 (cited in note 39).

263. There are a number of procedural mechanisms that might achieve this result. Plaintiffs might move for dismissal and either join as co-parties in a refiled suit or file individually and seek consolidation. Alternatively, and much more likely, plaintiffs might bring a motion requesting that the trial judge exclude them from the larger aggregation and allow them to litigate as a smaller group through a mutually acceptable sampling procedure.

264. Some additional refinements are needed to work through the model rigorously, but these are not essential to the textual discussion. For one thing, the rule can generate fractional trials, which do not make sense in this context. The best way to handle this problem is to round down to the next lower integer. Rounding down permits agreements with nonrandom distributions, but it limits the degree of nonrandomness and assures a formula giving everyone almost equal chances. By contrast, no agreement would be possible if one rounded up because there would always be some smaller coalition in which all members could do at least as well and one could do strictly better. Another problem is that coalitions may get too small to apply sampling techniques. Thus, a more complete analysis would have to specify a minimum coalition size.

to misrepresent their valuations—and thus could not allocate trial opportunities to coalitions on the basis of participation preference even if she wanted to do so.

Under this allocation rule the only agreement that all 1000 bargainers could unanimously accept is one that distributes all 100 trials by random lottery, giving each plaintiff a 1/1000 chance at each of the 100 trials or an expectation equal to one-tenth.[265] This is easy to see. Any other agreement must give at least one party greater than one-tenth and some other party less than one-tenth. The latter party can do better by forming a coalition consisting of all plaintiffs who receive at most one-tenth under the proposed agreement.[266] A random distribution of this smaller coalition's share of the total trials will give each coalition member one-tenth. Thus, the party who organized the coalition will do better in the coalition than under the proposed agreement, and all other coalition members will do at least as well. Because this result does not depend on the actual distribution or the size of the coalition, there will always be some coalition able to block any formula other than a random lottery with equal chances.[267]

Furthermore, no coalition can block a random lottery. A random distribution of a coalition's trial share will leave all coalition members in the same position as they would have been under the proposed lottery, and any departure from randomness will make at least one coali-

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265. In the technical language of cooperative game theory, the core of this game is nonempty, and it includes only a random distribution.

266. This analysis ignores the effect of transaction costs. The transaction costs of forming coalitions make more agreements possible by making it more difficult for coalitions to organize. On the other hand, smaller coalitions are likely to save on the transaction costs of bargaining because bargaining in a smaller group should be easier than hargaining in a large one. If the costs of coalition formation dominate, the coalition position of those on the low end of the proposed distribution would have to improve enough to compensate for the costs of forming the coalition. As a result, transaction costs will limit the range of permissible agreements; the smaller the transaction costs the easier it will be to form a coalition and the closer a proposed distribution will have to approximate randomness in order to avoid being hlocked. In any event, since transaction costs vary with individual circumstance, they should probably be excluded from a set of fair bargaining conditions.

267. It might help to consider a concrete example. Suppose that the proposed agreement gives 998 plaintiffs each a 1/10 expectation, and gives two plaintiffs, A and B, a 1/8 and a 3/40 expectation, respectively. (Recall that all the expectations have to add up to 100, the total number of trials available to the aggregation). In this situation B could do better by forming a coalition consisting of himself and 899 other plaintiffs not including A. The resulting 900-plaintiff coalition would he entitled to 90 trials, and if it distributed the trials by random lot, each coalition member, including A, would receive a 1/10 expectation. Because 1/10 is greater than 3/40, A does better in the coalition, and no other coalition member does worse. In fact, all coalition members can he made strictly better off by a distribution formula that gives A a little more than 3/40 but less than 1/10, and averages the difference over the other 899 coalition members. For example, the formula might give A a 7/80 expectation (i.e., 3/40 + 1/80) and average the remaining 1/80 over the other 899 members, so that each receives 1/10 + 1/899 x 1/80, which equals approximately .1000139. As a result, all coalition members would have an incentive to block the proposed distribution.

tion member worse off. Thus, assuming all 1000 bargainers are rational, they should agree on a random lottery and nothing else.[268]

To see how this argument provides an agent-relative reason of the sort we seek, it is necessary to discuss, if only in a limited way, a major issue in political philosophy — how a hypothetical contract can create any moral obligation for real individuals.[269] Whatever moral obligation exists, it clearly cannot derive from actual consent or promising. The bargaining situation is only a "thought experiment" and consent is purely hypothetical. Moreover, because of the hypothetical nature of the bargaining, there is no guarantee that everyone will be better off in the real world. In my contractarian argument, for example, a plaintiff with large enough damages, a sufficiently high participation value and a reasonable expectation of a timely trial is likely to be worse off with a lottery than with an individual trial.

