

A NORMATIVE EVALUATION OF ACTUARIAL LITIGATION

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This Article addresses the normative issues raised by the use of statistical sampling to adjudicate large case aggregations. In its recent decision, Wal-Mart Stores, Inc. v. Dukes, the Supreme Court referred to sampling pejoratively as “Trial by Formula.” This Article argues that the pejorative label is undeserved. In fact, sampling can be justified in many more situations than courts currently apply it, and society is paying a very high price for limiting its use. I explored some of the normative issues in an earlier publication, Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity, and the current Article expands on my earlier analysis in four respects. First, it analyzes the effect of sampling on settlement and discusses in more detail the problem of frivolous and weak filings. Sampling tends to reduce the likelihood of settlement and also provides cover for undesirable lawsuits. However, while both of these effects must be considered in any efficiency analysis, neither is likely to tip the cost-benefit balance against the use of sampling in large enough case aggregations. Second, this Article evaluates sampling in the context of an outcome-oriented rights-based theory. In this connection, the most serious problem is that sampling gives high value plaintiffs only an average recovery. Statistical Adjudication discussed this topic as well, but the current Article generalizes the analysis in a useful way. Third, the Article offers some further thoughts about process-based participation and the day-in-court right based on work that post-dates Statistical Adjudication. Fourth, the Article explores another possible objection to sampling that Statistical Adjudication did not address. This objection, which I call the “methodological legitimacy objection,” is distinct from adverse effects on outcome and limitations on individual participation. It rests ultimately on the assumption that adjudication at its core involves reasoned deliberation that engages the facts of particular cases. The problem with sampling from this perspective is that it substitutes a formulaic method for fact-sensitive reasoning. This Article shows that while the methodological legitimacy objection has some intuitive appeal, it is very difficult to sustain in a rigorous way.

I. INTRODUCTION

Statistical methods pervade the law and litigation. Sometimes the substantive law adopts an explicitly probabilistic standard suitable for evaluation by statistical techniques. One example is the likelihood of confusion requirement for trademark infringement, which calls on the court to estimate the probability that an ordinary consumer will be confused.¹ Sometimes the substantive law adopts a standard that, while not explicitly probabilistic on its face, nevertheless authorizes statistical methods. An example is the discrimination element of a disparate impact Title VII claim, which sometimes involves a statistical analysis to determine the existence and magnitude of differential effects.² Indeed, constitutional civil rights claims based on the Equal Protection Clause often depend on statistical evidence insofar as liability turns on a comparison of the challenged conduct to statistical features of a larger population.

Statistical methods are used even more frequently to generate evidence to prove a claim. Sometimes a legal standard that is not inherently linked to statistical properties of a phenomenon is nevertheless most easily proved statistically. For example, liability might turn on acts of the defendant reflected in written records too numerous to examine individually. In such a case, the plaintiff might rely on a sample to draw inferences about liability.³ For another example, statistical models are often used to estimate damages in antitrust and other complex cases where losses

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¹ See, e.g., J. THOMAS MCCARTHY, 4 MCCARTHY ON TRADEMARKS AND UNFAIR COMPETITION § 23:1 et seq. (4th ed. 1996). Courts use a multi-factor test to infer likelihood of confusion from factors such as the strength of the mark, the similarity of the marks, and the proximity of the products, but any inference is probabilistic and necessarily refers to statistical properties of the relevant consumer population. See *id.* § 23:19.

² See GEORGE RUTHERGLEN, EMPLOYMENT DISCRIMINATION LAW: VISIONS OF EQUALITY IN THEORY AND DOCTRINE 79-89 (3d ed. 2010).

³ See, e.g., MANUAL FOR COMPLEX LITIGATION § 11.493 (4th ed. 2004).

must be measured relative to a counter-factual baseline that cannot be easily reconstructed using non-statistical techniques.⁴

In fact, the law is bound up with statistical generalization at a very deep level. Any general rule reflects statistical generalizations about a large population of regulated phenomena, whether the generalization is done through the use of formal methods or through informal guesses or even rough political compromise. For example, the general rule that drivers must not exceed fifty miles per hour on a stretch of roadway is based on estimates of the average risk of harm at speeds in excess of fifty miles per hour. Thus, when the speed limit is applied to an individual driver, the driver's liability is evaluated not by the risk that she actually created, but rather by the average risk aggregated over all drivers in all possible situations.

This brief account might lead one to conclude that statistical methods fit litigation smoothly.⁵ But as we know, the use of statistics is controversial. Perhaps the most controversial yet important application is the use of sampling to adjudicate mass tort or other large-damage cases by extrapolating from sample outcomes. Whether the extrapolation involves simple averaging or more complex regression techniques, the result is the same. Very often some cases receive outcomes that differ systematically from the outcomes those cases would have received if they had been tried individually.

Despite the problems, however, there are well-known cases in which courts have used sampling to determine damages and sometimes liability as well. In *Hilao v. Estate of Marcos*,⁶ for example, the Ninth Circuit approved the use of sampling to award compensatory damages in 9,541 consolidated cases.⁷ On the advice of a statistical expert, the district judge randomly selected a sample of 137 cases and used the sample cases

⁴ Another example is calculating backpay for class members in an employment discrimination case involving discriminatory hiring and promotion. See *Pettway v. Am. Cast Iron Pipe Co.*, 494 F.2d 211, 258-63 (5th Cir. 1974). The court must somehow imagine what would have happened to each class member had there been no discrimination. This is such a complex polycentric problem that there is no other feasible method to do it than to use statistical models.

⁵ In his paper *Probability Sampling in Litigation* and his presentation to the Actuarial Litigation Conference, Professor Joseph Kadane gave more examples of the use of statistics in litigation.

⁶ *Hilao v. Estate of Marcos*, 103 F.3d 767 (9th Cir. 1996).

⁷ *Id.* at 782.

to generate a total compensatory damage award for the entire group.⁸ Perhaps the most famous sampling case is *Cimino v. Raymark Industries, Inc.*,⁹ in which Judge Parker, plagued by an onslaught of asbestos litigation, employed sampling to determine individual damages in 2,298 consolidated asbestos cases.¹⁰ He constructed a stratified sample of 160 cases, tried the sample cases, and gave the sample mean to all the other cases in the aggregation.¹¹ The Fifth Circuit reversed, holding that Judge Parker's use of sampling infringed the Seventh Amendment jury trial right and impermissibly altered state substantive law in violation of *Erie's* dictates.¹² But this case still stands as a dramatic reminder of what might still be possible in some circumstances.

Most recently, an en banc Ninth Circuit Court of Appeals, following *Hilao*, gave a favorable nod to the use of sampling to determine back pay for class members in a massive and highly publicized Title VII class action, *Dukes v. Wal-Mart Stores, Inc.*¹³ The court did so over Wal-Mart's objection that Title VII gave it individualized defenses that could only be adjudicated in individual suits.¹⁴ The Supreme Court reversed. The Court objected to the sampling procedure—calling it “Trial by Formula”—on the ground that sampling impaired Wal-Mart's entitlement to “litigate its statutory defenses to individual claims” and thus violated the Rules Enabling Act.¹⁵ Even so, there is still room left for sampling in future cases. It is not clear how far the Court's objection extends, and in any event, its Rules Enabling Act rationale does not apply to sampling that is legislatively authorized.

⁸ *See id.* The district court did not simply apply the sample average. Instead, a special master made damage recommendations for different injury subgroups by relying on the results of discovery in the sample cases. Then a jury heard testimony on the sampling procedure and special master's recommendations with freedom to reject, accept, or modify the results.

⁹ *Cimino v. Raymark Indus., Inc.*, 751 F. Supp. 649 (E.D. Tex. 1990).

¹⁰ *Id.* at 653.

¹¹ *Id.*

¹² *Cimino*, 151 F.3d 297, 320-21.

¹³ *Dukes v. Wal-Mart Stores, Inc.*, 603 F.3d 571, 625-28 (9th Cir. 2010); *see id.* at 627 n.56 (noting that the invalid claim rate for the sample could be applied to the entire aggregation). Any sampling would take place, however, only after the plaintiffs succeeded in proving company-wide discrimination and thus prima facie liability. *See id.* at 643.

¹⁴ *See id.* at 624-25.

¹⁵ *Wal-Mart Stores, Inc. v. Dukes*, 131 S. Ct. 2541, 2561 (2011).

This Article, prepared for the Actuarial Litigation Conference held at the University of Connecticut School of Law, addresses the normative questions raised by these and other controversial uses of sampling.¹⁶ In addressing these questions, it is important to distinguish between an outcome quality metric and a process-based participation metric. An outcome metric focuses on the quality of the judgments and settlements that sampling produces. Evaluation of outcomes in turn depends on whether one takes a utilitarian or a rights-based approach. The utilitarian evaluates outcome quality in terms of aggregate social benefits and costs. The rights-based proponent evaluates outcome quality in terms of how effectively parties' rights are enforced.

By contrast, a process-based evaluation ignores outcome effects altogether and focuses instead on the intrinsic value of participation. According to the United States Supreme Court, each individual has a due process right to her own personal "day in court"; that is, her own opportunity to control litigation that binds her.¹⁷ If this day-in-court right guarantees individual participation in all cases, it poses a serious obstacle to sampling, since sampling imposes outcomes on parties without giving them an opportunity to litigate their own suits. However, the day-in-court right is not absolute. The question then is what reasons for using sampling justify limiting party participation opportunities consistent with a process-based approach.

I explored these normative questions in a previous article, *Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity* (which I shall refer to as *Statistical Adjudication* for short).¹⁸ I summarize the main points of that earlier article here and extend its analysis in four respects. First, I analyze the effect of sampling on settlement and discuss in more detail the problem of frivolous and weak

¹⁶ The Actuarial Litigation Conference was held on April 15, 2011, and it focused on the use of sampling to litigate mass tort cases in the form of class actions or large-scale, non-class aggregations. For another discussion of the normative issues, see Alexandra D. Lahav, *The Case for "Trial by Formula"*, TEX. L. REV. (2012), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1945514 (arguing that sampling better achieves equal treatment among litigants and greater transparency of outcomes). See also Alexandra D. Lahav, *Rough Justice*, 1, 30 (2010), available at <http://ssrn.com/abstract=1562677>.

¹⁷ See, e.g., *Taylor v. Sturgell*, 553 U.S. 880, 892-93 (2008).

¹⁸ Robert G. Bone, *Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity*, 46 VAND. L. REV. 561 (1993) [hereinafter Bone, *Statistical Adjudication*].

filings. I ignored settlement effects in *Statistical Adjudication* and only touched on the frivolous suit problem. Both points deserve more extensive treatment. Second, I expand in this Article on the implications of an outcome-oriented rights-based theory for sampling. I discussed this topic in *Statistical Adjudication*, but the following discussion generalizes that analysis in a useful way. Third, I offer some further thoughts about process-based participation and the day-in-court right based on my more recent work.

The fourth extension deals with a possible objection to sampling that I did not discuss in *Statistical Adjudication*. This objection is distinct from adverse effects on outcome and limitations on individual participation. Simply put, it insists that sampling is incompatible with what adjudication is supposed to do. I believe that this objection rests ultimately on an assumption that adjudication at its core involves reasoned deliberation that engages the facts of particular cases. The problem with sampling from this perspective is that it substitutes a formulaic method for case-specific and fact-sensitive reasoning.

I shall refer to this objection as the “methodological legitimacy objection” to highlight its focus on legitimacy and its assumption that legitimacy has to do with the method of decision making rather than the quality of outcomes or the degree of participation. In theory, the methodological legitimacy objection retains whatever force it has even if there is no reason to worry about externalities, party participation is adequate, and litigation costs are reduced. In practice, however, it is likely to operate, when it does, behind the scenes, as a factor influencing decisions to reject sampling on other grounds. For example, the *Wal-Mart* Court might have had something like this concern in mind when it went out of its way to characterize sampling pejoratively as “Trial by Formula.”¹⁹ In any event, the methodological legitimacy objection has sufficient plausibility and superficial appeal to warrant separate discussion even if it is difficult to tell when it is being invoked. As we shall see, the objection is very difficult to sustain in a rigorous way.

The body of this Article is divided into four parts. Part I frames the problem more precisely. Part II focuses on outcome effects with special attention to settlement and frivolous and weak lawsuits. Part III focuses on process-based participation and adds some further thoughts on the day-in-court right. Finally, Part IV discusses the methodological legitimacy objection. Throughout, I mean to consider applications of sampling to

¹⁹ See *Dukes*, 131 S. Ct. at 2561.

determine damages, liability, or both. To be sure, there are special problems with applying sampling to determine liability and much of what I say fits damage sampling better than liability sampling. But liability sampling has been done in the past and might be done more often in the future if process scarcity becomes an even more pressing concern.²⁰

II. FRAMING THE PROBLEM MORE PRECISELY

Sampling runs the risk of distorting outcomes relative to individual trials and substantive entitlements, deprives parties of participation opportunities, and calls for a decision-making method that might be at odds with the usual case-specific reasoned deliberation associated with adjudication. On the positive side, sampling saves litigation resources, helps to equalize litigating power across the party line, and improves real recovery for plaintiffs trapped in a lengthy litigation queue. Parts II, III, and IV explore the normative tradeoff.

Before doing so, however, it is important to clarify the precise nature of sampling's effect on outcome and the normative problem sampling creates from an outcome quality perspective. Some commentators claim that sampling produces more accurate outcomes than individual trials in many situations.²¹ The truth, however, is not nearly as rosy as these claims suggest.

