# A PRICE THEORY OF LEGAL BARGAINING: AN INQUIRY INTO THE SELECTION OF SETTLEMENT AND LITIGATION UNDER UNCERTAINTY

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#### ABSTRACT

Conventional wisdom says that economic surplus is created when the cost of litigation is foregone in favor of settlement-a theory flowing from the Coase Theorem. The cost-benefit analysis weighs settlement against the expected value of litigation net of transaction cost. This calculus yields the normative proposition that settlements are superior and so most trials are considered "errors." While simple in concept, the prevailing economic model is flawed. This Article is a theoretical inquiry into the selection criteria of settlement and trial. It applies principles of financial economics to construct a pricing theory of legal disputes. In addition to probability and transaction cost, dispute risk must capture the concepts of weight of evidence, variance of case disposition, and confidence in assessment. In much the same way that cost of capital, a measure of financial risk, affects the valuation of firms, the risks associated with litigation and settlement imply a cost of resolution of which transaction cost is but one component. By focusing on transaction cost, the standard model underestimates true economic cost. Because the expenditure of transaction cost reduces uncertainty, transaction cost and risk adjusted valuation are in dynamic tension. Under this approach, settlement and litigation are different pricing mechanisms in the absence of market pricing and are imperfect substitutes operating in varying conditions of uncertainty. Accordingly, this Article rejects the normative axiom that litigation is inferior to settlement-a conclusion having broad policy implications in the administration of justice.

#### INTRODUCTION

This Article challenges the central tenet of the economic theory of legal bargaining—the normative superiority of settlement. For many years, law and economics scholarship has subscribed to the conventional wisdom that the valuation of a legal dispute is simply its "expected value," defined as the probability of judgment multiplied by the expected damage award.<sup>1</sup> The selection of settlement or litigation is seen through the prism of transaction

See, e.g., William M. Landes, An Economic Analysis of the Courts, 14 J.L. & ECON. 61 (1971);
Richard A. Posner, An Economic Approach to Legal Procedure and Judicial Administration, 2 J. LEGAL STUD. 399 (1973);
George L. Priest & Benjamin Klein, The Selection of Disputes for Litigation, 13 J. LEGAL STUD. 1 (1984);
Alan E. Friedman, Note, An Analysis of Settlement, 22 STAN. L. REV. 67 (1969).

cost economics: If a probabilistic value of a lawsuit can be calculated, a settlement is better since litigants can save the cost of litigation. The idea is elegant in its simplicity, but elegance is not the measure of correctness of positive theory or persuasiveness of normative prescription. Despite the siren's call of efficiency, settlements are rejected and cases are tried. In the search for an explanation, the common theme has been an "error" of some sort (of judgment, perception, or strategy). This proposition is now axiomatic.<sup>2</sup> The hostility to litigation is manifest. Trial has been described in such colorful terms as a "disease"<sup>3</sup> and a "pathological event."<sup>4</sup>

<sup>3</sup> Samuel R. Gross & Kent D. Syverud, *Don't Try: Civil Jury Verdicts in a System Geared to Settlement*, 44 UCLA L. REV. 1, 3 (1996) ("Trial is a disease, not generally fatal, but serious enough to be avoided at any reasonable cost." (footnote omitted)).

<sup>4</sup> Judith Resnik, *Many Doors? Closing Doors? Alternative Dispute Resolution and Adjudication*, 10 OHIO ST. J. ON DISP. RESOL. 211, 261 n.200 (1995) (It is "'a mistake to view trial as a pathological event, resulting from settlement miscalculations [by] the parties.") (quoting Edward H. Cooper, Minutes of the Advisory Committee of Civil Rules 20 (Oct. 21–23, 1993, *available at* http://www.uscourts.gov/rules/CV10-1993-min.pdf, which noted that this was "the most direct view" of members of the Advisory Committee on the Federal Rules of Civil Procedure).

<sup>&</sup>lt;sup>2</sup> This is expressed in "the familiar axiom that a bad settlement is almost always better than a good trial." In re Warner Commc'ns Sec. Litig., 618 F. Supp. 735, 740 (S.D.N.Y. 1985), aff'd, 798 F.2d 35 (2d Cir. 1986). Along this sentiment, a diverse array of scholars and analytic viewpoints has generally agreed that settlement is superior or more efficient. See Robert Cooter et al., Bargaining in the Shadow of the Law: A Testable Model of Strategic Behavior, 11 J. LEGAL STUD. 225, 225 (1982) (Trial "represents a bargaining breakdown."); Robert D. Cooter & Daniel L. Rubinfeld, Economic Analysis of Legal Disputes and Their Resolution, 27 J. ECON. LITERATURE 1067, 1074 (1989) (Trials result from "mistaken prediction[s]" made by parties.); Margaret Meriwether Cordray, Settlement Agreements and the Supreme Court, 48 HASTINGS L.J. 9, 36 (1996) ("Settlement is favored in the law for a variety of reasons."); Samuel R. Gross & Kent D. Syverud, Getting to No: A Study of Settlement Negotiations and the Selection of Cases for Trial, 90 MICH. L. REV. 319, 320 (1991) ("A trial is a failure."); Russell Korobkin & Chris Guthrie, Psychological Barriers to Litigation Settlement: An Experimental Approach, 93 MICH. L. REV. 107, 107-08 (1994) (noting that most scholars believe "that trials represent mistakes-breakdowns in the bargaining process-that leave the litigants and society worse off than they would have been had settlement been reached"); Larry Kramer, Consent Decrees and the Rights of Third Parties, 87 MICH. L. REV. 321, 327 (1988) ("Settlement is more efficient for the parties, giving them more of what they hoped to gain at less cost."); David M. Trubek et al., The Costs of Ordinary Litigation, 31 UCLA L. REV. 72, 122 (1983) ("[B]argaining and settlement are the prevalent and, for plaintiffs, perhaps the most cost-effective activity that occurs when cases are filed."); cf. infra notes 4, 14. Not surprisingly, the judicial view is consistent with the majority scholarly perspective. See, e.g., Marek v. Chesny, 473 U.S. 1, 10 (1985) ("In short, settlements rather than litigation will serve the interests of plaintiffs as well as defendants."), superseded by statute, Civil Rights Act of 1991, Pub. L. No. 102-166, § 107, 105 Stat. 1071, 1075-76; G. Heileman Brewing Co. v. Joseph Oat Corp., 871 F.2d 648, 664 (7th Cir. 1989) ("Settling litigation is valuable, and courts should promote it."). Litigation is inefficient in distributing compensation when compared to insurance or compensation fund schemes, particularly in circumstances of mass catastrophes. See Robert J. Rhee, Terrorism Risk in a Post-9/11 Economy: The Convergence of Capital Markets, Insurance, and Government Action, 37 ARIZ. ST. L.J. 435, 440 (2005). But this is a separate question from whether litigation is inefficient compared to settlement in resolving an ambiguous right through the litigation process.

It is easy to see how litigants find themselves at trial due to miscalculation. Cases do not settle early when transaction cost savings would be the greatest. They settle in mid-litigation when previous settlement attempts, on roughly similar terms, have failed. Still many others settle late when most transaction costs have become sunk costs.<sup>5</sup> Common explanations are error, strategic behavior, or optimism.<sup>6</sup> Human failing is a convenient explanation for many things gone awry. Viewed in the unflattering light of the standard economic theory, the enormous legal and judicial infrastructure supporting the institution of civil litigation is a monument to economic waste.<sup>7</sup> Human error and irrationality certainly explain some observations, but beneath the apparent plausibility of these conventional explanations, there is an undercurrent of doubt: is there a systematic selection process or valuational concept that explains the apparent irrationality of litigation, settlement behavior, and ultimately the choice of trial? The normative aspiration is that participants should assess the probability of outcome (an exercise in the prediction of legal decisions), calculate the expected value, and settle on a valuation that should have converged absent "optimism."<sup>8</sup> This Article questions whether this economic theory prescribes rational behavior or wishful ideal.

<sup>&</sup>lt;sup>5</sup> See Friedman, supra note 1, at 69 (arguing that sunk cost of litigation should be ignored); see also RICHARD A. BREALEY ET AL., PRINCIPLES OF CORPORATE FINANCE 116 (8th ed. 2006) ("Sunk costs are like spilled milk: They are past and irreversible outflows. Because sunk costs are bygones, they cannot be affected by the decision to accept or reject the project, and so they should be ignored."). This view of sunk costs assumes the American rule, which does not award attorneys' fees to the prevailing party. See infra note 48.