On the other hand, my argument is not simply a disguised form of average or aggregate utilitarianism, as has been said of some contractarian theories.[270] Because bargainers know their own participation values, my bargaining situation escapes the charge made against others, that depriving bargainers of all information about their own personal identities guarantees an outcome-maximizing average utility.[271] Furthermore, because all bargainers must agree on any distribution rule, the mere fact that a rule maximizes aggregate utility is not enough to validate it. To be sure, contractarian arguments assume that individuals maximize expected utility. But the requirement of unanimity and the ideal nature of the bargaining situation assure that the argument's moral force is not based on utilitarianism.

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268. This analysis assumes that all bargainers represent plaintiffs with positive participation values. If some plaintiffs had zero or negative values, the agreement would assign them a zero chance and randomize over the remaining plaintiffs. However, there is no way for a court to implement such an agreement, even if the result were consistent with outcome values, because there is no way to determine the participation preferences of everyone. Nevertheless, it is not unfair to impose a random lottery on plaintiffs with zero or negative participation values since they filed suit with an expectation that they might have to litigate.

269. For critical discussions of contractarian theory, see Barry, *Theories of Justice* at 3-142, 282-92 (cited in note 39); Nagel, *Mortal Questions*, at 120-27 (cited in note 89); Daniel Brudney, *Hypothetical Consent and Moral Force*, 10 L. & Phil. 235 (1991); David Gauthier, *Jules and the Tortist*, 15 Harv. J. L. & Pub. Pol. 683 (1992); Jean Hampton, *Rational Choice and the Law*, 15 Harv. J. L. & Pub. Pol. 649 (1992); T. M. Scanlon, *Contractualism and Utilitarianism*, in Amartya Sen and Bernard Williams, eds., *Utilitarianism and Beyond*, 103 (Cambridge, 1982); Kim Lane Scheppele and Jeremy Waldron, *Contractarian Methods in Political and Legal Evaluation*, 3 Yale J. L. & Hum. 195 (1991).

270. See Richard Craswell, *Efficiency and Rational Bargaining in Contractual Settings*, 15 Harv. J. L. & Pub. Pol. 806, 813-15, 820-22 (1992).

271. For a discussion of Harsanyi's argument that average utilitarianism is the outcome of an original position in which participants know nothing about their own identities, see Barry, *Theories of Justice* at 76-77 (cited in note 39).

Nevertheless, ideas of consent, rational self-interest, and collective welfare are central to contractarianism's moral force. These ideas are used to enlist norms of autonomy, equality, rationality, and impartiality to justify the bargaining outcome.[272] The contractarian argument in effect says to the loser of the lottery that she must accept her loss despite her right because it would be rational for a rightholder with her participation preferences to agree to do so in advance under fair bargaining conditions. Thus, even though the agreement takes place in a stylized bargaining situation, it should count in favor of a lottery for any plaintiff who finds the specified bargaining conditions morally attractive and who accepts the autonomy, equality, rationality, and impartiality values that inform contractarianism.

At best, however, this line of reasoning applies only to a plaintiff who accepts the premises of the contractarian argument. Why can't a plaintiff who finds herself on the losing end of the lottery simply reject the premises out of pure self-interest? The reason is that the plaintiff's claim of right requires that she provide *moral* reasons to support her position. By asserting a right within the institution of adjudication, the unhappy plaintiff in effect enlists principles of political morality to support her claim. Having done this, she cannot then refuse to recognize similar principles opposed to her position just because she does not like the results they produce. She must offer moral reasons to reject those principles in her case.

Furthermore, not just any moral reason will do. As we saw in discussing the limited fund cases, the institution of adjudication recognizes a general principle of fair regard for other litigants.[273] Although this principle does not justify the lottery directly, it does constrain the kind of reasons that can count against the contractarian argument. The unhappy plaintiff must offer a moral reason that is sensitive to the fact that satisfaction of her right will have effects on other litigants. This will not be easy to do, for the contractarian argument has considerable force in this situation. By requiring unanimity, the argument takes account of the individual plight of each plaintiff as well as the effects on other plaintiffs of satisfying any one plaintiff's right. And the centrality of autonomy and rationality values to contractarianism's morality is consistent with the pivotal role autonomy plays in justifying the participation right.

The contractarian argument thus gives specific content to the principle of fair regard for other litigants in the context of extreme process

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272. See, for example, Hampton, *Rational Choice* at 673-78 (cited in note 269); Scheppele and Waldron, 3 Yale J. L. & Hum. at 199-206 (cited in note 269).