To see why, let us compare the result from an individual trial of a tort case with the result for the same case when it is part of a mass tort aggregation subject to sampling. There is, of course, an error risk associated with an individual trial. Suppose the same case is tried over and over again. If the defendant is in fact liable and juries are reasonably reliable, we would expect most, but not all, of the trials to end in plaintiff verdicts. Moreover, the distribution of damage awards, with the incorrect defendant verdicts counted as zero, should roughly resemble a bell-shaped curve (i.e., a normal distribution) with a possible spike at zero. The mean of this distribution will closely approximate the expected trial outcome, and the mean of the distribution without the zero awards will closely

²⁰ For more on sampling to determine liability elements, see Laurens Walker & John Monahan, *Sampling Liability*, 85 VA. L. REV. 329 (1999).

²¹ See, e.g., Michael J. Saks & Peter David Blanck, *Justice Improved: The Unrecognized Benefits of Aggregation and Sampling in the Trial of Mass Torts*, 44 STAN. L. REV. 815, 851 (1992).

approximate true damages.²² In addition, the standard deviation of the distribution – that is, the spread around the mean – measures the error risk from an individual trial. Let us call this distribution the “individualized error distribution,” or IED for short.

Now assume instead that the case is part of an aggregation of 1000 mass tort cases. Suppose 10% (100 cases) are sampled and tried and that the average of the sample verdicts is calculated (with defendant verdicts assigned a value of zero). Imagine that we repeat this process over and over again. Each time we sample 100 cases randomly, try each of the 100 cases, and calculate the sample average. Not all the samples will be the same, of course, and the sample averages for the different rounds will vary a bit. Nevertheless, if we graph all the sample averages for all the rounds, they should form a bell-shaped (normal) distribution. Let us call the distribution of sample averages the “sample average distribution,” or SAD for short.

The mean of SAD with the erroneous zero verdicts closely approximates the average expected trial outcome for all the 1000 cases in the aggregation, and the mean of SAD without the zero verdicts closely approximates the average true damages for all cases. Moreover, according to basic statistical theory, the standard deviation of SAD should be small and it should get smaller as the sample size increases. In other words, the sample averages cluster rather tightly about the mean and they cluster ever more tightly with increasing sample size.²³ This means that sampling gives a very good estimate of damages for the average case. But it also means that sampling gives a rather poor estimate of damages for those cases that deviate substantially from the average.

²² For example, assume that the defendant caused \$100,000 in damages and that the case is tried 100 times. Suppose that there is a 10% risk of error in determining liability, so 90 of the trials yield plaintiff verdicts and 10 yield defendant verdicts. Also, suppose that of the 90 plaintiff verdicts, 25 are for \$50,000, 25 are for \$150,000, and 40 are for \$100,000. The mean of the entire distribution, including the 10 defendant verdicts, each counted as zero, is \$90,000, which is the same as the *expected* trial verdict when the probability of error in determining liability is 0.1 (i.e., likelihood of proving liability (0.9) x the expected damage amount if liability is proved (100,000) = \$90,000). Considering only the distribution of the 90 plaintiff verdicts, the mean is \$100,000, which is the true damage amount for the case.

²³ For a discussion of this and other statistical properties of the sample average, see RICHARD J. LARSEN & MORRIS L. MARX, AN INTRODUCTION TO MATHEMATICAL STATISTICS AND ITS APPLICATIONS (2d ed.1986).

To be more precise, if the cases in the aggregation do not vary much in salient characteristics (i.e., the aggregation is strongly homogenous), then all the cases closely resemble the average case and as a result the sample average is a very good approximation for every case. Moreover, if the error risk associated with an individual trial for each case is high (i.e., the standard deviation of the IED is large enough), then an individual trial does a relatively poor job of accurately determining case outcomes. With sampling doing a good job and individual trials doing a poor job, it is easy to see that sampling can produce a more accurate outcome than an individual trial for each case.

This is what the proponents of sampling are keen to point out—and it is a very important observation, one not clearly understood by judges and lawyers. The problem, however, is that this happy result breaks down when the aggregation is heterogeneous or the error risk associated with an individual trial is relatively small, or both.²⁴ Indeed, it does not take much heterogeneity before the sample average gives an estimate that is inferior to an individual trial for at least one case in the aggregation.²⁵ Whether this is a normative problem depends on one's theory of adjudication. As Part II.B explains, a utilitarian theory can accommodate a good deal of heterogeneity, but a rights-based theory is less forgiving.

The degree of population heterogeneity and the magnitude of the error risk for individual trials are both empirical questions, and there might be reasons to believe that the former is small and the latter large for some case aggregations. However, there are some, and perhaps many, aggregations for which this will not hold true. Even worse, judges will often find it difficult to determine which aggregations meet the

²⁴ For a more detailed explanation and an example, see Bone, *Statistical Adjudication*, *supra* note 18, at 577-87.

²⁵ The intuition is easy to grasp. When we take a sample, we know that the sample average is very likely to be close to the value of the average case for the population as a whole. This follows directly from the statistical property of the SAD mentioned in the text. Consider a case located at an extreme of the distribution of cases in the aggregation. This case will have a value much higher, or much lower, than the average case and thus the sample average. As long as judges and juries do a reasonably good job of deciding cases accurately on average and make only random errors that are not systematically skewed to one side, it follows easily that an individual trial is likely to come closer to the true outcome for the extreme case than the much lower (higher) sample average.

homogeneity and error risk conditions and which do not.²⁶ Assessing the relevant variables requires specific information about how individual cases vary over the aggregation and how much error individual trials create.²⁷ This case-specific information is costly to obtain, and those costs are precisely what sampling is meant to avoid.²⁸

In sum, my point is that the mean of the IED (which is the expected outcome from an individual trial) for at least some cases is likely to differ from the mean of the SAD (which is the expected outcome in the same case if sample averaging is used). The same is true, although in a bit more complicated way, for more sophisticated regression techniques.²⁹

These points distinguish the use of statistical methods to adjudicate case aggregations from the more accepted uses of statistics in litigation mentioned in the Introduction. Using sampling to extrapolate case outcomes from sample cases is not expressly authorized by any substantive law of which I am aware. Nor is it strictly necessary in the same strong way that statistical models are necessary to construct the counterfactual world for determining damages in complex antitrust cases. Calculating damages in an individual tort suit is a much more straightforward process than reconstructing what the market would have looked like without an illegal antitrust conspiracy or unlawful attempt to monopolize.

It is important to be clear about this last point. Sometimes advocates of sampling point to the *impossibility* of adjudicating individual cases for an extremely large population, such as hundreds of thousands of asbestos cases or the more than one million individual Title VII suits that were aggregated in the *Dukes v. Wal-Mart* class action. This way of

²⁶ This point raises an important question. What level of confidence in the degree of homogeneity and the error risk in individual trials should be required before sampling is justified? Suppose a judge is convinced that it is more likely than not that the aggregation is sufficiently homogenous so that the sample average will yield a more accurate result for each case than an individual trial. Should this be enough, or should something less than preponderance suffice?

²⁷ For example, some cases in a mass tort aggregation will be weaker on liability elements than others (such as a smoker who has trouble proving specific causation); some cases will have weaker evidence to support legal requirements for obtaining damages, and some cases will have more serious injuries than others (such as cancer versus benign abnormalities).

²⁸ Stratified sampling can reduce these problems. However, one must still know a good deal about the population of cases to form sufficiently homogenous subgroups for a stratified sample.

²⁹ See Bone, *Statistical Adjudication*, *supra* note 18, at 584-87.

framing the argument has rhetorical force, but it is incorrect. The fact is that individual litigation is not technically impossible.³⁰ Simply set up a queue and proceed. Matters are very different for the complex antitrust case. Calculating damages in a way that bears any reasonable relationship to those actually suffered is *analytically impossible* without using a statistical model. But it is not analytically impossible to litigate each mass tort or Title VII case individually. It might take hundreds of years to do it (although these kinds of numbers are usually hyperbolic given the inevitability of settlement), but in theory it can be done.

This is an important point because it highlights the respect in which sampling can force plaintiffs who have superior litigating advantages, such as better lawyers, better cases, or simply a better position in the litigation queue, to forego those advantages and accept average outcomes significantly less than the actual value of their cases. To be sure, some of these advantages are a matter of luck and not properly the subject of a moral claim. I shall discuss this point later when I examine the rights-based arguments against sampling.³¹ For now, the important point is that the normative issues must be squarely addressed in the sampling context; they cannot be dodged simply by arguing that there is no other way to provide relief to anyone. By contrast, in the antitrust case, no plaintiff can complain that she would have done better without the statistical approach, because the statistical approach is analytically essential to provide her with any meaningful relief at all.

None of this means, of course, that there are no good reasons to use statistical methods to adjudicate mass tort or other large-scale case aggregations. For one thing, individual trials generate unacceptably high costs in a world of scarce judicial resources.³² Moreover, separate trials generate delay costs for plaintiffs late in the litigation queue and those costs

³⁰ The pure epidemiological mass tort suit might be an exception. *See* Samuel Issacharoff, *Private Claims, Aggregate Rights*, 2009 SUP. CT. REV. 183, 215-20 (using Vioxx as an example of an “epidemiological mass tort” in which individual recovery is impossible because drug use leaves no trace of evidence to prove individualized causation, even though epidemiological studies confirm a correlation between use and injury). Professor Issacharoff argued at the Actuarial Litigation Conference that the only hope for recovery in these cases is to aggregate all the individual suits and use epidemiological statistics to generate an aggregate damage award. For more on this example, *see infra* note 67.

³¹ *See infra* note 67 and accompanying text.

³² This is, of course, due in large part to very restrictive nonparty preclusion rules. *See* Taylor v. Sturgell, 553 U.S. 880, 882-83 (2008).

can substantially erode the real value of any recovery. This dim prospect creates strong pressure to settle early and on terms favorable to the defendant. Sampling removes this type of unfairness. In addition, statistical methods facilitate aggregate litigation, which helps to equalize litigating power across the party line and produce settlements and trial outcomes closer to the substantive law ideal.³³

These are very weighty reasons. The question, however, is whether reasons like these can justify imposing on some parties statistically generated outcomes that are likely to deviate systematically from their substantive entitlements and from the results of individual trials. In analyzing this question, one should distinguish between consensual and nonconsensual use of sampling and between use to extrapolate final judgments and use to facilitate voluntary settlements.³⁴

This Article focuses on *nonconsensual* sampling used to impose *final judgments*. This is the most controversial application because it is supported neither by consent to sampling itself nor by consent to the settlements that sampling facilitates. Thus, it is the most difficult to justify. Moreover, it is also the most important application. It turns out that justifying nonconsensual use is critical to justifying sampling more generally because many of the uses that seem consensual are on closer inspection less consensual than they first appear.

Let me explain this last point a bit more clearly. In large case aggregations, individual plaintiffs are not likely to be the ones who give consent. The attorney usually decides whether to agree to sampling and whether to settle, and in a world of high agency costs typical of mass tort aggregations, attorneys cannot always be trusted to represent the interests

³³ Roughly, by aggregating separate claims into a single lawsuit, plaintiffs achieve economies of scale and incentivize their attorney to invest more than she would in an individual suit and at a level that is closer to what the defendant is likely to invest.

³⁴ Judges sometimes try a sample of cases from a large aggregation not to impose final judgments, but rather to generate a common baseline of trial verdicts from which parties can estimate the value of their own cases for settlement purposes. Because parties use the sample verdicts as a common baseline, their respective valuations are likely to converge, which makes settlement more likely. Moreover, the randomness of the sample helps to reduce the variance of party estimates, and the judge can reduce variance even further by increasing the sample size (although this also increases costs). For a useful discussion of the benefits of sampling to facilitate settlement in large case aggregations, see Alexandra D. Lahav, *Bellwether Trials*, 76 GEO. WASH. L. REV. 576 (2008).

of plaintiffs faithfully.³⁵ Given that lawyer-client incentives diverge, one should question the extent to which party consent actually legitimates sampling.

There is another reason to question consent in the sampling context. Any consent is likely to be thin. To see why, start with the premise that a party will agree to sampling whenever she expects a better outcome from sampling than from an individual trial. It follows that if delay costs are high enough with a long litigation queue so that the expected value of a trial outcome in the plaintiff's case is virtually zero, a plaintiff should be willing to accept virtually any kind of sampling procedure. But then consent is not meaningful because the plaintiff's choices are radically limited. Sampling might still be justified—and I shall argue in Parts II and III that it is—but it must be justified without relying on consent.

Thus, it is critical to justify nonconsensual use of sampling. As the basis for consent weakens, the need for an independent justification grows stronger, and any independent justification of sampling must include nonconsensual use. There are also other reasons to put nonconsensual use center stage. Parties are not always able to settle even with the benefit of a judicially created baseline, and the settlement process creates transaction costs that could be avoided if the judge were simply to give all parties the average or regression result. So there are efficiency advantages to coercive imposition as well.

III. AN OUTCOME-BASED ANALYSIS

Thus, the question is: When and why can courts use sampling to generate final judgments that are imposed on parties without their consent? The following discussion analyzes this question. It first summarizes the likely effects of sampling on trial judgments and settlements, and then reviews the normative arguments from utilitarian and rights-based perspectives.