<sup>&</sup>lt;sup>6</sup> See, e.g., Gross & Syverud, *supra* note 2, at 321 (reviewing scholarly literature showing that trials are explained by "a failure in parties" *predictions* of the behavior of the court" or by "a failure of *bargaining* between the parties").

<sup>&</sup>lt;sup>7</sup> According to a recent study, the number of trials decreased from 1962 to 2002, both in absolute numbers and percentages. Marc Galanter, *The Vanishing Trial: An Examination of Trials and Related Matters in Federal and State Courts*, 1 J. EMPIRICAL LEGAL STUD. 459, 462–63 tbl.1, 507 tbl.4 (2004) (trial rate in federal civil actions declined from 11.5% to 1.8% from 1962 to 2002; civil trials in twenty-two states declined from 36.1% to 15.8% from 1976 to 2002). Perhaps this dramatic decrease in number indicates a sudden market correction for the purportedly long-running inefficiency. But the data may also suggest the contrary—trials are decreasing because of "a striking philosophical, ideologically driven view that is hostile to trials." Adam Liptak, *U.S. Suits Multiply, But Fewer Ever Get to Trial, Study Says*, N.Y. TIMES, Dec. 14, 2003, at N1 (quoting Judge Patrick E. Higginbotham of the U.S. Court of Appeals for the Fifth Circuit); *see also Marc* Galanter & Mia Cahill, "*Most Cases Settle*": *Judicial Promotion and Regulation of Settlements*, 46 STAN. L. REV. 1339, 1342 (1994) ("Judges actively intervene in a significant portion of civil cases in American courts."); Arthur R. Miller, *The Pretrial Rush to Judgment: Are the "Litigation Explosion," "Liability Crisis," and Efficiency Clichés Eroding Our Day in Court and Jury Trial Commitments?*, 78 N.Y.U. L. REV. 982 (2003) (arguing that notions of "efficiency" are undermining the fundamental right to a day in court through procedural application such as summary judgment).

<sup>&</sup>lt;sup>8</sup> See infra note 46.

This Article argues that the standard economic model overstates the case for both human error and prescience. The model assumes a degree of impossible rationality by implying both the existence of an objective ex ante probability of the decision standard and the ability of the parties to find it. The impossibility of accurate predictions of uniquely human events cannot be assumed away for convenience of economic theory.<sup>9</sup> The standard model misstates the applicability of expected value and the overarching consideration of transaction cost economics. This Article proposes an alternative economic theory of legal bargaining-a pricing theory incorporating the risks associated with settlement and litigation. It adopts the microeconomic cornerstones of utility (value) maximization, cost-benefit analysis, and rational choice, but goes further to apply financial economics to determine the true economic cost of uncertainty (risk).<sup>10</sup> The academic discipline of financial economics fundamentally deals with "the valuation of cash flows that extend over time and are usually uncertain."<sup>11</sup> Since settlement and litigation involve the disbursement of cash flow under conditions of information imperfection and uncertainty, the academic discipline of financial economics is most relevant to a theoretical discourse on legal bargaining. Yet until recently, there has been little interdisciplinary application of the valuational techniques of finance theory to bargaining problems.<sup>12</sup>

<sup>&</sup>lt;sup>9</sup> Financial economic research since 1900 has conclusively shown that individual market participants cannot accurately predict future prices or market outcomes. *See infra* notes 182–183 and accompanying text.

<sup>&</sup>lt;sup>10</sup> The economic literature sometimes distinguishes *risk* and *uncertainty* in that risk consists of future outcomes that have a known distribution, while uncertainty describes those that have unknown distributions. FRANK H. KNIGHT, RISK, UNCERTAINTY AND PROFIT 233–34 (1921); *see also* Giuseppe Dari-Mattiacci, *Errors and the Functioning of Tort Liability*, 13 SUP. CT. ECON. REV. 165, 166 n.1 (2005). This Article does not make this distinction, and will use the two terms interchangeably. As explained in Part IV, most cases do not have probability distributions from which a probability of success can be inferred. If these probability distributions existed, like actuarial tables and reliable as such, they would have sparked a revolution in the legal profession; the work of attorneys would have given way to risk management firms. Thus far, we have not seen this revolution come to pass.

<sup>&</sup>lt;sup>11</sup> STEPHEN A. ROSS, NEOCLASSICAL FINANCE 1 (2005).

<sup>&</sup>lt;sup>12</sup> An early proponent was Bradford Cornell who applied a simple option pricing model to legal valuation. Bradford Cornell, *The Incentive to Sue: An Option-Pricing Approach*, 19 J. LEGAL STUD. 173 (1990). Recently, Joseph Grundfest and Peter Huang extended Cornell's option pricing model. Joseph A. Grundfest & Peter H. Huang, *The Unexpected Value of Litigation: A Real Options Perspective*, 58 STAN. L. REV. 1267 (2006). While this Article recognizes the value of an imbedded option, see *infra* Part V.C., the approach to valuation is from the perspective of an asset pricing model, see *infra* Part V.D. The imbedded option to pursue trial is a component of value, but not the main driver of the valuation of a lawsuit. Fundamentally, a lawsuit is a capital asset that generates an expected, but risky, cash flow. *See* Robert J. Rhee, *The Effect of Risk on Legal Valuation*, 78 U. COLO. L. REV. 193 (2006).

Under the pricing theory proposed here, litigation can offer a cheaper cost of resolution than settlement. This statement is counterintuitive only if the cost of resolution is seen as a cash or cash equivalent outlay, like transaction cost in litigation. But if the cost of resolution is seen in the broader context of valuation, then it is intuitive that litigation can be cheaper under certain pricing conditions, and thus preferred. This Article posits that any given disputed claim has a cost of resolution, which is the total economic cost of dispute risk. The governing condition of a lawsuit is the uncertainty of outcome. Yet risk is not captured in the notions of probability and expected value, which simply measure the expectation of outcome but not its riskiness. A risk-adjusted valuation must incorporate the concepts of weight of evidence, confidence in assessment, and variance of case disposition from expectation. The conventional cost-benefit analysis ignores these factors and overstates the importance of transaction cost surplus.

Litigation is not an obsolete substitute for settlement, but an imperfect one.<sup>13</sup> The two involve different risk profiles and cost implications. Certainly litigation involves greater transaction cost, but settlement is not cost free either. While many have asked, "What is the cost of litigation?," few have asked the less obvious but equally important question: "What is the cost of settlement?" Contrary to conventional thought, settlement is not an arbitrage proposition where the selection of certainty over risk is cost free; settlement can be as much of a gamble as trial. Like the cost of equity in the valuation of firms, the cost of settlement is not as apparent for it is imbedded in the valuation. A riskbased valuation model explains many apparently irrational behaviors: for example, reluctance to settle early when transaction cost savings are the greatest, "eleventh-hour" settlements when such savings are mostly depleted, and (some would say) decisions to go to trial. Seen through the prism of the standard analysis, these decisions seem irrational, or at least questionable. But if principles of financial economics are considered, apparent "errors" may be simply rational choices in the face of dynamic uncertainty. The fundamental problem is one of a coherent pricing scheme in the absence of market pricing.