273. See notes 257-59 and accompanying text.

scarcity.[274] As such, it supplies an argument of principle that takes account of each plaintiff's participation value and is to that extent agent-relative. However, the argument also abstracts from actual damages, the other important variable in any real world bargaining situation, and is to that extent impersonal.[275] Nevertheless, the contractarian argument shows why an individual plaintiff should accept the fairness of a random lottery as a way to satisfy her process-oriented participation right. This combines with the case for a lottery from an impersonal point of view to justify its use whenever a comprehensive distribution cannot be made and an auction is not desirable.[276]

V. CONCLUSION

Courts operate under significant constraints in designing adjudicative solutions in the face of process good scarcity. Judge Parker in *Cimino* observed that "[t]he litigants and the public rightfully expect the courts to be problem solvers."[277] There is truth to this observation, but there are also limits to what a court can do, limits set by both outcome and process values.

These limits allow for sampling, but they constrain the design of a sampling procedure. From an outcome-oriented perspective, the constraints depend upon one's theory of adjudication.[278] Sampling is relatively easy to square with an efficiency-based theory under most circumstances. It can also accommodate a rights-based theory, but probably only under conditions of severe scarcity. In either case, verdicts should be calculated in the same way for all plaintiffs, including

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274. Some readers may insist that there is no need to rely on a contractarian argument to get to the lottery result once one admits a principle of fair regard for other litigants. I am not convinced. One must do some work to get from the premise of equal rights and a general principle of fair regard to the conclusion that each plaintiff must settle for an equal chance. There are, after all, many ways to satisfy equality and fairness conditions. The virtue of the contractarian argument, it seems to me, is that it provides an analytically useful and normatively defensible way to argue from equality and fairness to the lottery scheme while respecting the status of each claimant as a distinct rightholder.

275. In fact, allowing bargainers to take account of actual damages opens up a wide range of possible distribution mechanisms including many that have unacceptable outcome effects, depending upon how actual damages are distributed relative to participation values and how individual verdicts are calculated.

276. The bargaining argument does not *require* the use of a lottery; it only provides an agent-relative reason for imposing lottery results on losing parties. One might not be justified in using a lottery if there were strong impersonal-type reasons against its use, but a lottery's intrinsic equality properties justify its use from an impersonal point of view.

277. *Cimino*, 751 F. Supp. at 652.

278. The appropriate theory could vary with the goals of the substantive law—deterrence goals being more suitable for an efficiency analysis—but the tension between rights and efficiency cannot be so easily reconciled if judicial precedent creates legal rights that a court cannot trade off against utility.

those in the sample group, and costs should be spread equally over the entire plaintiff population. Furthermore, although use of the sample average fits efficiency values nicely, a rights-based theory might require the use of a regression model unless scarcity is especially severe.

Process-oriented constraints are even more demanding. A court must distribute process goods fairly, and if each party has her own participation right, a fair distribution must respect the equal rights claims of all. This condition requires that the trial judge create as large an aggregation as possible and distribute the largest number of process goods consistent with fair treatment of litigants in other cases. It also imposes a lexical ordering on acceptable distribution schemes. The trial judge must first consider the possibility of a comprehensive distribution through use of litigation committees. If that is not possible, the judge should then consider selective distribution schemes. Only if an auction is not acceptable should the judge settle on a random lottery that offers equal chances to all plaintiffs with equal rights.

Furthermore, process and outcome demands may conflict. The ideal distribution scheme from a process perspective can produce grossly inaccurate outcomes under a sampling procedure. When these values conflict, outcome must have priority over process, but the precise implications depend on how strong a priority principle the trial judge accepts.

The factors developed in this Article are not only relevant to the judicial creation of a sampling procedure. They should also guide any legislative attempt to implement a sampling approach. In particular, the legislature should consider both the direct and indirect costs of sampling and legislate restrictions that minimize costs. Furthermore, any statute will have to leave room for trial judge discretion. In this regard it should require that judges consider both outcome and process values and observe the lexical ordering of fair distribution schemes.

Whether sampling is judicially created or authorized by legislation, the choice of a particular sampling procedure will require case-specific discretionary judgments. In exercising her discretion, it is vital that a judge justify the choices she makes. Only in this way will it be possible to develop a jurisprudence of sampling that respects the integrity of adjudication at the same time as it provides norms to guide statistical adjudication under all conditions of process scarcity.