³⁵ Both class actions and non-class aggregations are plagued by agency problems. See, e.g., Howard M. Erichson, *Informal Aggregation: Procedural and Ethical Implications of Coordination Among Counsel in Related Lawsuits*, 50 DUKE L.J. 381, 464-65 (2000); Bruce Hay & David Rosenberg, "Sweetheart" and "Blackmail" Settlements in Class Actions: Reality and Remedy, 75 NOTRE DAME L. REV. 1377, 1390-91 (2000).

A. LIKELY OUTCOME EFFECTS

1. Litigated Judgments

Statistical Adjudication made three main points about the effect of sampling on litigated judgments.³⁶ First, the sample average can deviate from a trial judgment for at least one and possibly many cases in the aggregation depending on the degree of heterogeneity. This is the same point as the one developed in Part I above. Second, it is possible to reduce this risk by adjusting the sampling procedure and using regression rather than sample averaging, but these refinements require information about the population of individual cases, which is costly to obtain. Third, sample averaging distorts litigation investment incentives by introducing a new source of free rider and externality problems.

As to the third point, the precise nature of the distortion depends on four factors: (1) whether the sample cases receive the sample average or their own trial verdicts; (2) whether the trial costs in the sample cases are spread over all cases in the population or left for the parties in the sample cases to bear; (3) the pattern of multiple representation of plaintiffs, and (4) the severity of agency problems in a large case aggregation with contingency fees.³⁷ Some combinations of these factors skew litigation investment incentives and results in the defendant's favor.³⁸ Other combinations skew incentives and results in the plaintiffs' favor. *Statistical Adjudication* proposed ways to mitigate these adverse effects.³⁹

In short, sampling can alter outcomes relative to litigated judgments in individual trials, and can do so in ways that for some and perhaps many cases deviate systematically from what the parties' substantive entitlements require. But sampling also produces benefits for many parties and for society at large by reducing cost, risk, and delay. How one strikes the balance depends on whether one takes a utilitarian or a rights-based perspective, as Section II.B below explains.

³⁶ See Bone, *Statistical Adjudication*, *supra* note 18, at 576-94.

³⁷ See *id.* at 587-94.

³⁸ Assuming that the party who invests more is more likely to win.

³⁹ Bone, *Statistical Adjudication*, *supra* note 18, at 587-94.

2. Settlements

The effect of sampling on settlement incentives is complicated. To begin with, it depends on the sampling protocol and in particular on three aspects: (1) whether the sampled cases are allowed to settle after they are chosen for the sample; (2) whether the sample plaintiffs receive the sample average or their own trial verdict; and (3) whether trial costs are averaged and spread over all cases in the population or left for sample plaintiffs to bear.

First, consider the question whether sample cases should be allowed to settle. On the one hand, forcing trial without party consent seems problematic. On the other hand, the point of sampling is to generate trial outcomes from which to extrapolate, and allowing parties in the sampled cases to settle makes it more difficult to achieve this goal. One might simply add settlements to the sample mix, but doing so complicates the task of extrapolation. Settlements are difficult to compare to trial verdicts because settlements discount for likely trial success and are influenced by relative bargaining power, which may or may not correlate strongly with the relative litigating power that affects trial verdicts. To make settlements comparable to trial verdicts, therefore, each settlement must be adjusted to take account of these differences, which is bound to be a complicated and imprecise task.⁴⁰

Given these problems, one might be tempted to exclude settlements, but doing so creates a different set of problems. The cases that settle are not randomly selected, so excluding settlements will taint the randomness of the remaining trial verdicts. Worse yet, it gives the defendant an incentive to settle the strongest sample cases in order to

⁴⁰ Suppose the plaintiff's probability of success in proving liability at trial is p ; the likely damage award conditional on success is w , and the cost to the plaintiff (defendant) of litigating through trial is C_p (C_D). Also assume that the plaintiff's relative bargaining power is γ , meaning that the plaintiff is likely to capture a fraction of the settlement surplus equal to γ . The lowest amount the plaintiff will accept in settlement is $pw - C_p$, and the largest amount the defendant will offer is $pw + C_D$. Therefore, the settlement surplus is $C_p + C_D$ and the likely settlement is: $pw - C_p + \gamma(C_p + C_D)$. If this sample case went to trial and the plaintiff succeeded in proving liability, we would expect a jury verdict close to w . If the cases in the sample vary by w and p , it will be difficult to adjust a settlement of $pw - C_p + \gamma(C_p + C_D)$ so that it is commensurable with verdicts of w in the sample cases that go to trial.

reduce the sample average and thus reduce total liability for all cases in the larger population.

These problems might not be all that serious if a single attorney represents the entire aggregation of plaintiffs and consults her own interest in a fee when she makes the decision whether to settle. Under these circumstances, the attorney has an incentive to counter the defendant's strategy by rejecting settlement offers in the cherry-picked cases. This is so because an attorney who settles cherry-picked cases loses the fee she would have earned with a larger sample average applied to the whole aggregation.⁴¹

Let us assume that the sample cases do not settle, either because settlement is barred or because the attorney rejects every settlement offer. What are the parties likely to do before cases are sampled if they know sampling will be used? Party incentives depend on the other two features of the sampling protocol: whether sample plaintiffs receive the sample average or their own trial verdict, and whether trial costs are averaged and spread over all cases in the population or left for sample plaintiffs to bear. These two elements create four possible scenarios:

	All Cases Receive Sample Average	Sampled Plaintiffs Receive Own Trial Verdicts
Total Costs Spread Over All Cases	SCENARIO I	SCENARIO II
Each Sample Case Bears Its Own Costs	SCENARIO III	SCENARIO IV

Scenario I is attractive on fairness grounds because it treats all plaintiffs in the aggregation equally. But Scenario I might be difficult to implement constitutionally if there are due process problems with denying the parties in the sample cases the benefit of their own trial verdicts. This pushes in the direction of Scenario II. Scenarios III and IV also have some

⁴¹ More precisely, the defendant would have to offer a premium that compensates the attorney for the fee amount lost due to a lower sample average. This is certainly possible but rather unlikely for large case aggregations. Of course, aggregate attorney representation can exacerbate the problem of agency costs, but that is a problem that exists without sampling as well.

attractive features, but there is a strong fairness reason to distribute costs equally over all cases since all plaintiffs in the aggregation benefit from the sample plaintiffs' litigation efforts, and this consideration weighs against Scenarios III and IV. For this reason, the following discussion focuses on Scenarios I and II.

In the Appendix, I present a simple settlement model and use it to analyze the settlement effects of sampling under Scenario I and Scenario II, comparing the results to the no-sampling baseline.⁴² In doing so, I consider two different allocations of settlement power: one in which each plaintiff controls the settlement decision in her own individual case, and one in which all plaintiffs are represented on contingency by the same attorney who controls the settlement decision and settles en-masse.

The most important result of this analysis is that the use of sampling under Scenario I and Scenario II makes settlement impossible, or at least more difficult, for many cases that could have settled without sampling. It follows then that sampling is likely to reduce settlement frequency. Moreover, this is true whether the individual plaintiff or the attorney for the aggregation controls the settlement decision—although the distribution and magnitude of the effects differ. The result for expected settlement amounts is less surprising. High value claims settle for less than they would without sampling. Low value claims normally settle for more.

The following provides a bit more discussion of these settlement impacts, but the details are in the Appendix.

a. Scenario I

The intuition behind the results for Scenario I is easy to grasp. In the simple settlement model, parties can settle if and only if the defendant's expected loss from going to trial is greater than or equal to the plaintiff's expected gain. Expected loss and expected gain depend on each party's estimate of plaintiff's likely success, the expected recovery if plaintiff succeeds, and expected litigation costs through trial. When parties settle, they bargain over how to apportion the savings in trial costs between them, and when they have different estimates of likely success, they also bargain over how to split the additional gains from trade.

⁴² The analysis uses the standard economic model of settlement under asymmetric estimates of likelihood of success. *See, e.g.*, ROBERT G. BONE, CIVIL PROCEDURE: THE ECONOMICS OF CIVIL PROCEDURE (2003) [hereinafter BONE, CIVIL PROCEDURE].

To see this clearly, suppose the plaintiff and the defendant make different estimates of plaintiff's likely success. Let p_π and p_Δ be plaintiff's and defendant's estimates, respectively.⁴³ Suppose the two parties agree on w , the likely recovery if plaintiff succeeds, and on C_P and C_D , the plaintiff's and defendant's costs, respectively, of litigating through trial. These latter two assumptions are not entirely realistic, but they are useful for simplifying the discussion and conveying the basic intuition.⁴⁴

Given that both parties agree on w , the conventional settlement model holds that settlement is feasible without sampling if and only if:

$$p_\Delta w + C_D \geq p_\pi w - C_P$$

The settlement surplus that parties create by settling is the difference between the left hand and right hand sides of this inequality, which is $p_\Delta w + C_D - (p_\pi w - C_P) = (p_\Delta - p_\pi)w + C_P + C_D$. Another way to state the feasibility condition is that the settlement surplus must be greater than or equal to zero; in other words, there must be something for the parties to bargain over:

$$(p_\Delta - p_\pi)w + C_P + C_D \geq 0 \quad (1)$$

Scenario I sampling has two effects on Expression (1). First, it gives all the plaintiffs in the aggregation the sample average for their individual cases. When the aggregation encompasses claims with different valuations, this effect reduces the value of w , the expected recovery conditional on success, for above-average claims and increases it for below-average claims. Second, sampling reduces total litigation costs (i.e., $C_P + C_D$), since only the sampled case are tried. Before the sample is selected, there is a chance that any case could be chosen for the sample, so

⁴³ Thus, p_π and p_Δ might refer to the likelihood of success in establishing liability and proving damages, or they might refer only to the likelihood of success in proving damages conditional on the plaintiff establishing liability without sampling. The referent for the variables depends on whether sampling is used only to determine damages or also to determine liability.

⁴⁴ For example, in the typical case, the plaintiff is likely to be better informed about the seriousness of her injuries (and thus about w) than the defendant. Also, C_P and C_D might vary with case value. It is possible to modify the model to take account of these factors, but doing so complicates the analysis. In a later footnote, I make a few comments about how asymmetric estimates of w might affect the results. *See infra* note 47.

the parties in every case discount litigation costs by the fraction of cases to be sampled. The impact of these two effects on the likelihood of settlement depends on whether $p_{\Delta} > p_{\pi}$ or $p_{\Delta} < p_{\pi}$.

First, consider the case where $p_{\Delta} > p_{\pi}$. In this situation, all the terms in Expression (1) are positive, which means that settlement is feasible for all cases whether or not sampling is used. However, sampling reduces the settlement surplus for above-average cases because w and $C_p + C_D$ both get smaller. For below-average cases, w increases with sampling but $C_p + C_D$ decreases. Therefore, the settlement surplus rises or falls depending on which factor dominates.

Although settlement is feasible in all these cases, the likelihood that parties will reach a settlement can be affected by the size of the settlement surplus. As I explain in the Appendix, one theory holds that parties have greater difficulty reaching a settlement when the settlement surplus is smaller because there is a more limited range of allocations on which the parties can agree. Another theory holds that parties have greater difficulty reaching a settlement when the surplus is larger because they are more likely to bargain hard when more is at stake. Therefore, the effect on settlement depends on which theory of bargaining behavior holds true, which might vary with the circumstances.⁴⁵

Next consider the case where $p_{\Delta} < p_{\pi}$. The results here are more striking. If $p_{\Delta} < p_{\pi}$, the difference $p_{\Delta} - p_{\pi}$ is always negative, so the $(p_{\Delta} - p_{\pi})w$ term in Expression (1) is always negative. Therefore, if w increases enough with sampling (so the negative $(p_{\Delta} - p_{\pi})w$ term gets sufficiently larger in the negative direction) or if $C_p + C_D$ decreases enough with sampling (so the positive term gets sufficiently smaller), a case that has a positive settlement surplus—and therefore could settle without sampling—can have a negative settlement surplus with sampling and be impossible to settle.⁴⁶

⁴⁵ I tend to think that hard bargaining kicks in only for very large settlement surpluses. If I am correct, then we would expect a reduced surplus to make settlement more difficult, unless the surplus is very large both before and after the change.

⁴⁶ The effects vary between above-average and below-average claims in the aggregation. For above-average cases, w decreases with sampling. This means that the negative term $(p_{\Delta} - p_{\pi})w$ is smaller in the negative direction and thus has a weaker impact in reducing the settlement surplus. Still, the magnitude of the reduction in $C_p + C_D$, which depends on the fraction of cases sampled, can be so large that Expression (1) turns from positive without sampling to negative with sampling for above-average cases that are not too far out on the tail of the

These effects obtain whether plaintiffs control their own settlements or an attorney for the aggregation controls the settlement and settles en masse. In the latter case, switching to sampling does not affect w because aggregations settle anyway for average recovery per case multiplied over all cases, which is exactly the same as the estimate under sampling. However, sampling reduces expected litigation costs since only sample cases are litigated, which reduces $C_p + C_D$.

The Appendix develops the analysis more rigorously and describes the different effects that Scenario I sampling can have on the settlement surplus for different types of cases and different sample sizes. The conclusion is the same throughout. For the most likely aggregations, Scenario I sampling rarely, if ever, converts a case that cannot settle into one that can, but frequently converts cases that can settle into ones that cannot.⁴⁷

population distribution. In theory, it is also possible for sampling to turn some cases that cannot settle without sampling into cases that can settle with sampling. However, the Appendix shows that the conditions necessary for this to occur should rarely hold as a practical matter. For below-average cases, w increases with sampling. This means that the negative term gets larger in the negative direction and has a stronger impact in reducing the settlement surplus. This result, combined with the reduction in $C_p + C_D$, guarantees that many below-average cases that could have settled without sampling become impossible to settle with sampling.