This Article seeks to provide a balanced view of the complexities of the selection between settlement and litigation within the framework of economic efficiency. The current environment is one of public, governmental, professional, judicial, and academic hostility toward litigation, and particularly

<sup>&</sup>lt;sup>13</sup> See Gross & Syverud, *supra* note 3, at 63 ("Formal litigation is presented not as an adjunct but as an alternative to private settlement; not as an aid but as a threat.").

trials, as a method of dispute resolution, and the shibboleth has been economic waste.<sup>14</sup> Litigation has been perceived as the prodigal partner in the business of dispute resolution. To be clear, this Article does not dispute that settlement frequently offers a better resolution of disputes. The goal of this Article is not to diminish the status of settlement, but to elevate litigation as a true partner—one with a minority interest perhaps, given the increasing rarity of trials, but with equal rights nevertheless.<sup>15</sup> The intellectual hostility toward litigation has far-reaching impact, touching on virtually every aspect of the administration of justice.<sup>16</sup> The axiomatic belief that settlement is inherently superior is regrettable, for it is far from clear that as a general rule, settlement—more precisely, settlement independent of litigation—provides the least costly economic transaction in contested actions.<sup>17</sup>

#### I. ASSUMPTIONS

Bargaining over a legal claim is an infinitely complex topic because the field is as fecund as the human endeavor. A grand theory capturing the myriad of economic and psychological factors is elusive. Instead, like a brushstroke of an impressionistic painting, each theory adds to the mosaic. The scope of any

<sup>15</sup> Settlement will always be the more dominant form of dispute resolution because principles of financial economics, predicated on the assumption that most investors are risk averse, predict that, all other factors being equal, a rational party always prefers the sum certain over its expected value equivalent. *See id.* 

<sup>16</sup> See, e.g., Miller, supra note 7. Courts have favored settlement over litigation. See supra note 2. Rules of procedure encourage settlements. See FED. R. CIV. P. 16(c)(9), 23(e), 68; see also Evans v. Jeff D., 475 U.S. 717, 726–27 (1986) (interpreting Rule 23(e) to promote settlements); Marek v. Chesny, 473 U.S. 1, 5 (1985) ("The plain purpose of Rule 68 is to encourage settlement and avoid litigation."); Charles R. Richey, Rule 16: A Survey and Some Considerations for the Bench and Bar, 126 F.R.D. 599 (Reg'l Rail Reorg. Ct. 1989); Gross & Syverud, supra note 3, at 2–3 ("We prefer settlements and have designed a system of civil justice that embodies and expresses that preference in everything from the rules of procedure and evidence, to appellate opinions, to legal scholarship, to the daily work of our trial judges." (footnotes omitted)).

<sup>17</sup> Indeed, litigation and settlement are often inextricably intertwined in that settlement cannot occur in many cases without vigorous litigation.

<sup>&</sup>lt;sup>14</sup> See, e.g., sources cited supra notes 2–4, 7 (scholars expressing or acknowledging a bias against litigation); ROBERT P. BURNS, A THEORY OF THE TRIAL 8–9 (1999) (noting the "hostility to the trial"); Galanter, supra note 7, at 517–18 & n.106 (noting the myths of "out of control" juries and "litigation explosion" in the general public and popular media); Miller, supra note 7, at 985–96 (discussing the popular misconception of the "litigation explosion"); Press Release, White House, President Discusses Lawsuit Abuse at White House Economy Conference (Dec. 15, 2004), http://www.whitehouse.gov/news/releases/2004/12/20041215-11.html (President Bush discussing abusive litigation). A minority of scholars have been vocal about the benefits of litigation and trial. See Paul Butler, The Case for Trials: Considering the Intangibles, 11, EMPIRICAL LEGAL STUD. 627 (2004); Owen M. Fiss, Against Settlement, 93 YALE L.J. 1073 (1984); Marc Galanter, The Quality of Settlements, 1988 J. DISP. RESOL. 55; cf. Marc Galanter, An Oil Strike in Hell: Contemporary Legends About the Civil Justice System, 40 ARIZ, L. REV. 717 (1998); Samuel R. Gross, The American Advantage: The Value of Inefficient Litigation, 85 MICH. L. REV. 734, 754 (1987).

work in the economics of legal bargaining is limited by its assumptions, and so they must be clearly stated.<sup>18</sup> The following assumptions are made:

1. This Article analyzes contested civil actions, defined as nonfrivolous actions that would survive pretrial disposition.<sup>19</sup> The purpose is two-fold: First, to exclude frivolous actions, which magnify the importance of transaction costs and repeat play considerations; second, to isolate cases that could either settle or go to trial, a procedural option held by each party, thus allowing an easier analysis of the reasons for its exercise or nonexercise.

2. Attorney and client interests are perfectly aligned such that agency cost is assumed to be zero. This assumption is unrealistic, but the incorporation of agency cost would complicate a model of the selection of trial and settlement. This Article is an effort to construct a simple model of an important question. The complexity of agency cost is better left for another day.

3. This Article is limited to an analysis of the economic costs of civil actions. Aspects of psychological and game theory are not considered, though these elements can never be removed from practice and are important to the larger theory of bargaining.<sup>20</sup> Repeat play complicates valuation and raises the problem of frivolous actions and strategic behavior. It is discussed tangentially in the context of individual preferences about risk.

4. This Article is not an exploration of rationality, a concept pregnant with economic, philosophical, and jurisprudential meaning.<sup>21</sup> But the concept touches all issues of price and value, and so a frame of reference is needed. This Article defines rationality in economic transactions as acts within ethical

<sup>21</sup> See Donald H. Regan, *The Problem of Social Cost Revisited*, 15 J.L. & ECON. 427, 429 (1972) (describing rationality as "a chameleon among words" in the context of the Coase Theorem).

<sup>&</sup>lt;sup>18</sup> See A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 2–6 (3d ed. 2003) (noting the limitations placed on economic theory by the necessary use of assumptions); Gillian K. Hadfield, *Where Have All the Trials Gone? Settlements, Nontrial Adjudications, and Statistical Artifacts in the Changing Disposition of Federal Civil Cases*, 1 J. EMPIRICAL LEGAL STUD. 705, 707 (2004) ("Sometimes, the law and economics literature shoe-horns this more complex world of case disposition into the simple settlement–trial model."). Such criticism of the "dismal science" is not new. *See* ROBERT L. HEILBRONER, THE WORLDLY PHILOSOPHERS: THE LIVES, TIMES, AND IDEAS OF THE GREAT ECONOMIC THINKERS 78 (7th ed. 1999).

<sup>&</sup>lt;sup>19</sup> About 20% of cases are terminated by nontrial adjudication. *See* Hadfield, *supra* note 18, at 730 tbl.7; Herbert M. Kritzer, *Adjudication to Settlement: Shading in the Gray*, 70 JUDICATURE 161, 164 tbl.2 (1986) (22% pretrial dispositions); Trubek et al., *supra* note 2, at 89 (22.5% of the cases studied were dismissed or judgment was rendered on the merits).

<sup>&</sup>lt;sup>20</sup> See, e.g., Robert Cooter, *The Cost of Coase*, 11 J. LEGAL STUD. 1, 14–29 (1982) (noting that one of the central problem of bargaining is strategic behavior); Korobkin & Guthrie, *supra* note 2 (discussing psychological impediments to bargaining); Thomas J. Miceli, *Settlement Strategies*, 27 J. LEGAL STUD. 473 (1998) (discussing the economics of settlement strategies).

bounds in furtherance of value maximization (or cost minimization) and not influenced by subjective bias or psychological distortions that have no basis in fact or are based on illogical connections among premises, facts, and beliefs.<sup>22</sup> This Article assumes a minimum level of reasoned thought to satisfy the condition of rationality. The hope is that this assumption is not questioned in a way such that the definition slides into *reductio ad absurdum* or philosophical atomism. Bias is distinguished from preference, which defines the utility function.<sup>23</sup> Degrees of rationality are not distinguished, i.e., whether the degree of belief or feeling about a proposition is warranted by a proportional weight of facts, inferences, and logical connections based on some objective scale. For simplicity only, it is assumed that rationality is not conferred with varying honorifics.

More importantly, rationality does not impute predictive powers beyond the capabilities of individuals or markets.<sup>24</sup> Efficient markets are only possible when participants err in their assessments as often as they are accurate. Accurate predictions of future prices by individual market participants are impossible in the markets, and there is no reason why this truth does not apply with more force to the predictions of legal decisions given that a civil action is not subject to market pricing, is not supported by risk management services or a derivative market, and is one of the most illiquid of assets or liabilities.<sup>25</sup> The abilities of disputants are assumed for what they are and not what they should be. Bad results as determined ex post are simply a part of the human condition,<sup>26</sup> and this Article's ascribe no normative condemnation so long as the ex ante belief was rational.

<sup>&</sup>lt;sup>22</sup> Cf. RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 17 (6th ed. 2003) ("Rationality means . . . a disposition to choose, consciously or unconsciously, an apt means to whatever ends the chooser happens to have."); Cooter, *supra* note 20, at 22 (Rational expectations are those that "contain no systematic bias, that is, the subjective expectations correspond to the objective frequencies of the random event.").