MATHEMATICAL APPENDIX

A. Sample Average Compared to Individual Trial Verdict

The following is a mathematical demonstration of the superiority of an individual trial verdict to the sample average as an estimate of actual damages. Let n be the total number of cases in the aggregation, and let x be a random variable representing actual damages. Suppose that the n cases are normally distributed with respect to x and that the distribution has a mean of μ and a standard deviation of σ_x. Furthermore, suppose that the error associated with an individual damages trial for any case is normally distributed about actual damages (i.e., about x) and that the standard deviation of the error distribution, σ_e, is the same for all cases.

1. Mean and Standard Deviation of the Sample Average Distribution

To compare the sample average to an individual trial verdict, we must first determine the mean and standard deviation of the sample average distribution. Suppose that a random sample of m cases is drawn from the aggregation. Each sample case is tried, and the average of the m verdicts calculated. Suppose further that this procedure is repeated over and over again, generating a distribution of sample averages. According to basic sampling theory, the sample averages will be normally distributed with a mean of μ (the same as the mean of the actual damages distribution for the entire aggregation).[279]

In order to specify the distribution precisely, we must determine its standard deviation, which I shall denote σ_s. Because all trial verdicts that enter into the sample average depend on two variables—actual damages and trial error—the standard deviation of the sample average distribution must depend on the standard deviations of these same two variables. To see how, let y be a random variable representing trial verdicts, and let σ_y be the standard deviation of the trial verdict distribution before averaging. Because we assume that actual damages and trial error are uncorrelated, the variance of the distribution of trial verdicts, σ_x^2, must equal the sum of the two component variances; that is, the sum of the damages variance and the trial error variance:[280]

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279. See Hoel, *Mathematical Statistics* at 103, 108 (cited in note 49).

280. The variable y can be written as the sum of actual damages and trial error in the following way:

$$y = x + (y - x)$$

The term x is the actual damages component, and the term, y - x is the trial error component, i.e., the difference between the trial verdict and the actual damages. The variance associated with x is σ_x^2, and the variance associated with y - x is σ_e^2. Since y - x and x are uncorrelated, the variance for

$$\sigma_y{}^2 \;=\; \sigma_x{}^2 \;+\; \sigma_e{}^2$$

Any sample average is just the average of a randomly drawn set of m y's. According to sampling theory, the variance of the distribution of these sample averages, $\sigma_s{}^2$, for fixed m equals $\sigma_y{}^2/m$. Substituting $\sigma_x{}^2 + \sigma_e{}^2$ for $\sigma_y{}^2$, we get the following for the standard deviation of the sample average distribution:

$$\sigma_s \;=\; \sqrt{\frac{\sigma_x{}^2 + \sigma_e{}^2}{m}}$$

2. Comparing the Trial Verdict With the Sample Average

Let $x_o > \mu$ represent actual damages for some arbitrarily chosen case above the mean, and consider the following graph showing a sample average distribution as well as a trial error distribution centered about x_o:

ACTUAL DAMAGES

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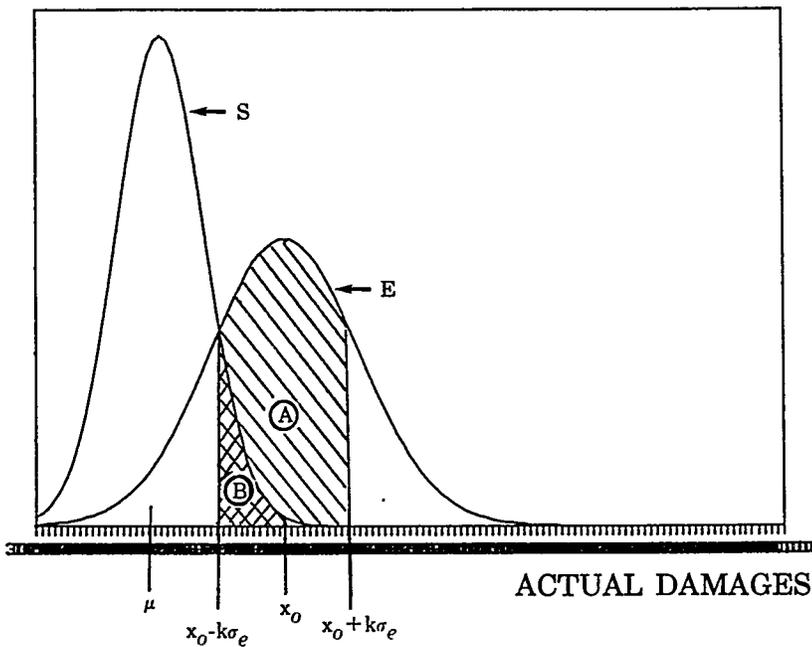
y, $\sigma_y{}^2$, is the sum of the two component variances. See generally id. at 199-200 (deriving the formula for combining variances).