⁴⁷ The results are slightly different if the parties have different estimates of w . In the most extreme case, the plaintiff knows w , but the defendant knows only the background distribution of w for all cases in the aggregation (i.e., what fraction are high value and what fraction are low value). Under these circumstances, the defendant must use the average value of w over all the cases; let's denote the average by v . Instead of (1), the settlement condition without sampling for this situation is:

$$p_{\Delta}v - p_{\pi}w + C_p + C_D \geq 0$$

For above-average claims, w is greater than v , so it is possible that this condition will not be satisfied when $p_{\Delta} > p_{\pi}$ and $w-v$ is very large, in which case settlement is impossible without sampling. (When $p_{\Delta} > p_{\pi}$, the condition is always satisfied for below-average claims, i.e. those for which $v > w$.) If Scenario I sampling is used, however, all cases can settle because the plaintiff calculates expected value based on v , the sample average, the same as the defendant does. This means that for above average cases that are located very far out on the tail of the distribution, i.e., where $w-v$ is large enough, settlement can become feasible with sampling when it is impossible without sampling. However, these should be fairly rare occurrences because not many cases are likely to deviate sufficiently from the mean to make this possible. Also, for a very high value claim, the

b. Scenario II

Not much more need be said about Scenario II. It has the same effect on $C_p + C_D$ as Scenario I because litigation costs are shared equally just as they are in Scenario I. But Scenario II sampling reduces the impact on w . This is because sample plaintiffs get their own trial verdicts. All the parties anticipate this possibility because all of them know there is a chance their case will be chosen for the sample, and therefore they include the possibility in their estimates of case value before a sample is chosen. This means that sampling produces a smaller reduction in w for above-average cases and a smaller increase in w for below-average cases. How much smaller depends on the fraction of cases chosen for the sample: the larger the fraction, the smaller the effect.

Nevertheless, Scenario II sampling has the same effect as Scenario I on the two critical factors defining the settlement surplus: it reduces (increases) w for high-value (low-value) claims, and it reduces total litigation costs. This means that it has the same general impact on the likelihood of settlement, except that the ranges of $(p_\Delta - p_\pi)$ values corresponding to the different effects vary to some extent from Scenario I. The precise results are in the Appendix.

In sum, the use of sampling can significantly reduce the settlement rate and thus increase litigation costs, all other things held equal. As the following section explains, this effect is important because it reduces sampling's cost-saving benefits and to that extent weakens the efficiency case for using it. Sampling also gives plaintiffs average recovery, which in effect transfers wealth from high-end to low-end plaintiffs. While this transfer must be justified under both utilitarian and rights-based theories, it is much more problematic for a rights-based theory. The following discussion explores these points.

settlement produced by sampling (which is based on v) departs markedly from the plaintiff's substantive entitlement, which can raise particularly serious fairness concerns.

When $p_\Delta < p_\pi$, the results are also similar to those for the symmetric information case, although the relevant ranges of $p_\pi - p_\Delta$ are different. It is still unlikely that sampling will enable settlement for above average claims, but it is somewhat more likely than in the symmetric information case. Also, sampling never enables settlement and sometimes scuttles settlement for below average cases.

B. AN OUTCOME-ORIENTED NORMATIVE ANALYSIS OF SAMPLING IN LIGHT OF ITS OUTCOME EFFECTS

1. Within a Utilitarian Metric

From a utilitarian perspective, the goal is to maximize aggregate utility, or in the version of utilitarianism associated with law and economics, the goal is to minimize social costs. The social costs of procedure include expected error costs and expected process (or administrative) costs. Thus, procedure aims on this view to minimize the sum of expected error and process costs; i.e., to produce more accurate outcomes but not at the price of excessively costly implementation.

More precisely, the social cost of erroneous outcomes is measured in terms of the policies that the substantive law aims to achieve. An error weakens deterrence and thus distorts primary incentives relative to the substantive law ideal. Process costs include the costs of such things as preparing and filing motions, litigating the issues, holding hearings, and deliberating on a decision. From a law-and-economics perspective, a procedure that reduces error risk might require such a large resource investment that the additional process costs outweigh the marginal reduction in error costs.⁴⁸

In *Statistical Adjudication*, I discussed the efficiency case for sampling.⁴⁹ Extrapolating from the sample average makes a great deal of sense on efficiency grounds. First, as long as aggregations are limited to transactionally-related cases, the sample average should do a reasonably good job of inducing efficient incentives. Agents shape their primary conduct in light of expectations, and the sample average is just an expectation measure. Second, insofar as sampling reduces the delay costs that dilute the real value of a damages payment, it should enhance deterrence. Third, using the sample average can reduce the variance

⁴⁸ To complicate matters further, there are two types of error, false negatives (for example, holding an innocent defendant liable) and false positives (for example, exonerating a guilty defendant). See BONE, CIVIL PROCEDURE, *supra* note 42, at 128-32 (explaining the importance of considering these two types of error). If false negatives are more costly than false positives, a rule might reduce the error risk overall and still increase expected error costs if it reduces the less costly type of error and increases the more costly one.

⁴⁹ See Bone, *Statistical Adjudication*, *supra* note 18, at 595-98.

associated with the expected outcome and thus improve incentives for risk-averse defendants.⁵⁰

On the other side of the coin, sampling adds costs of its own. First, the sampling procedure must be implemented—the sampling protocol designed, the cases actually sampled, and the results analyzed—and this adds process costs. Nevertheless, these costs should be relatively small compared to the litigation and trial costs that sampling saves. Second, by speeding up recovery and attracting more lawsuits, sampling could lead to over-deterrence in some cases. For example, the prospect of having to pay claims sooner could create serious cash flow problems for defendants faced with massive potential liability, and this in turn could force otherwise viable and productive companies into bankruptcy. However, as I argued in *Statistical Adjudication*, these concerns are better handled in ways other than delaying the payment of valid claims.⁵¹ Third, sampling can skew litigation incentives across the party line, and skewed incentives are likely to lead to skewed outcomes. However, the asymmetric stakes in ordinary litigation already produce a skewing effect, and the problems sampling creates can be mitigated to some extent by choosing the right sampling protocol. Moreover, the adverse effects might be offset somewhat if the case aggregation made possible by sampling corrects for a litigating power imbalance across the party line.⁵²

I concluded in *Statistical Adjudication* that the litigation cost savings and beneficial incentive effects make a powerful case for sampling from an efficiency perspective. Moreover, in order to minimize the risk of skewed litigation investment incentives, I recommended that courts use a sampling procedure that gives all plaintiffs the sample average and spreads litigation costs evenly over the aggregation. The following discussion extends this analysis by considering effects on settlement and filing incentives more carefully.⁵³

⁵⁰ This is so when the standard deviation of the distribution of possible sample averages, i.e., the SAD, is less than the standard deviation of the distribution of possible trial verdicts, i.e., the IED.

⁵¹ Bone, *Statistical Adjudication*, *supra* note 18, at 596.

⁵² For a discussion of how aggregation reduces skewed litigation investment incentives, see David Rosenberg, *Mass Tort Class Actions: What Defendants Have and Plaintiffs Don't*, 37 HARV. J. ON LEGIS. 393 (2000); Note, *Locating Investment Asymmetries and Optimal Deterrence in the Mass Tort Class Action*, 117 HARV. L. REV. 2665 (2004).

⁵³ I touched on the filing issue in *Statistical Adjudication*, but I gave it only cursory attention. See Bone, *Statistical Adjudication*, *supra* note 18, at 593-94.

First consider settlement. Section A above showed that a switch from individual litigation to sampling is likely to reduce the settlement rate for cases in the aggregation. With a reduced settlement rate, some (perhaps many) cases that would have settled instead incur additional litigation costs and these costs reduce sampling's cost-saving benefits. The magnitude of this effect, however, is uncertain: it depends in part on when sampling takes place and how much individual litigation precedes it. Sampling's adverse effect on settlement can increase costs substantially when the parties must have ample opportunity to invest in litigation of their individual suits between the time they become aware that sampling will take place and the time that the court actually draws the sample. This pre-sampling investment, after all, is a large part of what is saved by an early settlement. The trial judge can control these costs to some extent by managing the litigation to minimize pre-sampling expenditures and by implementing the sampling protocol expeditiously.

Assuming, however, that there is sufficient opportunity before sampling for parties to invest substantially, the adverse effect of sampling on the settlement rate is likely to be significant and should be included in an efficiency analysis.⁵⁴ The total cost of scuttled settlements increases with the size of the aggregation, so larger aggregations will generate higher costs. Of course, the total cost savings from sampling increase as well. Although it seems reasonable to suppose that cost savings will dominate most of the time, it depends on the fraction of cases that would have settled without sampling and the amount of extra investment those cases incur with sampling.

Second consider frivolous and weak suits. Since only the sample cases are tried, undesirable suits can receive the sample average simply by hiding in the aggregation. One might try to deter this strategy by entertaining summary judgment motions in individual suits before sampling, but doing so would increase pre-sampling costs and magnify the adverse settlement effects discussed in the previous paragraph. It is important to bear in mind, however, that the problem of frivolous and weak

⁵⁴ So too should the effect on settlement quality. The Appendix derives the likely settlement amount assuming equal bargaining power. This should be compared to the expected trial award in individual litigation, assuming that the expected trial award is the proper baseline for assessing deterrence and compensation gains.

filings already exists in the absence of sampling.⁵⁵ Large case aggregations tend to settle en-masse and the attorney for the aggregation has an incentive to include frivolous and weak cases in order to inflate the population size and the ultimate settlement. In the end, it is unclear whether or how much sampling exacerbates these already existing problems.⁵⁶

Even if the problems are more serious with sampling, the use of a sampling procedure makes possible new approaches to managing the risk. For example, a judge might refuse to apply the sample average when the sampling procedure yields a large enough fraction of zero or very small sample verdicts. The idea is to deprive frivolous and weak suits of their cover when the sample results signal a serious frivolous suit problem. This approach wastes the process costs invested in sampling whenever the judge refuses to extrapolate, but it could still make sense if it deterred enough frivolous and weak suits. The important point is that sampling can open up new ways to handle the frivolous suit problem.⁵⁷

2. Within a Rights-Based Metric

The analysis is much more complicated and the conclusions more qualified within a rights-based theory and this is one of the chief reasons sampling is so controversial. In *Statistical Adjudication*, I examined two

⁵⁵ See S. Todd Brown, *Specious Claims and Global Settlement*, 42 U. MEM. L. REV. (forthcoming 2012), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1783792; Francis E. McGovern, *Resolving Mature Mass Tort Litigation*, 69 B.U. L. REV. 659, 688 (1989).

⁵⁶ The defendant who anticipates this strategy can try to counter it by offering a smaller aggregate settlement or even refusing to settle outright. One might think that this is an important difference from sampling, which does not give the defendant this type of control. However, the defendant's total liability with sampling is not affected by frivolous and weak suits because the sample average takes account of their presence. It is the meritorious plaintiffs who are hurt, since they receive a sample average diluted by the presence of frivolous and weak suits in the sample mix.

⁵⁷ The literature on statistical techniques for sorting fraudulent from legitimate insurance claims might provide useful insights. See generally Richard A. Derrig, *Insurance Fraud*, 69 J. RISK & INS. 271 (2002) (providing an overview); Patrick L. Brockett, Richard A. Derrig, Linda L. Golden, Arnold Levine & Mark Alpert, *Fraud Classification Using Principal Component Analysis of RIDITs*, 69 J. RISK & INS. 341 (2002) (proposing a statistical technique for sorting claims).

versions of an outcome-oriented, rights-based theory.⁵⁸ One version assumes that legal rights are designed to enforce moral rights. In other words, it looks through the legal right to focus on the moral right that the legal right protects. The other version assumes that legal rights have force as utility-checking rights independent of their underlying justifications. Accordingly, it focuses on the positive legal right that the substantive law creates.

The existence of substantive rights, whether moral or legal in character, necessarily implies the existence of procedural rights. For without procedural rights, substantive rights could be sacrificed on utilitarian grounds—contrary to their status as *rights*—simply by denying the socially costly procedures needed to enforce them.⁵⁹

The core problem for sampling is the same no matter which version of a rights-based theory one adopts. Sampling can produce outcomes for at least some cases that systematically diverge from what moral or legal rights guarantee. This divergence can be justified in a utilitarian theory by relying on the social costs that sampling saves. But this type of justification is not available in a rights-based theory, or at least not available in quite as straightforward a way. A right is supposed to guarantee its holder the treatment it specifies even when the social costs of doing so are high. Thus, it would seem that sampling, by sacrificing substantive rights to achieve social gains, is just what an outcome-based procedural right is meant to prevent.

At first glance, this problem might seem intractable. However, *Statistical Adjudication* explored several ways to address it. In general, there are two possible approaches to addressing the problem. One approach assumes that the use of sampling is a *prima facie* violation of procedural rights, but that the violation is justified when sampling helps to prevent seriously unfair results produced by high litigation costs and protracted delay.⁶⁰ The second approach denies that there is even a *prima facie* violation. It argues that a proper understanding of the rights at stake shows

⁵⁸ Bone, *Statistical Adjudication*, *supra* note 18, at 605-17.

⁵⁹ For an excellent discussion of this point, see RONALD DWORKIN, *Principle, Policy, Procedure*, in *A MATTER OF PRINCIPLE* 72, 93-94 (1985).