<sup>&</sup>lt;sup>23</sup> Risk aversion and affinity are rational because a person derives utility from avoiding or seeking risk. On the other hand, the phenomenon of heuristic "framing," as discovered by Amos Tversky and Daniel Kahneman, raises the issue of whether such behavior is irrational, or whether rationality is bounded. *See generally* CHOICES, VALUES, AND FRAMES (Daniel Kahneman & Amos Tversky eds., 2000); JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (Daniel Kahneman et al. eds., 1982).

<sup>&</sup>lt;sup>24</sup> See infra notes 182–183.

<sup>&</sup>lt;sup>25</sup> See Earl Johnson, Jr., Lawyers' Choice: A Theoretical Appraisal of Litigation Investment Decisions, 15 LAW & SOC'Y REV. 567, 573 (1980–81) ("During litigation, lawyers operate in a world of imperfect information and probability estimation: the maximum expected net benefit target is easier to state than it is to hit.").

<sup>&</sup>lt;sup>26</sup> See SCOTT E. HARRINGTON & GREGORY R. NIEHAUS, RISK MANAGEMENT AND INSURANCE 35 (2d ed. 2004) ("Once the outcomes are observed, it usually is easy to say what would have been the best decision. However, we cannot evaluate decisions from this perspective, which is why probability distributions are so

5. The scholarly literature has defined transaction cost in different wavs.<sup>27</sup> This Article defines transaction cost in the dispute resolution context narrowly: the direct economic costs incurred by the parties, primarily costs associated with inspection, bargaining, enforcement, and litigation. These costs are typically cash expenses, like attorneys' fees, or reducible to cash equivalents, like time and effort. Construed broadly, transaction costs could include the secondary costs associated with the judicial infrastructure. If, however, valuation is the issue, a cost to others is not a cost to self and thus irrelevant. This observation is not intended to imply the irrelevance of grander policy issues or perhaps the normative aspirations of society, but simply to highlight that markets work efficiently because each person pursues self-interest.<sup>28</sup> The goal of this Article is to analyze the efficient price qua each party, which is simply value maximization through, among other things, the pursuit of the lowest cost. A party would be indifferent to the cost incurred by others if it is neutral to her valuation, and therefore this is the assumption.<sup>29</sup>

R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 15 (1960). Cooter defined transaction costs of bargaining as "the cost of communicating among the parties (including the value of time used up in sending messages), making side payments (the cost of the transaction, not the value of what is exchanged), and the cost of excluding people from sharing in the benefits exchanged by the parties." Cooter, *supra* note 20, at 16; *see also* Guido Calabresi, *Transaction Costs, Resource Allocation and Liability Rules—A Comment*, 11 J.L. & ECON. 67, 68 n.5 (1968) ("By transaction costs, I have in mind costs like those of getting large numbers of people together to bargain, and costs of excluding free loaders.").

<sup>28</sup> This Article does not mean to suggest that self-interest is the only motivation for individuals or markets. Self-interest is a primary guide in litigation, which often results in a serious conflict between parties who typically have diametrically opposed interests. *See infra* note 50. A plaintiff's dollar gained in settlement or judgment is a defendant's dollar lost. In the larger perspective, however, there is a place in economic thought and models for ethics and feelings for the welfare of others. *See AMARTYA SEN, ON ETHICS & ECONOMICS* (1988). Adam Smith, the founding father of modern economics, was not only an economist, but also a moral philosopher. *See ADAM SMITH, THE THEORY OF MORAL SENTIMENTS* (Knud Haakonssen ed., 2002) (1759).

<sup>29</sup> Two general arguments are that disputants should use the court system parsimoniously and that the legal infrastructure should be designed to minimize litigation. This argument states an unachievable ideal. We should not expect market participants to act altruistically or voluntarily bear the obligation of some greater societal ideal. Nor does this Article accept the notion that centralized planning of such a resource through normative prescriptions best achieves efficiency. The decision to litigate or settle, and at what price, should be left to the parties who know their own interests, free from any institutional bias. If access to courts is "free," parties will consider only the costs they incur in calculating the value of the dispute. The argument that

important."); Cooter, *supra* note 20, at 20 (Bargaining sometimes fails because "the best move ex ante turns out to be a bad move ex post.").

<sup>&</sup>lt;sup>27</sup> Cooter, *supra* note 20, at 16. Coase defined it:

In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on.

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These assumptions allow an isolated study of the elementary economics of a disputed claim—a limited goal, but one rich in policy implications. The perspective is that of a financier or investor in an economic project.<sup>30</sup> This Article answers a simple question: when two parties dispute an ambiguous right that would warrant resolution by trial if one party so chooses, how does each party value the claim and make a rational choice either to settle or exercise the trial option?

# II. STANDARD ECONOMIC MODEL OF BARGAINING

#### A. Transaction Cost Efficiency

The key to any economic transaction is achieving maximum price at the lowest cost,<sup>31</sup> and so bargaining theory lends itself to economic analysis. The economic theory of legal bargaining has a well-developed history. Ronald Coase's landmark article, *The Problem of Social Cost*,<sup>32</sup> is credited with providing the doctrinal precursor to the standard economic model of bargaining.<sup>33</sup> The broadest lesson from the Coase Theorem is that the economic efficiency of any transaction is dependent, in part at least, on its

litigation is subsidized dispute resolution and thus distorts the pricing of disputes rings hollow. The judicial infrastructure is largely a fixed overhead. It is paid for by taxes or borrowings, and it belongs to the users as needed. The cost of judicial administration is not free, but it is built into the tax and debt system. If the argument is that efficient bargaining can reduce the overall cost of the judicial system, I cannot see the day in which judges would be laid off in large numbers as a result of judicial downsizing. If the argument is that parsimony controls the growth of the judicial infrastructure, the issue is whether such additional cost is justifiable in relation to other factors, such as population and wage growth, costs in relation to other incurred costs (e.g., the cost of settlement), and extrapolation of the efficient level of judicial system use. At some point in the cost-benefit debate, the difficult and tedious task of calculating the dollar value of the costs and benefits must be done to determine the intellectual stake at issue rather than maintaining the abstractness of "costs" and "efficiency." In the end, the best arbiters of the price of the dispute are the parties themselves, and they should be free to set this price in the forum they choose without undue institutional, academic, legal, or social pressures manifested in rules, policies, and attitudes.

<sup>&</sup>lt;sup>30</sup> Increasingly, scholars are analyzing lawsuits from the perspective of finance theory. *See* Cornell, *supra* note 12, at 173 (considering a lawsuit as an "investment"); Grundfest & Huang, *supra* note 12, at 1269–70, 1269 n.1 ("Lawsuits and investment projects have much in common."); Rhee, *supra* note 12 (considering a lawsuit as a capital asset subject to modeling under asset pricing principles); *see also* Robert J. Rhee, *The Application of Finance Theory to Increased Risk Harms in Toxic Tort Litigation*, 23 VA. ENVTL. L.J. 111, 156–57 (2004) (analogizing a lawsuit to a financial project in which "[t]he plaintiff provides the business opportunity, and the attorney provides not only the intellectual capital and labor but often the financial capital in the form of contingent attorney's fees and costs").

<sup>&</sup>lt;sup>31</sup> See Landes, *supra* note 1, at 61 ("The basic assumption of the model is that both the prosecutor and the defendant maximize their utility, appropriately defined, subject to a constraint on their resources.").

<sup>&</sup>lt;sup>32</sup> Coase, *supra* note 27.

<sup>&</sup>lt;sup>33</sup> See Landes, supra note 1, at 102 n.61.

transaction cost.<sup>34</sup> All else being equal (a significant condition), the least costly transaction is more efficient and thus maximizes value. The implication of the Coase Theorem is applicable to a prescriptive theory of bargaining.