Curve S represents the sample average distribution, which has mean μ and standard deviation σ_s (as given above), and curve E represents the trial error distribution, which has a mean of x_0 and a standard deviation of σ_e. The graph shows an interval centered about x_0: $[x_0 - k\sigma_e, x_0 + k\sigma_e]$. "A" stands for the area over this interval that lies under curve E, and "B" stands for the area over the same interval that lies under curve S. Thus, area A represents the probability that an individual trial verdict will fall within the interval, and area B represents the probability that the sample average will fall within the same interval.

For the graph as shown, it appears that area A is larger than area B over the interval. (This is not always the case; it depends on the values chosen for x_0, μ, σ_s, σ_e, and k). Thus, the probability that an individual trial verdict will fall within the interval is greater than the probability that the sample average will do so, and in this sense we can say that an individual trial verdict is superior to the sample average over the interval, $[x_0 - k\sigma_e, x_0 + k\sigma_e]$.

One way to compare the trial verdict with the sample average is to calculate the ratio of the two probabilities or the ratio of the odds. The ratio of the two probabilities is equal to area A divided by area B, which gives a measure of how many times more likely it is that the trial verdict will fall within the specified interval than that sample average will. Using the ratio of the odds is almost as straightforward. The odds that the trial verdict will fall within the specified interval are given by: area A/(1 - area A). The odds that the sample average will do so are given by: area B/(1 - area B). The former divided by the latter gives the ratio of the odds, which measures how many times greater the odds are that the trial verdict will fall within the interval than that the sample average will.

However, if the interval is very small (i.e., k is small) and the trial error distribution has a large standard deviation (i.e., σ_e is large), this method of comparison is not terribly helpful because the likelihood that an individual trial verdict will fall within the interval is itself very small. I use a second method in the text in order to avoid this shortcoming. This alternative method calculates the joint probability of two independent events occurring: the trial verdict falling within some specified range of actual damages for a given case *and* the sample average falling outside that range. The maximum value of this joint probability, subject to the constraint that the probability associated with the trial verdict be larger than that associated with the sample average (i.e., area A > area B), represents the greatest confidence with which we can assert that an individual trial verdict will lie closer to actual damages than the sample average. If this joint probability exceeds .5, for exam-

ple, we can be confident that it is more likely than not that an individual trial verdict is superior.

To formalize this second approach, let $P(k)$ be the joint probability that corresponds to the interval $[x_0 - k\sigma_e, x_0 + k\sigma_e]$. To obtain an expression for $P(k)$, consider areas A and B, which are given by the following equations:

$$\text{Area A} = \frac{1}{\sigma_e \sqrt{2\pi}} \int_{x_0-k\sigma_e}^{x_0+k\sigma_e} e^{-\frac{1}{2}\left(\frac{x-x_0}{\sigma_e}\right)^2} dx$$

$$\text{Area B} = \frac{1}{\sigma_S \sqrt{2\pi}} \int_{x_0-k\sigma_e}^{x_0+k\sigma_e} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma_s}\right)^2} dx$$

The joint probability $P(k)$ equals the product of the separate probabilities associated with the two events:

$$P(k) = \text{Area A} \times (1 - \text{Area B})$$

Given any value for the joint probability $P(k)$ one can try to solve the resulting equation for k. If a solution exists where Area A > Area B, it means that we can be confident at level $P(k)$ that an individual trial verdict will be closer to actual damages than the sample average for a case with actual damages x_0. Furthermore, consider the set of all values of k such that Area A > Area B. Provided the set is nonempty, there must be some element of the set, k_0, for which $P(k)$ achieves a maximum value over the set. This is so because $P(k)$ is greater than zero for all $k>0$, $P(0)=0$, $P(k)$ approaches zero as k approaches infinity, and $P(k)$ is continuous and bounded above by 1. This maximum, $P(k_0)$, represents the highest probability with which we can assert that a trial verdict is superior for any case located at x_0. The examples in the text illustrate these methods for a hypothetical sampling situation.[281]

B. Strategic Behavior Under Sampling

1. The Basic Analysis

The following analysis proves the propositions about litigation investment under the alternative rules for determining sample case verdicts and allocating litigation costs discussed in Part III.B. As above, let n be the number of cases in the case aggregation, and let m be the number of cases in the sample. Let M be the set of all sample cases. To

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281. See notes 52-59 and accompanying text.

simplify the analysis, suppose each case includes only one plaintiff and that all the plaintiffs sue one and the same defendant.