⁶⁰ In this approach, the statistical method used must treat all plaintiffs with equal concern and respect and must aim for outcomes that take account of case-specific facts to the extent practically feasible under the circumstances. See Bone, *Statistical Adjudication*, *supra* note 18, at 615-17. The latter constraint might call for a regression analysis in many situations.

that they can make room for sampling, provided that the sampling procedure is properly designed.⁶¹

More generally—and here I expand on my argument in *Statistical Adjudication* to take account of subsequent work—any sensible conception of outcome-based procedural rights must incorporate four factors that together allow for the use of sampling in appropriate circumstances.⁶² First, a sampling procedure generates aggregate liability that closely approximates what the defendant should pay under the substantive law, and it does so regardless of how the total damages are distributed among plaintiffs. The defendant might insist, as defendants do in these cases, that it has a right to contest liability in each individual case, but there is no obvious outcome-based justification for such a right as a normative matter. After all, the defendant's expected loss is the same in both situations. In fact, its total liability is likely to be more accurately measured with sampling.⁶³

Second, it must matter in some way that a plaintiff who obtains a recovery less than her substantive entitlement makes up for the shortfall with the litigation costs that she saves through sampling. One might object that each plaintiff has a right to the remedy that the substantive law guarantees and that this substantive right does not deduct for litigation costs. On this view, any shortfall in recovery would be a reason by itself to condemn sampling on moral grounds. But this view cannot be correct. If it were, severe delay costs would be irrelevant as well. It would be enough that the plaintiff recovered a formal judgment in the right amount even if she did so many decades after her injury.

The reason litigation cost savings matter is that the substantive rights courts enforce are institutional rights and as such take account of the salient features of the institutions in which they operate, including the

⁶¹ In *Statistical Adjudication*, I focus on the nature of the underlying substantive right. I argue for a corrective justice theory of tort law that recognizes a moral right to compensation only for expected loss. Since the sample average measures expected loss, sampling gives each plaintiff exactly what corrective justice requires. *See id.* at 605-15.

⁶² *See, e.g.*, Robert G. Bone, *Procedure, Participation, Rights*, 90 B.U. L. REV. 1011, 1013-18 (2010) [hereinafter Bone, *Procedure, Participation, Rights*]; Robert G. Bone, *Agreeing to Fair Process: The Problem With Contractarian Theories of Procedural Fairness*, 83 B.U. L. REV. 485, 513-16 (2003) [hereinafter Bone, *Agreeing to Fair Process*].

⁶³ This follows from the statistical property that the sample average is very close to the population average. *See supra* note 23 and accompanying text.

courts that enforce them. Accordingly, they take account of the different ways that rightholders obtain redress within the institution of adjudication, including through the litigation costs they save. This point may seem fairly obvious for legal rights, which after all are created with enforcement in mind. But it is also true for moral rights, although in a less obvious way. Courts do not enforce background moral rights directly; they enforce legal rights that instantiate the moral rights institutionally. And those legal rights, as institutional rights, take account of institutional context, including the litigation costs the institution creates.⁶⁴

The third factor goes to the nature of the procedural right itself. Because outcome error is inevitable and because process costs must matter to the amount of procedure any society provides, outcome-oriented procedural rights are most sensibly defined not as rights to some predefined set of specific procedures, but rather as rights to a fair and just distribution of error risk across cases and litigants.⁶⁵ Understood in this way, procedural rights guarantee that each litigant is treated with equal concern and respect in decisions about how error risk is distributed. This means that the overall error risk can be distributed unequally as long as the reasons for doing so accord equal concern and respect to each individual as a substantive-right-holder. Reasons sounding in social utility, standing alone, are too impersonal to meet this condition. However, reasons that focus on how collective gains benefit each individual personally can qualify.

The fourth factor shifts from the rights litigants possess to the duties they owe one another. This is too complex a subject to provide a detailed analysis here. Let me summarize briefly. The American system of litigation is highly adversarial and parties are given broad freedom to control their own lawsuits. These facts might lead one to conclude that the only duties parties owe one another are duties to refrain from obviously objectionable conduct, such as intentionally filing a frivolous suit or imposing costs for the sole purpose of burdening one's opponent. But a closer examination of actual litigation procedure and practice shows that

⁶⁴ This does not collapse moral rights theory into legal rights theory. In contrast to legal rights, moral rights recognize that background moral principles continue to exert independent force on courts. For example, a court has some freedom to adopt a procedure that better implements a moral right even it also distorts the corresponding legal right to some extent.

⁶⁵ See, e.g., Bone, *Procedure, Participation, Rights*, *supra* note 62, at 1015-18; Bone, *Agreeing to Fair Process*, *supra* note 62, at 513-16. This is not the place to parse the content of this right carefully.

the duties of parties are more robust. Indeed, the fact that procedural rights are institutional rights means that parties owe a general duty of fair regard to one another that is tied to what makes adjudication as an institution work fairly for all litigants.⁶⁶

These four factors taken together can justify sampling on outcome quality grounds in a range of circumstances. The defendant's outcome-oriented rights are fully satisfied by a properly designed sampling procedure. Moreover, the plaintiffs' procedural rights are institutional and as a result take account of institutional context, including the reality of high litigation and delay costs. This opens the door to an argument that procedural rights are satisfied for plaintiffs who end up at least as well off net of litigation costs with sampling as without, a group that includes plaintiffs with cases relatively close to the sample mean. As for those plaintiffs with cases further out on the tail of the distribution, they have procedural rights only to equal concern and respect. This means that they are entitled not to specific procedures or a specific result, but rather to a good reason for the outcome they must bear that respects them as individual rightholders. Moreover, they also owe duties of fair regard to others in the aggregation the same as everyone else.

Still, the fact that parties have procedural rights imposes constraints on when sampling can be used. It is not enough, as it is for a utilitarian approach, that sampling reduces net social costs compared to individual litigation. In a rights-based theory, sampling must be a sensible solution to the problem of high litigation costs and long litigation delays and a solution that fits the fact that parties are rightholders.

For example, suppose cost and delay put some litigants at risk of unfair outcomes due only to the (bad) luck of where they happen to end up in the litigation queue. Because one's place in the queue is a matter of luck and no one can make a moral claim to benefit from this luck, it makes sense to evaluate sampling not *ex post*, after queue position is set, but rather *ex ante*, before any plaintiff knows where she is in the queue. From an *ex ante* perspective, all the plaintiffs face an equal chance of filing late and thus an equal chance of suffering unfair delay. Insofar as sampling

⁶⁶ See Robert G. Bone, *The Puzzling Idea of Adjudicative Representation: Lessons for Aggregate Litigation and Class Actions*, 79 GEO. WASH. L. REV. 577, 619, 623-24 (2011) [hereinafter Bone, *The Puzzling Idea*] (arguing that a duty of fair regard is at work when Rule 19 and Rule 23(b)(1)(B) force some plaintiffs to accept outcomes less than what their substantive entitlements guarantee so that other plaintiffs receive minimally fair recovery).

makes aggregation feasible, it responds to this unfairness for each and every plaintiff. That it does so is a justification for its use that accords equal concern and respect to each plaintiff as an individual rightholder.⁶⁷

Thus, as long as sampling does not distort outcomes for high value plaintiffs by too much,⁶⁸ it can be justified as compatible with outcome-oriented procedural rights.

IV. A PROCESS-ORIENTED ANALYSIS

There are reasons to doubt the coherence of a process-oriented participation right in civil adjudication, but I will not discuss those doubts

⁶⁷ A more extreme example is the epidemiological mass tort. *See supra* note 30. The Vioxx litigation is an example. *See In re Vioxx Prod. Liab. Litig.*, No. 05-3700, 2010 U.S. Dist. LEXIS 64388 (E.D. La. June 29, 2010). Vioxx is a drug prescribed for back pain. After Vioxx was on the market for some time, medical research established a statistically significant link to risk of cardiac abnormalities. However, the cardiac events associated with the use of Vioxx are caused by many other factors as well, and Vioxx leaves no signature trace linking it to the injury. As a result, few plaintiffs can marshal the evidence necessary to prove individual causation by a preponderance of the evidence—even though the epidemiological studies show convincingly that the drug is responsible for a significant fraction of cardiac injuries in the population as a whole.

Given this situation, if suits must proceed individually, many deserving plaintiffs would choose not to sue because the chance of success is too small compared to the cost of litigating. Moreover, many of those who did sue would lose on the causation issue. This would result in potentially serious under-enforcement of tort law, which could impair compensation and deterrence goals. One solution is to aggregate the individual suits into a single class action and use sampling to provide an aggregate damage award for the class as a whole. This solution does not deal with the causation-proof problem, which will still produce an aggregate award significantly below what is optimal, but it does deal with the failure-to-sue problem and thus provides some relief to those injured parties who would not otherwise choose to sue. To deal with the causation-proof problem and provide complete relief that holds the defendant fully accountable, one must use the epidemiological studies to craft an aggregate damage award based on the statistical probability of injury overall. But to do this, one must ignore—or at least skirt—doctrinal obstacles in existing tort law.

⁶⁸ This condition would not be satisfied for case populations that have observable features that strongly indicate high variance. Moreover, it might require the use of regression for some aggregations.

here.⁶⁹ Instead, I shall assume that such a right makes sense and briefly explore its implications, just as I did in *Statistical Adjudication*. The discussion in *Statistical Adjudication* explained why a sampling lottery is a just way to distribute participation opportunities when each litigant has a right to his own day-in-court and budget constraints preclude giving everyone a meaningful individual trial.⁷⁰ It also defined the appropriate scarcity conditions for the use of sampling and explored implications for the choice of sampling methodology. In doing the analysis, however, I accepted, for purposes of argument, the Supreme Court's robust version of the right, the so-called right to a personal day in court that guarantees broad freedom to control strategic choices in individual litigation. With a right defined so broadly, it followed that sampling could be used only in relatively narrow circumstances.⁷¹

I now believe that the best account of the day-in-court right, as that right is reflected in settled features of litigation procedure and practice, is much more limited. The particular version of the right that fits the participation opportunities parties actually enjoy falls far short of the relatively unchecked freedom of strategic choice and party control usually associated with the broad version of the day-in-court right.⁷² For example, a plaintiff can be forced to consolidate her case with hundreds, even thousands, of others under the Multi-District Litigation Act.⁷³ The MDL judge often appoints a litigation committee to control litigation strategy on behalf of the group. The result is that attorneys for most plaintiffs have very little, if any, control over litigation strategy. In effect, plaintiffs are forced to accept a group rather than an individual day in court and they are often forced to do so for reasons that sound in efficiency.⁷⁴ Another example is the (b)(3) class action that binds absent class members to achieve judicial economy gains and often does so without giving those

⁶⁹ See Robert G. Bone, *Rethinking the "Day in Court" Ideal and Nonparty Preclusion*, 67 N.Y.U. L. REV. 193, 279-88 (1992) [hereinafter Bone, *Rethinking*] (explaining the reasons for doubt).

⁷⁰ See Bone, *Statistical Adjudication*, *supra* note 18, at 628-50 (arguing that since sampling distributes participation opportunities by lottery, it is justified whenever a lottery is a just distributional device).

⁷¹ *Id.* at 628-34.

⁷² I have described some of these limitations in a recent article. Bone, *The Puzzling Idea*, *supra* note 66, at 614-24.

⁷³ 28 U.S.C. § 1407 (2008); see Bone, *The Puzzling Idea*, *supra* note 66, at 620-22.

⁷⁴ Bone, *The Puzzling Idea*, *supra* note 66, at 620-22.

absentees realistic opportunities to participate.⁷⁵ To be sure, notice must be sent to class members and absentees have a right to opt out, but they are still bound even if notice fails to reach them and even if they do not understand the notice they receive. Moreover, class representatives and the class attorney represent the interests of the class as a whole, not the individual interests of each class member.⁷⁶

These examples and others like them point to a flexible conception of the day-in-court right, one defined by a balance of considerations relevant to assuring that adjudication works fairly and justly for all litigants.⁷⁷ The fact that the day in court is a *right* still rules out routine reliance on minimizing social costs, but as the MDL and class action examples indicate, it does not rule out social cost arguments altogether.

This flexible and institutional conception allows greater room for sampling. To be sure, the right bars routine use of sampling, just as it bars ordinary utilitarian justifications for its use. At the same time, however, sampling might be reconciled with a process-oriented day-in-court right on broader grounds than avoiding serious unfairness. For example, substantial enough litigation cost savings might justify sampling in the same way judicial economy gains sometimes justify truncated participation in MDL and (b)(3) class actions. In fact, the argument for sampling is stronger in some respects than the argument for the class action on process-oriented participation grounds. Sampling allows more individual participation than the class action, since all litigants make some litigation choices before the sampling procedure is implemented.⁷⁸ Also, sampling can be designed to guarantee even more participation, although doing so increases costs. For example, each party in the larger aggregation might be given a chance to object to the sampling protocol before implementation, and perhaps to

⁷⁵ *Id.* at 592-95.

⁷⁶ *Id.*

⁷⁷ For a more extensive discussion, see *id.* at 615-17.