Scholars subsequently adopted the mantra of surplus maximization through transaction cost efficiency, and prescribed the goal of closing the gap between the real world of litigation costs and the ideal Coasian world of frictionless transactions. One of the earliest works was a well-written, insightful student note that set forth all the essential elements of the basic standard model:

To compute his bargaining limit, plaintiff will (1) multiply the expected damage award by the probability that the court will award it to him, (2) subtract from the product in (1) the amount of his anticipated litigation costs, (3) add his settlement costs, and (4) subtract his opportunity gains from receiving payment now as opposed to a judgment later.<sup>35</sup>

William Landes and Richard Posner struck the same theme of analyzing valuation from a cost-benefit perspective.<sup>36</sup> Courts, too, have echoed a similar economic approach.<sup>37</sup> Under this conventional approach, transaction cost is

The plaintiff's minimum offer is the expected value of the litigation to him plus his settlement costs, the expected value of the litigation being the present value of the judgment if he wins, multiplied by the probability (as he estimates it) of his winning, minus the present value of his litigation expenses. The defendant's maximum offer is the expected cost of the litigation to him and consists of his litigation expenses, plus the cost of an adverse judgment multiplied by the probability as he estimates it of the plaintiff's winning (which is equal to one minus the probability of *his* winning), minus his settlement costs.

<sup>&</sup>lt;sup>34</sup> The Coase Theorem states: "With costless market transactions, the decision of the courts concerning liability for damage would be without effect on the allocation of resources." Coase, *supra* note 27, at 10; *see also* Calabresi, *supra* note 27, at 68 ("[I]f one assumes rationality, no transaction costs, and no legal impediments to bargaining, *all* misallocations of resources would be fully cured in the market by bargains."). *But see* Cooter, *supra* note 20, at 17 (arguing that the Coase Theorem is flawed because it assumes an optimistic attitude toward the ability of people to distribute economic surplus).

<sup>&</sup>lt;sup>35</sup> Friedman, *supra* note 1, at 80. This note is a sophisticated economic analysis that established most of the basic ideas about the valuation of a legal dispute. It covers the time value of costs, the effect of sunk costs on settlement decision, marginal cost analysis, and opportunity costs.

<sup>&</sup>lt;sup>36</sup> See Landes, *supra* note 1, at 61, 101–02; Posner, *supra* note 1, at 417–18. Posner formulates the standard model as:

*Id.* at 418. Priest and Klein credit Landes and Posner with developing the standard economic model of bargaining, Priest & Klein, *supra* note 1, at 4 n.16, but much of the credit must go to Friedman's note which was published several years before Landes and Posner published their outstanding articles. *See* Friedman, *supra* note 1.

<sup>&</sup>lt;sup>37</sup> "Most defendants are unlikely to settle unless the cost of the predicted judgment, discounted by its probability, plus the transaction costs of further litigation, are greater than the cost of the settlement package." Evans v. Jeff D., 475 U.S. 717, 734 (1986).

seen as a waste if the parties can agree on the expected value, which hinges on a probabilistic assessment. While subsequent scholarship has augmented the idea,<sup>38</sup> this basic cost-benefit analysis is the reference point for economically oriented scholarship.<sup>39</sup> Thus, it is termed the "standard economic model" for convenience.

The standard model lends itself to simple mathematical expressions where V is settlement valuation, J is expected judgment amount, P is probability of judgment, and T is transaction cost. The ministerial function of time value of money adjustment is ignored.<sup>40</sup> Also, this Article ignores the cash outlay of settlement cost because it is de minimis relative to litigation cost.<sup>41</sup> A defendant should settle only if  $V \le (J \times P) + T$ . A plaintiff should settle only if  $V \ge (J \times P) - T$ . If the defendant's maximum value is greater than the plaintiff's minimum value, which is to say that the valuations intersect, a positive contract zone exists. The larger this contract zone, the greater is the possibility of settlement absent strategic bargaining.<sup>42</sup> The relationship between probability and transaction cost can be seen by rearranging the above equations. Assuming a common J and T and noting the aggregate transaction cost as B, trial results only if this trial inequality holds true:  $J \times P_p - T > J \times P_d + T$ .<sup>43</sup> This inequality can be restated:  $(P_p - P_d) \times J > B$ .<sup>44</sup> Thus, trial results

<sup>&</sup>lt;sup>38</sup> See, e.g., Lucian Arye Bebchuk, *Litigation and Settlement Under Imperfect Information*, 15 RAND J. ECON. 404 (1984) (discussing the effects of asymmetric information on bargaining); Cooter et al., *supra* note 2, at 226, 231 (positing that the surplus created from a settlement may lead to strategic bargaining and a "problem of distribution").

<sup>&</sup>lt;sup>39</sup> See Cooter & Rubinfeld, supra note 2, at 1075; Don L. Coursey & Linda R. Stanley, Pretrial Bargaining Behavior Within the Shadow of the Law: Theory and Experimental Evidence, 8 INT'L REV. L. & ECON. 161 (1988); John P. Gould, The Economics of Legal Conflicts, 2 J. LEGAL STUD. 279 (1973); Landes, supra note 1; Posner, supra note 1; Priest & Klein, supra note 1; Donald Wittman, Dispute Resolution, Bargaining, and the Selection of Cases for Trial: A Study of the Generation of Biased and Unbiased Data, 17 J. LEGAL STUD. 313 (1988).

<sup>&</sup>lt;sup>40</sup> Obviously, all else being the same, the defendant would prefer a later payout because there is an opportunity cost associated with an early payout, and for the same reason the plaintiff would prefer an earlier payoff.

<sup>&</sup>lt;sup>41</sup> For the purpose of modeling, scholars have considered settlement cost to be "nil." *See* Cooter & Rubinfeld, *supra* note 2, at 1075. Of course, if the concept of cost is expanded beyond simply the direct cash outlays associated with negotiating and executing settlement, then the settlement cost can far exceed the expected litigation costs. *See* Rhee, *supra* note 12.

<sup>&</sup>lt;sup>42</sup> See Wittman, *supra* note 39, at 319 ("[T]he greater the cost of a trial relative to the cost of a settlement, the greater the likelihood of a settlement."). *But see* Cooter, *supra* note 20, at 17–18 (Large contract zones may result in greater strategic behavior that reduces the likelihood of settlement.).

<sup>&</sup>lt;sup>43</sup> POSNER, *supra* note 22, at 568–69.

<sup>&</sup>lt;sup>44</sup> *Id.* Note the remarkable similarity to the Hand Formula. *See* discussion *infra* Part III. There is a simple explanation for this. Both the standard model and the Hand Formula are conventional cost-benefit

when the difference in probabilistic assessments is greater than the aggregate transaction cost. If the parties have the same assessment such that  $(P_p - P_d) = 0$ , or if one party is more pessimistic than the other such that  $(P_p - P_d) < 0$ , the trial inequality would not hold true and settlement would result.<sup>45</sup> Generally, litigation occurs only if at least one party is "optimistic" about the outcome of the litigation.<sup>46</sup>

Thus, settlement is a function of transaction cost economics. The prospect of a high transaction cost relative to expected value tends to facilitate settlement. The extreme example is a frivolous lawsuit in which settlement may be reached for nuisance value.<sup>47</sup> The prospect of a low transaction cost relative to the stake tends to facilitate litigation.<sup>48</sup> Minute differences in probability assessments may exceed the value of the potential surplus. Thus, the standard economic model is best understood as a prescription to mimic the idealized Coasian world of private bargains, zero transaction costs, costless pricing system, and irrelevance of legal rules.

#### B. Selection Theory of Trial and Settlement

While the standard model speaks to efficiency, it is silent as to whether a systematic selection of settlement or trial exists, or whether selection is simply random. Certainly random errors explain some selections. In hindsight, some disputes should have been settled. But a bad result must be distinguished from an error, which is the result of an ex ante irrational decision, made on the basis of inadequate facts, speculation (gambling), or subjective bias. Some disputes

analyses with an underlying assumption of wealth maximization. Moreover, both models focus on the concept of probability as the key valuational parameter.

<sup>&</sup>lt;sup>45</sup> POSNER, *supra* note 22, at 569; *see also* DOUGLAS G. BAIRD ET AL., GAME THEORY AND THE LAW 285 n.7 (1994) ("Parties are equally likely to be pessimistic about their chances, but in these cases there is always settlement.").

<sup>&</sup>lt;sup>46</sup> POSNER, *supra* note 22, at 569. "Optimistic" is a poor choice of term. Optimism suggests irrationality, subjective bias, or differences in assessments due to information asymmetry or strategic bargaining. Thus, it is "misleading" to label one party as "optimistic" when legitimate differences in opinion in the face of uncertainty result in litigation. BAIRD ET AL, *supra* note 45, at 285 n.7.