Let c_π^i be the amount of investment that the ith sample plaintiff makes in her case, and let c_d^i be the amount of investment that defendant makes in the ith sample case. Let L_i be the actual damages for the ith sample case. Plaintiff and defendant each place some estimate on the fraction of total damages plaintiff can expect to recover as a function of the parties' levels of investment. Let $p_\pi(c_\pi^i, c_d^i)$ represent plaintiff's function and $p_d(c_\pi^i, c_d^i)$ represent defendant's function, and assume these functions are the same for all sample cases. Thus, plaintiff's expected recovery in the ith sample case before averaging and before deducting litigation costs equals $p_\pi(c_\pi^i, c_d^i)L_i$, and defendant's expected loss equals $p_d(c_\pi^i, c_d^i)L_i$.

For the following analysis, assume that the defendant is found liable in all the aggregated cases. After the liability determination has been made, the lawsuit enters the damages phase and m cases are randomly sampled. After the sample cases have been selected, the sample plaintiffs and the defendant make their litigation investment choices. Furthermore, they choose with knowledge of the verdict and cost allocation rules that will eventually be applied. All m sample cases are litigated and verdicts returned. Sample verdicts are then combined and litigation costs allocated according to the applicable rules reflected in the different Arrangements.

a. Arrangement I

Under Arrangement I all cases, including the sample cases, receive the sample average and each sample plaintiff bears her own litigation costs. Each sample plaintiff chooses an investment strategy, $c_\pi^i \in R_+$. Since the defendant is a party to all the cases, defendant chooses an investment strategy for all the sample cases. Thus, defendant's strategy set includes the set of all vectors, $c_d = (c_d^1, c_d^2 \ldots c_d^m)$, where $c_d \in R_+^m$. Thus, letting u_π^i be the ith sample plaintiff's payoff and u_d be the defendant's payoff, we have:

$$u_\pi^i = \frac{\sum_{j \in M} p_\pi \left(c_\pi^j, c_d^j \right) L_j}{m} - c_\pi^i$$

$$u_d = -n \frac{\sum_{j \in M} p_d \left(c_\pi^j, c_d^j \right) L_j}{m} - \sum_{j \in M} c_d^j$$

The first order conditions for a maximum are:

$$\frac{\partial u_\pi{}^i}{\partial c_\pi{}^i} = \frac{1}{m} \frac{\partial p_\pi\left(c_\pi{}^i, c_d{}^i\right)}{\partial c_\pi{}^i} L_i - 1 = 0, \text{ or } \frac{\partial p_\pi\left(c_\pi{}^i, c_d{}^i\right)}{\partial c_\pi{}^i} = \frac{m}{L_i}$$

$$\frac{\partial u_d}{\partial c_d{}^i} = -\frac{n}{m} \frac{\partial p_d\left(c_\pi{}^i, c_d{}^i\right)}{\partial c_d{}^i} L_i - 1 = 0, \text{ or } \frac{\partial p_d\left(c_\pi{}^i, c_d{}^i\right)}{\partial c_d{}^i} = -\frac{m}{nL_i}$$

In a Nash equilibrium each party's strategy is her best response to the strategies chosen by all the other parties. Therefore, an equilibrium set of strategies for all players, $c^* = (c_\pi{}^{1*}, c_\pi{}^{2*} \ldots c_\pi{}^{m*}, c_d{}^{1*}, c_d{}^{2*} \ldots c_d{}^{m*})$, must satisfy the following conditions:

$$\frac{\partial p_\pi\left(c_\pi{}^{i*}, c_d{}^{i*}\right)}{\partial c_\pi{}^i} = \frac{m}{L_i}$$

$$\frac{\partial p_d\left(c_\pi{}^{i*}, c_d{}^{i*}\right)}{\partial c_d{}^i} = -\frac{m}{nL_i}$$

For each i these conditions generate two equations in two unknowns, which can be solved simultaneously to obtain values for $c_\pi{}^{i*}$ and $c_d{}^{i*}$. Part B.2. of this Appendix shows the results for a simple version of the functions $p_\pi(c_\pi{}^i, c_d{}^i)$ and $p_d(c_\pi{}^i, c_d{}^i)$.

b.   Arrangement III

Under Arrangement III all sample plaintiffs receive the sample average, but total litigation costs are averaged over all plaintiffs in the aggregation. Thus, the payoff functions are:

$$u_\pi{}^i = \frac{\sum_{j \in M} p_\pi\left(c_\pi{}^j, c_d{}^j\right) L_j}{m} - \frac{\sum_{j \in M} c_\pi{}^j}{n}$$

$$u_d = -n \frac{\sum_{j \in M} p_d\left(c_\pi{}^j, c_d{}^j\right) L_j}{m} - \sum_{j \in M} c_d{}^j$$

And the conditions for a set of strategies c* to be an equilibrium are:

$$\frac{\partial p}{\partial c_\pi^i} = \frac{kc_d^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = \frac{m}{L_i}$$

$$\frac{\partial p}{\partial c_d^i} = \frac{-kc_\pi^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = -\frac{m}{nL_i}$$

Equilibrium conditions can be generated in the same way for the other Arrangements.