⁷⁸ In fact, there are notable similarities between sampling and the class action. Sample cases usually share many common questions with cases not chosen for the sample. Moreover, the plaintiffs in non-sample cases should be able to point to a case in the sample that is typical of their own, at least if the overall aggregation is not too heterogeneous and the sample is large enough. In addition, there is no reason to believe that the sample cases would not be litigated vigorously or that lawyers litigating those cases would sell out the aggregation, at least no more reason than already exists without sampling.

argue against application of the sample average to her particular case afterward.⁷⁹

It is important to be clear, however, that squaring sampling with process-oriented participation is only one step in justifying its use. As discussed in Part II above, sampling must also pass an outcome-oriented analysis under a utilitarian or rights-based metric. Furthermore, if there is any sense to the methodological legitimacy critique, sampling must be justified separately on legitimacy grounds as well. Part IV addresses this last topic.

V. THE METHODOLOGICAL LEGITIMACY OBJECTION

To set the stage for the legitimacy objection, imagine that the defendant and all the plaintiffs genuinely consent to the use of a sampling procedure and their consent is their own and not just their attorney's.⁸⁰ Also, assume that the sampling procedure is carefully designed to generate a reliable expected outcome for the population of cases as a whole, and suppose too that it significantly reduces litigation costs and does not adversely affect third parties. In other words, sampling in our hypothetical preserves deterrence benefits without harming others and does so at a significantly lower cost than individual litigation. Is there any reason left to object to it?

Many people—and I count myself among them—would answer no. Nevertheless, one has reason to feel a bit uneasy. After all, deciding cases by extrapolating from a sample is a rather strange way to do adjudication. In the traditional ideal, judges focus on the facts of each individual case

⁷⁹ There is one more potential obstacle to sampling: the jury trial right. *See, e.g., Cimino v. Raymark Indus., Inc.*, 151 F.3d 297, 319-21 (5th Cir. 1998) (holding that trial judge's sampling plan violates the defendant's Seventh Amendment jury trial right). Sampling provides jury trials only for the sample cases. Still, if the sample is large enough, each case in the larger aggregation should have at least one case in the sample that is very similar to it and tried to a jury. Moreover, it is not clear that jury trial must be extended to each separate party. After all, the class action binds absent class members without giving them an individual jury trial, and offensive nonmutual issue preclusion can bind a party to a judge decision in a case where that party would otherwise be entitled to a jury trial. *See Parklane Hosiery Co. v. Shore*, 439 U.S. 322, 333-37 (1979). I leave an analysis of the jury trial objection for another occasion.

⁸⁰ Suppose the parties prefer a speedier resolution at a lower cost.

and reason from those facts to a decision for that case.⁸¹ There are exceptions, of course—the class action being the most notable—but the fact that these are exceptions, and some of them rather controversial, tends to prove the general rule.

This uneasiness with sampling might just be a result of unfamiliarity with its use, but I suspect that more is involved. For example, some critics of large-scale aggregation object to procedures like sampling because they believe that aggregative procedure is somehow at odds with what adjudication is about as an institution.⁸² This type of objection might be about adverse effects on outcome-based rights or process-based individual participation, already dealt with in Parts II and III above.⁸³ But it is also possible that the objection runs deeper, that it rests on a view that aggregative procedures like sampling are institutionally incompatible with civil litigation because they force courts to act in ways that are foreign to adjudication.

To illustrate this point, consider the Supreme Court's gratuitous indictment of sampling as "Trial by Formula" in the recent *Wal-Mart* case.⁸⁴ The Court's explicit argument invoked Wal-Mart's supposed entitlement to "litigate its statutory [Title VII] defenses to individual claims", noted that sampling abridges this entitlement, and concluded that sampling violates the Rules Enabling Act for this reason.⁸⁵ This argument

⁸¹ By the traditional ideal, I mean something like Professor Chayes's traditional model of litigation. See Abram Chayes, *The Role of the Judge in Public Law Litigation*, 89 HARV. L. REV. 1281 (1976) (describing two polar models of litigation—traditional and public law).

⁸² See, e.g., MARTIN H. REDISH, *WHOLESALE JUSTICE: CONSTITUTIONAL DEMOCRACY AND THE PROBLEM OF THE CLASS ACTION LAWSUIT* (2009). I also suspect that objections based on the symbolic or expressive value of individual trial fall into this category. See, e.g., Laurence H. Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 HARV. L. REV. 1329, 1391-93 (1971). These objections tend to focus on the institutional benefits of individualized procedure rather than on party rights.

⁸³ For example, Professor Redish invokes the right to individual participation and fits it into a broader theory of democratic legitimacy. He argues, in effect, that many uses of the class action do violence to democratic legitimacy because they deprive class members of the right to individually litigate their own claims, a right that instantiates democratic participation in adjudication. See REDISH, *supra* note 82.

⁸⁴ *Wal-Mart Stores, Inc. v. Dukes*, 131 S. Ct. 2541, 2561 (2011).

⁸⁵ *Id.*

is weak and not well defended in the case.⁸⁶ Moreover, the Court could have made the argument perfectly well without going out of its way to take a gratuitous rhetorical swipe at sampling.

The Court's use of the phrase "Trial by Formula" suggests a strong aversion to sampling on the ground that it substitutes a statistical formula for an individual trial. But why is the use of a formula such a problem? We can only guess at the answer. It is difficult to see how it can be about bad outcomes or about participation rights that the parties would otherwise have exercised. Wal-Mart has no legitimate reason to complain about the outcome. This is because a properly designed sampling procedure will generate a total amount of backpay damages for the class that closely approximates Wal-Mart's aggregate liability—perhaps even more closely than individual trials.⁸⁷ Moreover, although Wal-Mart is not able to litigate its defense to each individual suit with sampling, it does get to participate fully in each sample case.⁸⁸ Furthermore, because each plaintiff probably has too little backpay at stake to justify an individual suit, all plaintiffs share a strong interest in aggregate resolution, which can be accomplished only through some type of aggregate procedure like sampling. So neither outcome quality nor participation rights seem capable of providing an answer to our question. But there is another possibility. Perhaps the Court believes that sampling just does not belong in adjudication because it

⁸⁶ For example, although Title VII recognizes a *substantive* right to individual defenses against backpay awards, it is not clear that the statute also confers a right to litigate those defenses individually. If it does not, it is unclear what "substantive right" is being "abridged . . . or modified" within the meaning of the Rules Enabling Act. 28 U.S.C. § 2072(b) (2006).

⁸⁷ To be sure, the averaging effect of sampling almost certainly will give some class members a smaller, and some a larger, backpay award than their substantive entitlements guarantee, but that does not affect Wal-Mart. It is also worth noting that, while the Court does not refer to the rights of class members, the distribution of backpay among class members can be justified from a rights-based perspective. The typical backpay amount would not support an individual suit and the possibility of qualifying for a (b)(3) class action is remote without the use of sampling. Thus, one can argue that all plaintiffs have an interest in sampling so they can recover at least some backpay award.

⁸⁸ Also, any claim that Wal-Mart might have to process-based participation must take account of the adverse effect on the participation rights of class members, most of whom would probably not be able to bring their backpay claims at all without sampling. Indeed, it is fairly obvious that Wal-Mart seeks individual litigation precisely because it is likely to discourage the pursuit of individual backpay claims.

involves trying cases with a “formula” and not attending individually to the facts of each case.

In any event, I believe that the institutional argument has sufficient intuitive appeal that it should be addressed separately. Even if judges and scholars do not invoke it explicitly, they could still be influenced by it implicitly while formulating their express objections on outcome quality or participation grounds.⁸⁹ In a world of institutional differentiation and specialization, the legitimacy of an institution depends in large part on the presence of structural elements that fit the institution’s distinctive purpose and function.⁹⁰ Following this logic, critics of sampling might say that the function of courts is to decide individual claims of right and that traditional litigation procedure is essential to this function and thus essential as well to the institution’s legitimacy.

I shall refer to this type of argument as the “methodological legitimacy objection” since it focuses on legitimacy and supposes that legitimacy depends on the method used to decide a case. To get a clearer grasp on the nature of the argument, let us consider a more obvious example than sampling. Most people bristle at the idea that a judge would decide an issue by flipping a coin, and they are likely to object even though the issue is in equipoise, each side has an equal chance to win, and no third parties are harmed.⁹¹ The objection is that flipping a coin is simply not a

⁸⁹ In particular, judges might be more willing to embrace an argument that sampling violates outcome-based rights or infringes a litigant’s due process right to a personal day in court because they also believe that sampling is simply not what adjudication is about.

⁹⁰ For example, the legitimacy of the legislative process depends on a voting system that facilitates public participation and, in theory at least, assures representative accountability to electorate preferences. This voting system adds legitimacy because it fits the function of legislation in a way that accommodates democratic values. However, voting would contribute nothing to legitimacy if the legislature were suddenly enlisted to adjudicate individual cases as well. In fact, many would deem it illegitimate for a legislature to take on the function of adjudication, even if the parties agreed and even if all the legislators wanted to do it.

⁹¹ See, e.g., *In re Brown*, 662 N.W.2d 733, 736 (Mich. 2003) (judge censured for flipping a coin when neither side’s argument was more persuasive); Adam M. Samaha, *Randomization in Adjudication*, 51 WM. & MARY L. REV. 1, 28-29 (2009) (providing several examples). The hypothetical assumes that the decision is not subject to a burden of persuasion that would break the tie. To make the situation more concrete, imagine that the issue is committed entirely to the judge’s discretion. It is worth pointing out though that the preponderance-of-the-evidence

proper decision procedure for adjudication. If pressed to explain why, a critic would probably focus on the close link between adjudication and case-specific deliberation.⁹² She might argue that judges are supposed to decide cases by reasoning through the implications of general rules and principles on the facts of the particular case and that this mode of reasoning is essential to adjudication's legitimacy.⁹³

It is important to be clear about the nature of this objection. It has nothing necessarily to do with adverse effects on the substantive or procedural rights of the parties. Moreover, neither coin flipping nor sampling is an arbitrary decision procedure.⁹⁴ A judge can have a very good reason to use either method. For example, flipping a coin can be justified on moral grounds when it is impossible to tell which party is correct and both have equally strong substantive entitlements.⁹⁵ So too, sampling makes sense when the sheer volume of cases produces serious problems for individual litigation, as previously discussed.

The methodological legitimacy objection, I believe, has to do with the fact that sampling, like coin flipping, disables the usual reasoning process at the point of actual decision. The judge relies exclusively on a statistical method rather than applying rules and principles to the facts of each specific case. Still, the question remains why this is an illegitimate method when the judge can provide a sensible reason for using it. The

persuasion burden, as a general rule for breaking ties, is itself based on statistical generalizations about broad categories of cases.

⁹² See Shay Lavie, *Reverse Sampling: Holding Lotteries to Allocate the Proceeds of Small-Claims Class Actions*, 79 GEO. WASH. L. REV. 1065, 1084-85 (2011) (arguing that people oppose lotteries because they substitute luck for reason, and quoting the N.Y. Commission on Judicial Conduct in *In re Friess*, ANNUAL REPORT OF THE NEW YORK STATE COMMISSION ON JUDICIAL CONDUCT 88 (1984), for the proposition that: "The public has every right to expect that a jurist will carefully weigh the matters at issue and . . . render reasoned rulings and decisions.").

⁹³ See generally JON ELSTER, SOLOMONIC JUDGMENTS 38 (1989) (emphasizing that "the use of lotteries to resolve decision problems under uncertainty presupposes an unusual willingness to admit the insufficiency of reason.").

⁹⁴ Cf. *id.*, at 102 (noting that randomness in legal decisions is often associated with arbitrariness or whimsy).

⁹⁵ See generally Lewis A. Kornhauser & Lawrence G. Sager, *Just Lotteries*, 27 RATIONALITY & SOCIETY 483, 495-505 (1988) (discussing equal entitlement and scarcity conditions for using the lottery as an exclusive or nonexclusive method of allocation and noting that using the lottery under these conditions is supported by reasons).

answer must be that the application of reason at the point of case-specific decision is a fundamental aspect of adjudication that neither the parties nor the judge can change without risking the institution's legitimacy.

It is quite common to view adjudication as intimately tied to a special reasoning process that combines general principles with case-specific facts.⁹⁶ For example, Lon Fuller characterized common law reasoning in this way. He described a decision process that closely resembles the method of reflective equilibrium.⁹⁷ Roughly, judges interpret the law by placing existing legal principles and norms alongside the facts of the particular case. The judge moves back and forth between her best understanding of the law and whatever moral or practical intuitions the facts generate, adjusting law and intuition until they fit together in reflective equilibrium.

However, even if this account of adjudicative reasoning is correct, as I believe it is, there remains the question why exceptions are not permitted when they respond in a sensible way to serious litigation problems. One possible reason to worry about exceptions has to do with public perception. The concern on this account is that the public will lose faith in the legitimacy of adjudication if judges employ unfamiliar methods to resolve cases. But this concern is exaggerated and ultimately unpersuasive. For one thing, public perceptions are malleable. For example, the public might accept coin flipping as legitimate in a particular case if they knew that the parties requested it and understood that it was supported by good reasons. In addition, public perception is circular. People tend to equate what is legitimate with what is familiar.⁹⁸ If judges routinely flip coins, for example, public opinion could shift toward accepting coin flipping as a proper decision method. Finally, it is simply implausible that the public would give up on the court system just because judges

⁹⁶ See, e.g., RONALD DWORKIN, *LAW'S EMPIRE* 225-75 (1986); Lon L. Fuller, *The Forms and Limits of Adjudication*, 92 HARV. L. REV. 353, 372-81 (1978).