<sup>&</sup>lt;sup>47</sup> *Cf.* Grundfest & Huang, *supra* note 12, at 1299–1305 (arguing that the negative expected value case can have substantial settlement value due to its optionality). *But see* Rhee, *supra* note 12, at 212–23 (criticizing an option analogy).

<sup>&</sup>lt;sup>48</sup> See Posner, supra note 1, at 419 n.29 ("There is empirical evidence that higher stakes do increase the likelihood of litigation."). Allocating legal costs under the American and English rules significantly affects the decisions to sue, settle, and try a case. See Cooter & Rubinfeld, supra note 2, at 1078; A. Mitchell Polinsky & Daniel L. Rubinfeld, Does the English Rule Discourage Low-Probability-of-Prevailing Plaintiffs?, 27 J. LEGAL STUD. 141 (1998); Steven Shavell, Suit, Settlement, and Trial: A Theoretical Analysis Under Alternative Methods for the Allocation of Legal Costs, 11 J. LEGAL STUD. 55 (1982).

end in trial because ex ante one party or both badly misjudged the situation (just as some disputes settle for precisely the same reason). These errors are random and unpredictable, and thus there is no underlying order to when people make bad judgments.

unpredictable Randomness also explains risk-taking behaviors. Negotiation may break down due to strategic bargaining behaviors such as the assertion of excessive valuations, deliberate misrepresentation, "hard" bargaining, calculated delay, obstruction, and other arguably noncooperative behavior. The motivation for these behaviors is the opportunity for a superior settlement.<sup>49</sup> Self-interest is a rational condition.<sup>50</sup> Strategic behavior cannot be faulted because the instinct to test fate is as old as human history.<sup>51</sup> Bargaining entails a great deal of informed risk taking and strategy. Unless accurate foresight is imported into a normative view of the bargaining process, hindsight cannot be used to judge rationality.<sup>52</sup> Indeed, while increasing the likelihood of trial, strategic behavior may play a beneficial role for society because it may be a natural arbiter of liability, favoring those who have a stronger conviction or pursue their claims more aggressively. To the extent that the merit of a claim is aligned with such sentiments, these parties are more likely to have a greater interest in "winning" the settlement game; they may take greater risk for greater potential gain, which may be seen as one's just reward. When and how strategic behavior will manifest in individual cases is unpredictable. Thus, strategic behavior also explains a large portion of the cases that do not settle.

George Priest and Benjamin Klein suggest that selection of settlement and trial is also affected by factors independent of the decision process. They propose a systematic selection hypothesis based on characteristics of the case

<sup>&</sup>lt;sup>49</sup> See Cooter et al., *supra* note 2, at 226, 231 (positing that surplus created from a settlement may lead to a "problem of distribution" and strategic bargaining); Gross & Syverud, *supra* note 2, at 327–30 ("Trials, according to the [strategic bargaining] model, consist largely of cases where gambles like this did not pay off—where hard bargaining strategies caused negotiations to fail.").

<sup>&</sup>lt;sup>50</sup> Adam Smith provided the most eloquent and enduring articulation of this truth: "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest." ADAM SMITH, AN INQUIRY INTO THE NATURE AND CAUSES OF THE WEALTH OF NATIONS 15 (Edwin Cannan ed., Random House 1994) (1776). "By pursuing [their] own interest [they] frequently promote[] that of the society more effectually than when [they] really intend[] to promote it." *Id.* at 485.

<sup>&</sup>lt;sup>51</sup> See generally PETER L. BERNSTEIN, AGAINST THE GODS: THE REMARKABLE STORY OF RISK (1996) (popular treatment of the subject of risk).

<sup>&</sup>lt;sup>52</sup> See infra Part III.C.

merit.<sup>53</sup> Their model is mathematically based and complex. The following is a simplified description. The argument begins by assuming that each party knows the "decision standard"  $Y^*$ , defined as the objective inflection point between liability and no liability.<sup>54</sup> Each dispute has a "true value" Y, defined as an objective value of the case as would be determined by the deliberative body based on the facts and the applicable law.<sup>55</sup> Each party assesses the probability of the case. Priest and Klein refine the definition of probability to mean the evaluation of how the decision standard would be applied to the unique facts of the dispute.<sup>56</sup> Case assessment entails an estimate of the distance between the decision standard  $Y^*$  and the true value  $Y^{57}$ . This estimate is subject to an error variable such that  $Y_i = Y + \varepsilon^{.58}$  The error variable  $\varepsilon$  is normally distributed and random so that "the parties' expectations are independent, unbiased, and on average equal to the true value of Y."59 Building on the standard model, Priest and Klein assume that each party calculates a settlement value by multiplying the probability of success by the judgment amount net of transaction costs.<sup>60</sup> Litigation occurs when the plaintiff's minimum settlement value is greater than the defendant's maximum value, which is a restatement of the trial inequality.<sup>61</sup>

Priest and Klein argue that trial and settlement are not randomly selected. When the true value Y is far from the decisions standard  $Y^*$ , settlement is more likely because the parties are more likely to agree on the probable outcome even accounting for random error and differences in probabilistic assessment.<sup>62</sup> "In litigation, as in gambling, agreement over the outcome leads parties to drop out."<sup>63</sup> But when the true value is closer to the decision standard, there is "more uncertainty as to their outcomes and, thus, more disagreement between the parties."<sup>64</sup> Their key intuition is that expectations in close cases are more

<sup>&</sup>lt;sup>53</sup> See Priest & Klein, supra note 1; see also George L. Priest, Reexamining the Selection Hypothesis: Learning from Wittman's Mistakes, 14 J. LEGAL STUD. 215, 216–21 (1985) (providing a nonmathematical explanation of the theory).

<sup>&</sup>lt;sup>54</sup> Priest & Klein, *supra* note 1, at 7–8.

<sup>&</sup>lt;sup>55</sup> Id. at 9.

<sup>&</sup>lt;sup>56</sup> Priest, *supra* note 53, at 217.

<sup>&</sup>lt;sup>57</sup> *Id.*; Priest & Klein, *supra* note 1, at 10–11.

<sup>&</sup>lt;sup>58</sup> Priest & Klein, *supra* note 1, at 9.

<sup>&</sup>lt;sup>59</sup> *Id.* at 9, 14.

<sup>&</sup>lt;sup>60</sup> Priest, *supra* note 53, at 217; Priest & Klein, *supra* note 1, at 12–13.

<sup>&</sup>lt;sup>61</sup> Priest & Klein, *supra* note 1, at 13.

<sup>&</sup>lt;sup>62</sup> *Id.* at 14–15.

<sup>&</sup>lt;sup>63</sup> *Id.* at 17.

<sup>&</sup>lt;sup>64</sup> Id. at 16.

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sensitive to error and differences in probabilistic assessments.<sup>65</sup> Slight differences in the position of the true value *Y* may mean it is within or outside of the decision standard  $Y^*$ . A random error, one way or the other, may tip the outcome more so than when *Y* is far from  $Y^*$ , and thus the parties are more likely to dispute the expected outcome. Based on this theory, Priest and Klein also predict that the rate of success for plaintiffs at trial would be close to 50%.<sup>66</sup>

Under the Priest and Klein selection hypothesis then, the case merit relative to a fixed decision standard is the key factor that systematically sorts cases for trial and settlement. As long as the "true value" of the case can be determined accurately, easy cases in the sense of predictability of outcome settle while close cases tend toward trial. Thus, uncertainty of outcome promotes trial.<sup>67</sup>

## C. Assumptions of the Standard Model

Economic theory is commonly criticized for unrealistic assumptions.<sup>68</sup> But not all assumptions are cut from the same cloth. This Article distinguishes two types of assumptions: model assumptions and theory assumptions. Model assumptions are those that do not always hold in the practical world, but are nevertheless sufficiently grounded in worldly possibilities that they are acceptable devices to isolate the noise from complicating variables. They are made in the spirit of maintaining a uniform set of conditions to analyze or simplify a problem. Criticism on the grounds that model assumptions do not reflect reality is muted by the fact that the thought experiment, without worldly complications, is still valuable in understanding the underlying workings of a real problem.<sup>69</sup> On the other hand, theory assumptions are so fundamental that

<sup>&</sup>lt;sup>65</sup> "Parties are more likely to differ in their expectations of the outcomes of disputes that lie close to the decision standard—the marginal liability cases—again, regardless of the decision standard itself." Priest, *supra* note 53, at 218.