2. A Simple Model of Litigation Investment

For a simple model of litigation investment, I shall assume that plaintiffs and defendant all estimate plaintiffs' fractional recovery in the same way. Thus, $p_\pi(c_\pi^i, c_d^i) = p_d(c_\pi^i, c_d^i) = p(c_\pi^i, c_d^i)$, for all i. Suppose that $p(c_\pi^i, c_d^i)$ has the following form, where k is a constant reflecting both parties' estimates of the effectiveness of plaintiffs' litigation expenditures relative to defendant's (we assume that the two parties have identical estimates of k):[282]

$$p(c_\pi, c_d) = \frac{kc_\pi}{c_\pi + c_d}$$

a. Arrangement I

Applied to Arrangement I, this model yields the following conditions for a set of strategies to be a Nash equilibrium:

$$\frac{\partial p_\pi\left(c_\pi^{i*}, c_d^{i*}\right)}{\partial c_\pi^i} = \frac{m}{nL_i}$$

$$\frac{\partial p_d\left(c_\pi^{i*}, c_d^{i*}\right)}{\partial c_d^i} = -\frac{m}{nL_i}$$

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282. For a similar but somewhat more complicated model, see Posner, 2 J. Legal Stud. at 456-58 (cited in note 90). Posner's model allows plaintiff and defendant to make different estimates of relative litigating advantage (in other words, the k factor need not be the same for both parties). Our assumption of the same estimates for k simplifies the analysis while still communicating the main points.

Solving these two equations simultaneously, we obtain:

$$c_\pi^{i*} = \frac{knL_i}{(n+1)^2 m}$$

$$c_d^{i*} = \frac{kn^2 L_i}{(n+1)^2 m}$$

Thus, $c_d^{i*} = nc_\pi^{i*}$. This means that for large n, defendant should invest at a much higher level than plaintiff, and the absolute amount of the plaintiff's investment should be quite low. For example, if $n=200$, $m=10$, $L_i = \$1$ million, and $k=1$, then $c_\pi^{i*}=\$495$ and $c_d^{i*}=\$99,000$.

b. *Arrangement III*

Applied to Arrangement III, the model yields the following conditions for a set of strategies to be a Nash equilibrium:

$$\frac{\partial p}{\partial c_\pi^i} = \frac{kc_d^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = \frac{m}{nL_i}$$

$$\frac{\partial p}{\partial c_d^i} = \frac{-kc_\pi^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = -\frac{m}{nL_i}$$

Solving these two equations simultaneously, we obtain:

$$c_\pi^{i*} = c_d^{i*} = \frac{knL_i}{4m}$$

Thus, plaintiff and defendant ought to invest the same amount in equilibrium, and for large n relative to m, all parties ought to invest at a high level. For example, if $n=200$, $m=10$, $L_i = \$1$ million, and $k=1$, then $c_\pi^{i*} = c_d^{i*} = \$5$ million.

3. The Effect of Attorney Control and Multiple Representation

Suppose that all plaintiffs are represented by attorneys on a contingency fee basis and that the attorneys control the litigation for their own benefit. Suppose also that the attorneys represent more than one plaintiff in the aggregation. Let r be the contingency factor, so that an attorney's recovery before deduction of litigation costs must be discounted by r, and let s be the number of plaintiffs represented by each attorney.

a.   Arrangement I

Suppose that after random sampling an attorney ends up representing h sample plaintiffs, and let H be the set of all such plaintiffs. Treating this attorney as the actual player in the litigation game, her payoff function, u_a, under Arrangement I is:

$$u_a = rs \frac{\sum_{j \in M} p_\pi \left(c_\pi^j, c_d^j \right) L_j}{m} - \sum_{j \in H} c_\pi^j$$

And the first order condition for an attorney maximum is:

$$\frac{\partial p_\pi \left(c_\pi^i, c_d^i \right)}{\partial c_\pi^i} = \frac{m}{rsL_i}$$