⁹⁷ See Robert G. Bone, *Lon Fuller's Theory of Adjudication and the False Dichotomy Between Dispute Resolution and Public Law Models of Litigation*, 75 B.U. L. REV. 1273 (1995) (describing Fuller's views in terms of reflective equilibrium). On the method of reflective equilibrium more generally, see JOHN RAWLS, *A THEORY OF JUSTICE* 42-45 (rev. ed. 1999).

⁹⁸ The other alternative is to base their opinion on what they believe courts *should do*. But in that case, it is not the perception that matters, but the underlying normative theory that supports the perception.

occasionally used sampling to decide large case aggregations, especially if they also provided good reasons for doing so.⁹⁹

This leaves only one reason I can think of for worrying about exceptions. This has to do with the adverse effect of occasional use on the quality of adjudicative decisions over the long run. The concern is that allowing some exceptions will invite more exceptions and send adjudication down a slippery slope, transforming the institution in undesirable ways. This concern might have force for coin flips. Maybe a few coin flips would not be a problem, but if judges became accustomed to flipping coins, they might relax constraints on its use and make coin flipping a more general practice. Also, a judge faced with a difficult decision might be tempted to give up too soon and resort to flipping a coin when a more careful analysis would show that a reasoned decision is feasible. This could be particularly problematic if hard cases are the ones where principled decision is most valuable for the development of the law.

Whatever merit it might have for coin flips, this slippery slope argument is much less convincing for sampling. No matter how frequently sampling is used, there will always be sample cases decided in the ordinary way. Thus, judges never completely escape individualized decisions. Moreover, there is no reason to believe that *every* case must be adjudicated individually in order to produce good common law rules and principles or sound interpretations of statutes or constitutional provisions. Finally, the use of sampling is limited to large case aggregations and requires much more deliberation and preparation than coin flipping. Thus, the slippery slope is a lot less slippery for sampling than for coin flipping.

In sum, it is not at all clear that the methodological legitimacy objection has force against a well-justified use of sampling in mass tort aggregations. Sampling is sufficiently different from coin flipping even though both employ probabilistic techniques and randomized decision procedures.

⁹⁹ There is a closely related argument that deserves brief mention. According to this argument, adjudication has social value as a symbol of our collective commitment to principled reason in government and that this symbol's message would be diluted if judges flipped coins or used sampling. Even if the premise is true, the conclusion does not necessarily follow. I find it rather far-fetched to believe that the message would be lost if judges sometimes used sampling. Indeed, the fact that sampling is itself supported by good reasons should reinforce the message of reason's importance in government.

VI. CONCLUSION

Sampling is an extremely useful tool for litigating large aggregations of cases. Squaring it with adjudication, however, raises a number of complicated normative questions. In this Article and in my earlier work, I have attempted to address three types of challenges: challenges directed to sampling's effect on outcome quality, challenges directed to its effect on process-based participation, and challenges based on sampling's supposed incompatibility with adjudication's distinctive mode of decisionmaking.

In the end, sampling can be justified in many more situations than courts currently apply it, and society is paying a very high price for ignoring this insight. Courts should be more receptive to the benefits of sampling and judges should engage the task of justifying its use more carefully. The system of adjudication would be much the better for it.

APPENDIX

This Appendix models the settlement decision under a no-sampling regime and under two different sampling scenarios. The point is to show that sampling can often reduce the likelihood of settlement and skew the settlement amount.

The analysis considers settlement incentives before any cases are actually sampled on the assumption that all parties know that sampling will take place and also know the court's sampling protocol. I consider the results when each plaintiff controls her own settlement decision, and then when an attorney representing all plaintiffs in the case aggregation on contingency makes the settlement decision in her own self-interest.

I. MODEL AND TERMINOLOGY

Let N be the total number of cases in the aggregation. Let α be the fraction of cases that will be sampled. So αN is the number of cases in the sample. Assume that each case has a single plaintiff and a single defendant and that the plaintiffs are all different but the defendant is the same. Suppose there are two types of claims in the aggregation, high-value claims (H) and low value claims (L). To simplify the analysis, assume that these two types of claims vary only with respect to the amount of damages and not the objective likelihood of plaintiff's success.¹⁰⁰ Let w^H and w^L be the damages for a high-value and a low-value claim, respectively.

Suppose that the plaintiffs and the defendant know w , but disagree about plaintiff's likelihood of success in proving liability or damages, or both, at trial. This type of disagreement can occur, for example, when there is asymmetric information so that one party has information about the claim not yet known to the other side. Assume all the plaintiffs share the same estimates of likely success, which we shall denote p_π . Let p_Δ be the defendant's estimate of plaintiff's likelihood of success and assume that it is the same for all the cases.¹⁰¹

¹⁰⁰ This is just for purposes of simplification. One can also vary likelihood of success and get similar qualitative results.

¹⁰¹ Therefore, the parties might have different information about liability or they might view generally known evidence of liability differently. Alternatively, they might agree on the probability of liability but disagree on the likely fraction of full damages that the plaintiff will be able to prove. In this case, p can be

Now let β be the fraction of high-value claims in the aggregation. Also, let C_P be each plaintiff's cost of litigating her individual case all the way through trial and let C_D be the defendant's cost.¹⁰² To simplify the analysis, assume that the parties have equal bargaining power in settlement negotiations, so they split the settlement surplus evenly.¹⁰³ Finally, it will be convenient to have a variable to denote the average damage amount over the entire class. Let v be this average, so $v = \beta w^H + (1-\beta)w^L$.

It is worth noting that the assumption that both parties know whether a case is high or low value – and therefore agree on w – is rather strong. It is more realistic to assume that the plaintiff has private information about the value of w for her particular case. Nevertheless, the strong assumption simplifies the analysis and conveys the essential insight. In footnotes, I explain why the results are likely to be similar when information about w is asymmetric.¹⁰⁴

II. THE NO-SAMPLING BASELINE

First, we need to determine the results in a litigation world without sampling. These results will serve as a baseline against which to compare the impact of sampling.

A. PLAINTIFFS CONTROL SETTLEMENT DECISION

Suppose that each plaintiff makes the decision whether to settle and for how much. Without sampling, the conditions for settlement being feasible for a high-value and a low-value claim, respectively, are:

$$\begin{aligned} p_{\Delta}w^H + C_D &\geq p_{\pi}w^H - C_P \\ p_{\Delta}w^L + C_D &\geq p_{\pi}w^L - C_P \end{aligned}$$

interpreted as the probability of success on liability times the fraction of a full damage recovery the plaintiff is likely to receive.

¹⁰² For simplicity, I assume that C_P and C_D are the same for high-value and low-value claims. I could relax this assumption, but it would complicate the analysis unnecessarily.

¹⁰³ We could generalize by letting γ be the plaintiff's relative bargaining power; that is, γ would be the fraction of the settlement surplus that the plaintiff can capture. In this model, I set $\gamma = 0.5$.

¹⁰⁴ See *infra* notes 105-108, 110.

These are just the standard settlement feasibility conditions. The defendant's expected trial loss must be greater than or equal to the plaintiff's expected trial gain for the defendant to be willing to offer a settlement that the plaintiff is willing to accept.

Rearranging, we get:

$$(\mathbf{p}_\Delta - \mathbf{p}_\pi)\mathbf{w}^H + C_P + C_D \geq 0 \quad (1)$$

$$(\mathbf{p}_\Delta - \mathbf{p}_\pi)\mathbf{w}^L + C_P + C_D \geq 0 \quad (2)$$

The expression on the left hand side is the settlement surplus, which must be nonnegative for settlement to be feasible.¹⁰⁵

When bargaining power is equal, as we assume it is, the expected settlement is likely to be at the midpoint of the settlement range. Letting S^{H*} and S^{L*} be the expected settlement for a high-value and a low-value case, respectively, we have:

$$S^{H*} = (\mathbf{p}_\pi + \mathbf{p}_\Delta)\mathbf{w}^H/2 + (C_D - C_P)/2 \quad (3)$$

$$S^{L*} = (\mathbf{p}_\pi + \mathbf{p}_\Delta)\mathbf{w}^L/2 + (C_D - C_P)/2 \quad (4)$$

B. ATTORNEY FOR ALL PLAINTIFFS CONTROLS SETTLEMENT DECISION AND SETTLES EN MASSE

Now assume that all the plaintiffs in the aggregation are represented by the same attorney, who is hired on contingency with a contract that specifies a contingency percentage of r . Suppose that the attorney only settles en masse and that she makes the settlement decision to maximize her own fee; in other words, assume that agency costs are high.

¹⁰⁵ Suppose instead that information about w is asymmetric: the plaintiff knows whether her case is high or low value, but the defendant only knows the background fraction, β , of high value claims. In this situation, the defendant will assign the average value, v , to all cases. Let $z^H = w^H - v$ and $z^L = v - w^L$. Then the conditions for settlement being feasible without sampling, for a high-value and a low-value claim, respectively, are:

$$(\mathbf{p}_\Delta - \mathbf{p}_\pi)\mathbf{w}^H - \mathbf{p}_\Delta z^H + C_P + C_D \geq 0$$

$$(\mathbf{p}_\Delta - \mathbf{p}_\pi)\mathbf{w}^L + \mathbf{p}_\Delta z^L + C_P + C_D \geq 0$$

Thus, the settlement surplus differs from the symmetric information case by a factor equal to the amount by which the true value of w differs from the average value, discounted by \mathbf{p}_Δ .

The smallest settlement the attorney will accept, S , is one that makes her indifferent between settling or going to trial. This condition is: $rS = np_{\pi}v - nC_p$. Thus, the attorney's minimum settlement demand is:

$$np_{\pi}v - nC_p/r$$

The most the defendant is willing to offer is a settlement that makes it indifferent between settling and going to trial. Therefore the defendant's maximum offer for the whole aggregation is:

$$np_{\Delta}v + nC_D$$

The feasibility condition for settlement if settlement takes place en masse is:

$$np_{\Delta}v + nC_D - np_{\pi}v + nC_p/r \geq 0$$

Simplifying, we get:

$$(p_{\Delta} - p_{\pi})v + C_p/r + C_D \geq 0 \quad (5)$$

And S^* for an en masse settlement with attorney control is:

$$S^* = n[(p_{\pi} + p_{\Delta})v + C_D - C_p/r]/2 \quad (6)$$

III. WITH SAMPLING

The parties' expectations change with sampling. A plaintiff knows that if she is chosen for the sample, she will receive either her own trial verdict or the sample average depending on the sampling protocol – and the defendant knows the same thing. If the sample plaintiffs' costs are shared equally by all plaintiffs, then each plaintiff's litigation costs are the same and equal to αC_p . However, if sample plaintiffs must pay their own litigation costs, then the litigation costs for each of the sample plaintiffs are C_p and the litigation costs for each of the remaining plaintiffs are 0.

Let us assume that the defendant in all the scenarios averages total litigation costs for the sampled cases over all the cases in the aggregation. It follows that the defendant's anticipated litigation costs are the same for all cases; namely αC_D .

The following discussion analyzes only Scenarios I and II. The other two scenarios can be analyzed in the same way.

A. SCENARIO I: SAMPLE PLAINTIFFS RECEIVE SAMPLE AVERAGE AND COSTS ARE SHARED EQUALLY

1. When the Plaintiffs Control the Settlement Decision

a. *Effect on Settlement Feasibility*

With these assumptions in place, we can set forth the feasibility conditions for settlement before any sample is chosen. In Scenario I, all the plaintiffs get the sample average and share the sample plaintiffs' litigation costs equally. Therefore, a plaintiff's expected value of litigating through trial when she knows sampling will take place is: $p_{\pi}v - \alpha C_P$. The defendant's expected loss is: $p_{\Delta}v + \alpha C_D$. Therefore, the feasibility condition for settlement in Scenario I is:

$$(p_{\Delta} - p_{\pi})v + \alpha(C_P + C_D) \geq 0 \quad (7)$$

Given this, let us examine whether the use of sampling is likely to reduce, increase, or leave unaffected the likelihood of settlement compared with the no-sampling baseline. To determine this, we must compare (7) with (1) and (2). It is useful to consider cases where $p_{\Delta} \geq p_{\pi}$ and cases where $p_{\Delta} < p_{\pi}$ separately.

First, suppose $p_{\Delta} \geq p_{\pi}$. Comparing (1) and (2) with (7), it is easy to see that settlement is feasible for all cases with and without sampling. However, sampling might affect the probability of successful settlement for high value and low value claims. For high value claims, sampling reduces the settlement surplus. This follows directly from the fact that $v < w^H$ and $\alpha < 1$. Whether this is likely to reduce or increase the frequency of settlement depends on how the size of the surplus affects the likelihood of settlement. One view is that a larger surplus creates more points of potential agreement for the parties, which makes settlement more likely. Another view is that a larger surplus invites harder bargaining because there is more to gain, which makes settlement less likely. Under the first view, sampling is likely to reduce the probability of settlement for high-value claims. Under the second view, it is likely to increase the probability.