<sup>&</sup>lt;sup>66</sup> *Id.* at 218–19; Priest & Klein, *supra* note 1, at 18–19.

<sup>&</sup>lt;sup>67</sup> Priest & Klein, *supra* note 1, at 16–17. A stylized numeric example illustrates the point. Let the decision standard  $Y^* = 0$  and liability is some positive number (L > 0). Assume liability is clear and the parties hold these views:  $Y_p = 10$  and  $Y_d = 8$ . If  $\varepsilon = \pm 2$ , unbiased and normally distributed, the parties' combined estimate of the range of "true value" is Y = [6, 12], suggesting liability is still clear even considering the potential error and differences in probabilistic assessments. Assume now that  $Y_p = 1$  and  $Y_d = 0$ . The case is much closer and the true value is in the range of Y = [-2, 3]. This range encompasses both liability and no liability determinations, and so the parties are more likely to dispute the outcome as it is more uncertain.

<sup>&</sup>lt;sup>68</sup> See supra note 18 and accompanying text.

 $<sup>^{69}</sup>$  The standard model makes some of these assumptions: the dispute is a two-party, single-play game; litigants are rational and risk neutral; and they have equal stake in the litigation and symmetric information. *See, e.g.*, Posner, *supra* note 1, at 417–18 & n.27 (underlying assumptions of the standard economic model

they constitute core elements of the underlying theory. They do not limit the scope of the thought experiment so much as they are its subject. Criticism of a theory assumption questions not the method of experimentation but the very legitimacy of the theory. This Article criticizes the following four theory assumptions of the standard economic model:

1. The standard model eliminates the relevance of variance of outcome through an assumption of risk neutrality.<sup>70</sup> Under this condition, the concept of probability incorporates all components of dispute risk. Expected value captures the uncertainty of litigation, discounting settlement value by probability.<sup>71</sup> Since expected value is weighed against expected transaction cost, which is subject to reasonable forecasting, probability is objective, both in the sense of measurability and independence from a party's subjective belief. This is consistent with the "rational expectation" model, which "means that expectations contain no systematic bias, that is, the subjective expectations correspond to the objective frequencies of the random event."<sup>72</sup> Thus, probability is typically stated as a statistical frequency, or at least frequency is a linguistic proxy for the concept.<sup>73</sup>

2. By assuming a true frequency, the standard model also assumes that the decision standard of a deliberative body is a fixed point of reference. Priest and Klein are explicit about this: "[W]e will presume that standards exist for resolving disputes, and that judges or juries apply specific standards consistently in disputes of one type or another."<sup>74</sup> The important implication is that consistent predictability of legal decisions is possible and the parties should, absent "optimism" or error, discover it upon proper analysis and assessment of probability.

may not hold in multiparty negotiations); Priest & Klein, *supra* note 1, at 16–17 (assuming information symmetry and consistent probabilistic assessments).

 $<sup>^{70}</sup>$  See, e.g., Cooter & Rubinfeld, *supra* note 2, at 1076 ("Risk aversion thus increases the surplus . . . which presumably increases the probability of a settlement."); Landes, *supra* note 1, at 67 (risk affinity may result in litigation for the opportunity to achieve the most optimal result); Shavell, *supra* note 48, at 57 (assumption of risk neutrality).

<sup>&</sup>lt;sup>71</sup> As Posner explains, "[T]he plaintiff's net expected gain from litigating is the judgment if he wins discounted by his estimate of the probability that he will win, minus his litigation costs." POSNER, *supra* note 22, at 568.

<sup>&</sup>lt;sup>72</sup> Cooter, *supra* note 20, at 22.

<sup>&</sup>lt;sup>73</sup> *Id.*; *see* Cooter et al., *supra* note 2, at 233 ("Thus the equilibrium of the game is a situation in which subjective probabilities correspond to objective frequencies.").

<sup>&</sup>lt;sup>74</sup> Priest & Klein, *supra* note 1, at 7.

3. Similarly, the standard model is optimistic as to the predictive powers of rational parties. Again, Priest and Klein articulate this optimism: "The most important assumption of the model is that potential litigants form rational estimates of the likely decision, whether it is based on applicable legal precedent or judicial or jury bias."<sup>75</sup> In arguing that private bargains should lead to efficient economic production, Coase also implied the same: "Of course, if market transactions were costless, all that matters (questions of equity apart) is that the rights of the various parties should be well-defined and the results of legal actions *easy to forecast.*<sup>76</sup> The assumption is that iudicial proceedings are fairly predictable. Here, two thoughts are distinguished: first, whether a party can decide a course of action based on a rational belief that her assessment is accurate under the circumstances and within the limits of human knowledge; second, whether that probabilistic assessment *is* accurate. The standard model answers affirmatively to both queries. Note that without the assumption that the parties can probabilistically handicap judicial outcomes, the normative superiority of settlement cannot hold and the resolution of a dispute is simply a matter of pricing.

4. Transaction cost is synonymous with cost of resolution. It is primarily the cash or cash equivalent outlays of resolving a claim, e.g., attorneys' fees, time and effort. Under this definition, litigation entails substantial transaction costs,<sup>77</sup> whereas settlement cost is assumed to be de minimis. If the cost of resolution is limited to cash expenditure, this assumption would be reasonable as litigation costs typically far exceed settlement costs. Under the standard model, the cost of resolution does not incorporate a broader concept of a risk-adjusted cost of resolution that would affect the valuation of the dispute.

These four fundamental assumptions provide the superstructure to the argument that settlement is normatively superior. The syllogism is: Rational parties should be able to predict their chances of prevailing on the merits; expectations should converge toward a fixed decision standard, diminishing optimism and creating a contract zone; since the transaction cost of litigation is greater than the zero cost of negotiating a private bargain, settlement is the

<sup>&</sup>lt;sup>75</sup> *Id.* at 4; *see* Cooter & Rubinfeld, *supra* note 2, at 1074 ("These hypotheses all build on the view that cases fail to settle as a consequence of a mistaken prediction about the outcome of a trial made by one of the parties."); Priest, *supra* note 53, at 218 ("We presume that parties or their lawyers are on average accurate in their evaluations of disputes.").

<sup>&</sup>lt;sup>76</sup> Coase, *supra* note 27, at 19 (emphasis added).

<sup>&</sup>lt;sup>77</sup> See, e.g., Trubek et al., *supra* note 2, at 75 (defining the cost of litigation as the "direct expenditures of time and money on processing disputes through litigation"); *supra* note 27 and accompanying text.

more efficient method of dispute resolution; thus, litigation is a wasteful activity.<sup>78</sup> The economic model is as simple as it is elegant, or more precisely, its elegance lies in its simplicity.<sup>79</sup> However, if the above theory assumptions go beyond the limits of credible tolerance, the model is a flawed vision of the general system of legal bargaining.

# III. CRITIQUE OF THE STANDARD MODEL

## A. Theories of Probability

The point from which all arguments depart is that a legal dispute creates uncertainty: how will a deliberative body decide the case? At the heart of the conventional cost-benefit analysis is a probabilistic assessment of trial outcome. Most law and economics literature foregoes a formal definition of *probability* and simply assumes it to be a numeric interval between zero and one.<sup>80</sup> But objective probability of legal case assessment is impossible. The standard model blurs the distinction between matters that are subject to reasonable measurement, such as expected transaction cost, and those that are qualitatively judged, such as expected trial results.<sup>81</sup> The latter is bounded only by the plausibility of reasoning and the conclusions drawn may be contradictory. A comparison of these terms superimposes the empirical rigor of a standard cost-benefit analysis on the dynamic uncertainties of the bargaining process.

The concept of probability in legal literature is not new. Perhaps the most celebrated example is *United States v. Carroll Towing*, in which Judge Hand expressed negligence in the algebraic formula  $P \ x \ L > B$ , where P is probability of the accident occurring, L is anticipated loss, and B is burden of precaution.<sup>82</sup> Despite its prominence in academic literature, the Hand Formula is an operationally neutered concept—Judge Hand himself subsequently

<sup>&</sup>lt;sup>78</sup> See, e.g., POSNER, supra note 22, at 567–71.