Using the simple investment model and recalling that defendant's payoff function remains the same, the conditions for a set of strategies to be a Nash equilibrium are:

$$\frac{\partial p}{\partial c_\pi^i} = \frac{kc_d^{i*}}{\left(c_\pi^{i*} + c_d^{i*} \right)^2} = \frac{m}{rsL_i}$$

$$\frac{\partial p}{\partial c_d^i} = \frac{-kc_\pi^{i*}}{\left(c_\pi^{i*} + c_d^{i*} \right)^2} = - \frac{m}{nL_i}$$

Solving these two equations simultaneously, we obtain:

$$c_\pi^{i*} = \frac{knL_i}{\left(\dfrac{n}{rs} + 1\right)^2 m}$$

$$c_d^{i*} = \frac{kn^2 L_i}{rs\left(\dfrac{n}{rs} + 1\right)^2 m}$$

Thus, $c_d^{i*}/c_\pi^{i*} = n/rs$. If $s=1$ and $r=\frac{1}{3}$, for example, the asymmetry in litigation investment is worse with a contingency arrangement than without one. If $r=\frac{1}{3}$ and $s>3$, however, multiple representation reduces the asymmetry somewhat, although significant asymmetry remains.

b. *Arrangement III*

The attorney's payoff function, u_a, under Arrangement III is:

$$u_a = rs \frac{\sum_{j \in M} P_\pi\left(c_\pi^j, c_d^j\right) L_j}{m} - s \frac{\sum_{j \in M} c_\pi^j}{n}$$

Under the simple model, the conditions for a set of strategies to be a Nash equilibrium are:

$$\frac{\partial p}{\partial c_\pi^i} = \frac{kc_d^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = \frac{m}{rnL_i}$$

$$\frac{\partial p}{\partial c_d^i} = \frac{-kc_\pi^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = -\frac{m}{nL_i}$$

Solving these equations simultaneously, we obtain the following:

$$c_\pi^{i*} = \frac{kr^2 nL_i}{(r+1)^2 m}$$

$$c_d^{i*} = \frac{krnL_i}{(r+1)^2 m}$$

Thus, $c_\pi^{i*} = rc_d^{i*}$. This shows that multiple representation does not affect litigation investment under Arrangement III, but contingency representation introduces an asymmetry that depends on the contingency factor.

c. *Arrangement IV*

In Part III.B. of the text, I pointed out that sometimes Arrangement IV might be superior to Arrangement III under contingency fees and multiple representation.[283] To see how, consider the Nash equilibrium investments for Arrangement IV under the simple model.

To begin with, since Arrangement IV gives sample plaintiffs their own verdicts (and all others the sample average) and averages total litigation costs over all plaintiffs, the payoff function (u_a) for an attorney representing s plaintiffs in the aggregation and h plaintiffs in the sample, all with contingency r and the payoff function for the defendant (u_d) are as follows:

$$u_a = r\Sigma_{j\epsilon H}p\left(c_\pi^{\,j}, c_d^{\,j}\right)L_j \ + r\ (s\text{-}h)\ \frac{\Sigma_{j\epsilon M}\ p\ (c_\pi^{\,j},\ c_d^{\,j})L_j}{m} - s\frac{\Sigma_{j\epsilon M}c_\pi^{\,j}}{n}$$

$$u_d = -n\ \frac{\Sigma_{j\epsilon M}p\left(c_\pi^{\,j},\ c_d^{\,j}\right)L_j}{m}\ -\Sigma_{j\epsilon M}c_d^{\,j}$$

As we did above, we can determine the conditions for a set of strategies to be a Nash equilibrium under the simple model, with the following results:

$$\frac{\partial p}{\partial c_\pi^{i*}} = \frac{kc_d^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = \frac{m}{nL_i}\left(\frac{s}{r(m + s\ \text{-}\ h)}\right)$$

$$\frac{\partial p}{\partial c_d^{i}} = \frac{\text{-}kc_\pi^{i*}}{\left(c_\pi^{i*} + c_d^{i*}\right)^2} = -\ \frac{m}{nL_i}$$

Solving these equations simultaneously and letting $w = s/[r(m + s\ \text{-}\ h)]$, we obtain:

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283. See note 86 and accompanying text.

$$c_{\pi}{}^{i*} = \frac{knL_i}{m\ (1+w)^2}$$

$$c_d{}^{i*} = \frac{knL_iw}{m(1+w)^2}$$

Thus, $c_{\pi}{}^{i*} = wc_d{}^{i*}$. If $r = \frac{1}{3}$, m=315, s=150, and h = 15, for example, then $c_{\pi}{}^{i*} = c_d{}^{i*}$ under Arrangement IV. But $c_{\pi}{}^{i*} = c_d{}^{i*}/3$ under Arrangement III. Therefore, in this hypothetical, Arrangement IV is superior to Arrangement III because of the multiple representation and contingency.