For low-value claims, the effects depend on the magnitude of $p_{\Delta} - p_{\pi}$. In particular, using sampling increases the surplus if $p_{\Delta} - p_{\pi} > (1 - \alpha)(C_P + C_D)/(v - w^L)$, which is, after rearranging, $\alpha > 1 - [(p_{\Delta} - p_{\pi})(v - w^L)/(C_P + C_D)]$. For any realistic α , such as a 10% or 15% sample size, this condition is not likely to be satisfied unless $v > w^L$, which

in turn is not likely unless $w^H > w^L$. It follows that using sampling is likely to reduce the settlement surplus for most low-value cases as well.¹⁰⁶

Second, suppose $p_\Delta < p_\pi$. When this condition holds, some cases that can settle without sampling cannot settle with sampling. To see this point, note that the following two conditions must be satisfied if a case can be settled without sampling but not with sampling, if the claim is high value:

$$\begin{aligned}(p_\Delta - p_\pi)w^H + C_P + C_D &\geq 0 \\ (p_\Delta - p_\pi)v + \alpha(C_P + C_D) &< 0\end{aligned}$$

Let $q = p_\pi - p_\Delta$. Solving for q in each inequality and putting the inequalities together, we get:

$$\alpha(C_P + C_D)/v < q \leq (C_P + C_D)/w^H$$

For this to be possible, $\alpha(C_P + C_D)/v < (C_P + C_D)/w^H$, which implies that $\alpha < v/w^H$.

Therefore, for high-value claims with $p_\Delta < p_\pi$ (i.e., $q > 0$), the case can settle without sampling but not with sampling if and only if:

$$\alpha < v/w^H, \text{ and}$$

$$\alpha(C_P + C_D)/v < q \leq (C_P + C_D)/w^H$$

If $q \leq \alpha(C_P + C_D)/v$, then the case can settle with or without sampling, and if $q > (C_P + C_D)/w^H$, then the case cannot settle whether or not sampling is used.

¹⁰⁶ The results are a bit different when information about w is asymmetric. See *supra* note 105. One must compare (7) with $(p_\Delta - p_\pi)w^H - p_\Delta z^H + C_P + C_D$ for high-value claims and with $(p_\Delta - p_\pi)w^L + p_\Delta z^L + C_P + C_D$ for low-value claims. When $p_\Delta > p_\pi$, it is theoretically possible for sampling to enable settlement for high value claims (but never for low value claims) when settlement is not otherwise feasible. For this to hold true for a high value claim, two conditions must be satisfied:

$$\begin{aligned}(p_\Delta - p_\pi)w^H - p_\Delta z^H + C_P + C_D &< 0 \text{ and} \\ (p_\Delta - p_\pi)v + \alpha(C_P + C_D) &\geq 0\end{aligned}$$

The latter condition is always satisfied and the former is satisfied if $z^H > [(p_\Delta - p_\pi)w^H + C_P + C_D]/p_\Delta$. In other words, the case must be quite far out on the tail of the distribution before sampling enables settlement.

The opposite result—i.e., that sampling makes settlement feasible—is also possible but highly unlikely for most aggregations. It can be easily shown that for sampling to enable settlement when it would not otherwise occur, the following condition must be satisfied: $(C_p + C_D)/w^H < q \leq \alpha(C_p + C_D)/v$. This condition can hold only if $\alpha > v/w^H$. But this constraint on α (the sample size) is not likely to hold for most aggregations. As long as the standard deviation of the aggregation is not unusually large, v/w^H will be a reasonably large fraction and no court is likely to sample a large fraction of cases from the aggregation.¹⁰⁷

One can do the same analysis for low-value claims. It is easy to see that the switch to sampling can never make settlement possible for a low-value claim if it is not possible without sampling. This is because $(p_\Delta - p_\pi)v + \alpha(C_p + C_D) < (p_\Delta - p_\pi)w^L + C_p + C_D$ whenever $p_\Delta < p_\pi$ (since $v > w^L$). However, the switch to sampling scuttles settlement for low-value cases whenever $\alpha(C_p + C_D)/v < q \leq (C_p + C_D)/w^L$.¹⁰⁸

To summarize, we have the following two results for cases where $p_\Delta < p_\pi$:

- For realistic values of α and aggregations that are not too widely dispersed about the mean, switching from no-sampling to sampling never turns a case that cannot settle into one that can.
- More importantly, using sampling turns some cases that can settle into ones that cannot. These are cases where $\alpha(C_p + C_D)/v < q \leq (C_p + C_D)/w^i$ ($i = H$ or L).

¹⁰⁷ When information about w is asymmetric, similar results obtain. *See supra* note 105. It is easy to derive the parallel conditions for sampling to scuttle settlement for high value claims, assuming $p_\Delta < p_\pi$:

$$\alpha < [1 - p_\Delta z^H / (C_p + C_D)]v/w^H, \text{ and} \\ \alpha(C_p + C_D)/v < q \leq (C_p + C_D - p_\Delta z^H)/w^H$$

If $\alpha > [1 - p_\Delta z^H / (C_p + C_D)]v/w^H$, there is a range of q for which sampling enables settlement of high value claims, just as for the symmetric information case. However, as long as $p_\Delta z^H / (C_p + C_D)$ is relatively small, α is very unlikely to exceed this threshold and sampling will only scuttle settlement of high-value claims.

¹⁰⁸ Similar results obtain for low-value claims when information about w is asymmetric. Sampling never enables settlement no matter what α is. Moreover, sampling scuttles settlement when $\alpha(C_p + C_D)/v < q \leq (C_p + C_D + p_\Delta z^L)/w^L$.

To give a concrete example of the second result, suppose a high-value claim is worth \$1,000,000 and a low-value claim is worth \$600,000 and 20% of the aggregation is high-value claims. Suppose $C_P = C_D = \$150,000$, and a 10% sample is used, so $\alpha = 0.1$. Then $v = .2 \times 1,000,000 + .8 \times 600,000 = 680,000$, and $v/w^H = 0.68$. Therefore, the condition $\alpha < v/w^H$ is satisfied (and, of course, $\alpha < v/w^L$ for all α , since $v/w^L > 1$). In this case, $\alpha(C_P + C_D)/v = 30,000/680,000 = .044$. For high-value claims, $(C_P + C_D)/w^H = 300,000/1,000,000 = 0.3$. For low-value claims, $(C_P + C_D)/w^L = 300,000/600,000 = 0.5$. Assume $p_\Delta < p_\pi$. If the difference between the plaintiff's and defendant's estimates of p is between 0.044 and 0.3, using sampling will turn all claims into ones that cannot settle.

b. *Effect on Settlement Amount*

Next, consider the effect of sampling on the expected settlement amount. Assuming equal bargaining power, so the parties split the surplus evenly, the expected settlement amount with Scenario #1 is:

$$S^* = [(p_\pi + p_\Delta)v + \alpha(C_D - C_P)]/2 \quad (8)$$

We must compare (8) with (3) and (4). It is easy to see that sampling always reduces the settlement amount of high-value claims – from $[(p_\pi + p_\Delta)w^H + (C_D - C_P)]/2$ to $[(p_\pi + p_\Delta)v + \alpha(C_D - C_P)]/2$. Sampling also increases the expected settlement for low-value claims if $\alpha > 1 - [(p_\pi + p_\Delta)(v - w^L)/(C_D - C_P)]$, which should (almost) always hold true.

2. When the Attorney Controls the Settlement Decision and Settles En-Masse

a. *Effect on Settlement Feasibility*

The condition for a feasible settlement under Scenario I when the attorney is in control is:

$$(p_\Delta - p_\pi)v + \alpha(C_P/r + C_D) \geq 0 \quad (9)$$

We must compare (9) with (5). Doing so yields the following results:

- If $p_\Delta \geq p_\pi$, the aggregation can settle en-masse with and without sampling, but the surplus is less with

sampling. The surplus is $(p_{\Delta} - p_{\pi})v + C_p/r + C_D$ without sampling and $(p_{\Delta} - p_{\pi})v + \alpha(C_p/r + C_D)$ with sampling.

- If $p_{\Delta} < p_{\pi}$, then for all α (with $q = p_{\pi} - p_{\Delta}$), a case that cannot settle without sampling cannot settle with sampling. But there are cases where settlement is scuttled with sampling. These are cases where $\alpha(C_p/r + C_D)/v < q \leq (C_p/r + C_D)/v$.¹⁰⁹

To illustrate, consider the same example as we analyzed above: $w^H = \$1,000,000$; $w^L = \$600,000$; 20% of the aggregation is high-value claims; $C_p = C_D = \$150,000$, $\alpha = 0.1$, and $v = 680,000$. Assume $r = 0.25$, which is roughly the average contingency recovery in large aggregations. Then $C_p/r + C_D = 750,000$.

If $p_{\Delta} \geq p_{\pi}$, then settlement is always possible, but sampling reduces the size of the surplus by \$675,000. This is a significant amount given that v is \$680,000. For example, suppose $p_{\Delta} - p_{\pi} = 0.4$. Then the surplus falls from \$1,022,000 to \$347,000.

If $p_{\Delta} < p_{\pi}$, then using sampling will turn cases that can settle into cases that cannot whenever $0.11 < q \leq 1$. Therefore, as long as the divergence in estimates is large enough, every such case will turn from feasible to impossible to settle when sampling is used.

b. *Effect on Settlement Amount*

The expected en masse settlement under Scenario I with the attorney in control is:

$$S^* = n[(p_{\pi} + p_{\Delta})v + \alpha(C_D - C_p/r)]/2 \quad (9)$$

To determine the effect on the settlement amount, we must compare (9) with (6). It is easy to see that sampling increases the expected settlement amount if, as is very likely, $C_p/r > C_D$.

¹⁰⁹ If $q \leq \alpha(C_p/r + C_D)/v$, then the case can settle with or without sampling. If $q \geq (C_p/r + C_D)/v$, then the case cannot settle whether sampling is used or not.

B. SCENARIO II: SAMPLE PLAINTIFFS RECEIVE OWN VERDICTS AND COSTS ARE SHARED EQUALLY

1. When the Plaintiffs Control the Settlement Decision

a. *Effect on Settlement Feasibility*

When sample plaintiffs receive their own verdicts, a plaintiff's expected value of litigating through trial knowing that sampling will be used depends on whether the claim is high or low value. Since α is the probability a plaintiff will be selected for the sample and since a sample plaintiff receives her own verdict, w^H or w^L , and a non-sample plaintiff receives the sample average, v , the feasibility conditions with sampling become for high-value and low-value claims, respectively:

$$(p_{\Delta} - p_{\pi})[\alpha w^H + (1-\alpha)v] + \alpha(C_P + C_D) \geq 0 \quad (10)$$

$$(p_{\Delta} - p_{\pi})[\alpha w^L + (1-\alpha)v] + \alpha(C_P + C_D) \geq 0 \quad (11)$$

We must compare (10) with (1), and (11) with (2). Doing so and applying the same method as above yields the following results (where $q = p_{\pi} - p_{\Delta}$):¹¹⁰

- If $p_{\Delta} \geq p_{\pi}$, all high-value and low-value cases can settle, but the surplus is less with sampling for high-value claims. The surplus is less with sampling for low-value claims if $p_{\Delta} - p_{\pi} < (C_P + C_D)/(v - w^L)$ and greater with sampling if the inequality is reversed.
- If $p_{\Delta} < p_{\pi}$, then for all high-value cases and all α , a case that cannot settle without sampling also cannot settle with sampling. But there are cases where settlement is scuttled with sampling: a case can settle without sampling but not with sampling if $\alpha(C_P + C_D)/[\alpha w^H + (1-\alpha)v] < q \leq (C_P + C_D)/w^H$.¹¹¹

¹¹⁰ It is possible to derive parallel conditions that apply when information about w is asymmetric, just as in Scenario I. *See supra* notes 107-108.

¹¹¹ If $q \leq \alpha(C_P + C_D)/[\alpha w^H + (1-\alpha)v]$, then the case can settle with or without sampling. If $q > (C_P + C_D)/w^H$, then the case cannot settle whether sampling is used or not.

- If $p_\Delta < p_\pi$, then for all low-value cases and all α (and with $q = p_\pi - p_\Delta$), a case that cannot settle without sampling also cannot settle with sampling. But there are cases where settlement is scuttled with sampling: a case can settle without sampling but not with sampling if $\alpha(C_P + C_D)/[\alpha w^L + (1-\alpha)v] < q < (C_P + C_D)/w^L$.¹¹²

b. *Effect on Settlement Amount*

Under Scenario II, the expected settlement amounts with sampling become for high-value and low-value claims, respectively:

$$S^{H*} = \{(p_\pi + p_\Delta)[\alpha w^H + (1-\alpha)v] + \alpha(C_D - C_P)\}/2 \quad (12)$$

$$S^{L*} = \{(p_\pi + p_\Delta)[\alpha w^L + (1-\alpha)v] + \alpha(C_D - C_P)\}/2 \quad (13)$$

We must compare (12) with (3) and (13) with (4). It is clear from inspection that sampling reduces S^{H*} . Sampling increases S^{L*} if $p_\pi + p_\Delta > (C_D - C_P)/(v - w^L)$, which should usually be the case unless defendant's litigation costs greatly exceed the plaintiff's or the low-value case is very close to the population average.

2. When the Attorney Controls the Settlement Decision and Settles En-Masse

a. *Effect on Settlement Feasibility*

The feasibility condition with attorney control and sampling is:

$$(p_\Delta - p_\pi)v + \alpha(C_P/r + C_D) \geq 0 \quad (14)$$

This is the same as for Scenario I with the attorney controlling the settlement decision and settling en-masse. Therefore, the same results hold.

¹¹² If $q \leq \alpha(C_P + C_D)/[\alpha w^L + (1-\alpha)v]$, then the case can settle with or without sampling. If $q > (C_P + C_D)/w^L$, then the case cannot settle whether sampling is used or not.

b. *Effect on Settlement Amount*

The expected settlement without and with sampling are the same as for Scenario I, so the results are the same as well. Sampling increases the expected settlement amount if, as is very likely, $C_p/r > C_D$.