<sup>&</sup>lt;sup>79</sup> Posner, *supra* note 1, at 420 (noting the problem of indeterminacy and suggesting a "simple approach" though it is "none altogether satisfactory").

<sup>&</sup>lt;sup>80</sup> See, e.g., supra note 73 and accompanying text; POSNER, supra note 22, at 568 (no formal definition of probability in the context of bargaining theory); Priest & Klein, supra note 1, at 10–13 (same).

<sup>&</sup>lt;sup>81</sup> There are two probabilities: the probability of a finding of liability and the probability pertaining to damages. For simplicity, damages are assumed to be reasonably predictable.

<sup>&</sup>lt;sup>82</sup> 159 F.2d 169 (2d Cir. 1947); see Richard A. Posner, A Theory of Negligence, 1 J. LEGAL STUD. 29, 32–33 (1972) (commenting that the Hand Formula provides an applicable test for the determination of negligence).

conceded that all attempts to quantify its variables, and particularly probability, are "illusory."<sup>83</sup> While it is often illustrated in stylized marginal cost analyses,<sup>84</sup> there has been no scholarly attempt to measure in retrospect the variables in Carroll Towing. Such an exercise would be of great academic value, if only to show that the formula has operational functionality.<sup>85</sup> The reason for this is simple—even if the accident could have been analyzed ex ante, no probability would have existed on the chance that a string of six specific barges, moored together in the manner that they were, would break loose from the particular ropes used under increasing conditions of wind and tide on that particular day, and that the specific barge in question, one out of six set loose from their mooring, would crash into another ship in a manner that would result in the sinking of that barge.<sup>86</sup> The facts surrounding that accident, like those of most legal disputes, were unique; the relevant class of comparison is one, of which the outcome is binary (either there is an accident or there is not). Nor is the problem of indeterminacy solved by inquiring into a broader foreseeability of risk analysis-whether there could have been an accident of some sort irrespective of the precise chain of events-as the risk can only be assessed in a qualitative, judgmental manner.<sup>87</sup> Simply put, no ex ante probability-at least expressed as a frequency-existed. To the extent that the Hand Formula constitutes a balanced application of the concepts of foreseeability and risk under the totality of the circumstances standard, the

<sup>&</sup>lt;sup>83</sup> Moisan v. Loftus, 178 F.2d 148, 149 (2d Cir. 1949) ("It follows that all such attempts are illusory, and, if serviceable at all, are so only to center attention upon which one of the factors may be determinative in any given situation.").

<sup>&</sup>lt;sup>84</sup> See, e.g., RICHARD A. EPSTEIN, CASES AND MATERIALS ON TORTS 179 (8th ed. 2004) (giving an example of concept of marginal precautions under the Hand formula); POSNER, *supra* note 22, at 168 (same).

<sup>&</sup>lt;sup>85</sup> The criticism of immeasurability is not new. *See, e.g.*, DAVID B. BARNES & LYNN A. STOUT, CASES AND MATERIALS ON LAW AND ECONOMICS 95 (1992) ("It might be impossible for a statistician to calculate even the probability of the accident that actually occurred."); Stephen G. Gilles, United States v. Carroll Towing Co.: *The Hand Formula's Home Port, in* TORTS STORIES 11, 31 n.79 (Robert L. Rabin & Stephen D. Sugarman eds., 2003) ("The problem of "incommensurability" is not peculiar to the Hand Formula. It is a standard objection to cost-benefit analysis in *any* context, and has generated a scholarly literature too expansive even to summarize here."). Even the strongest supporters of the Hand Formula admit that in the final analysis it is nothing but a qualitative multifactor analysis. *See* POSNER, *supra* note 22, at 564 ("Of course, as with the Hand Formula itself, it is rarely possible (or at least efforts are not made) to quantify the terms. But the formula is valuable even when used qualitatively rather than quantitatively."); McCarty v. Pheasant Run, Inc., 826 F.2d 1554, 1557 (7th Cir. 1987) (Posner, J.) (The Formula "has greater analytic than operational significance.").

<sup>&</sup>lt;sup>86</sup> See Gilles, supra note 85, at 12–15 (describing the complex facts surrounding the accident).

<sup>&</sup>lt;sup>87</sup> Foresight into the precise chain of events is not needed for a determination of negligence. *See, e.g.*, Petition of Kinsman Transit Co., 338 F.2d 708 (2d Cir. 1964) (accident resulting from a complex chain of events involving collision of ships and subsequent collision with a bridge).

formula has salvage value.<sup>88</sup> But to the extent that it purports to add an economic rigor to the calculus of negligence, the endeavor is a chimera, a pretension of objective analysis laden with the subjective views of the deliberative body.<sup>89</sup>

The standard model of bargaining suffers from the same problem of immeasurability. The assumption has been that probability is a numeric interval,<sup>90</sup> or that subjective viewpoints correlate to some objective standard.<sup>91</sup> This is consistent with the broader tenor of a cost-benefit analysis. The model assumes that there is always a probability, and since it is a numeric value it can be compared against transaction cost to calculate an optimal solution.<sup>92</sup> The problem goes to the heart of the definition and philosophy of probability. What does *probability* mean? There are two broad theories, which are described in the following subsections.

*Statistical Probability.* Statistical probability is based on empirical observation of events from which we infer a future event, and its foundation is based on mathematics.<sup>93</sup> It is formally defined as "the limiting value of the

<sup>&</sup>lt;sup>88</sup> This can be seen in the definition of negligence in the Third Restatement of Torts: "Primary factors to consider in ascertaining whether the person's conduct lacks reasonable care are the foreseeable likelihood that the person's conduct will result in harm, the foreseeable severity of any harm that may ensue, and the burden of precautions to eliminate or reduce the risk of harm." RESTATEMENT (THIRD) OF TORTS § 3 (Draft 2001). The Restatement avoids the term "probability" and any concept of algebraic weight. *Id.* § 3 cmt. e. Comment e, however, makes clear that the Restatement adopts a "cost-benefit" analysis, where "[c]onduct is negligent if its disadvantages outweigh its advantages, while conduct is not negligent if its advantages outweigh its disadvantages." *Id.* The comments go on to note that the problem of valuation is difficult to quantify and "the burden of precaution is intangible in a way that perplexes any effort at quantification." *Id.* § 3 cmt. h.

<sup>&</sup>lt;sup>89</sup> See McCarty, 826 F.2d at 1557 (Posner, J.) (suggesting that judgments must be "reasonable," meaning "intuiting rather than measuring the factors in the Hand Formula"); *cf.* Richard W. Wright, *Hand, Posner, and the Myth of the "Hand Formula,*" 4 THEORETICAL INQUIRIES L. 145 (2003) (criticizing the Hand Formula and its perceived importance in the field of tort law).

<sup>&</sup>lt;sup>90</sup> See, e.g., Grundfest & Huang, supra note 12, at 1286 (treating probability as a relative frequency); Jeffrey O'Connell et al., An Economic Model Costing "Early Offers" Medical Malpractice Reform: Trading Noneconomic Damages for Prompt Payment of Economic Damages, 35 N.M. L. REV. 259, 284–86 (2005) (same); Priest & Klein, supra note 1 (same).

<sup>&</sup>lt;sup>91</sup> See supra note 73. Posner and Cooter suggest that probability is subjective. See Cooter, supra note 20, at 22 (probability is "subjective expectations correspond[ing] to the objective frequencies of the random event"); Posner, supra note 1, at 468 (noting that probability is calculated as each party "estimates it"). Even when scholars recognize the subjective nature of probability, its implications are not explored. See, e.g., WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF TORT LAW 55 (1987) (noting that the utility function depends on "subjective probability" but failing to discuss the implications on tort theory).

<sup>&</sup>lt;sup>92</sup> See supra Part II.C.

<sup>&</sup>lt;sup>93</sup> M.G. BULMER, PRINCIPLES OF STATISTICS 4 (1979).

relative frequency with which some event occurs."<sup>94</sup> John Maynard Keynes summarized the frequency theory:

The essence of this theory can be expressed in a few words. To say, that the probability of an event's having a certain characteristic is x/y, is to mean that the event is one of a number of events, a proportion x/y of which have the characteristic in question; and the *fact*, that there *is* such a series of events possessing this frequency in respect of the characteristic, is purely a matter of experience to be determined in the same manner as any other question of fact. That such a series do exist happens to be a characteristic of the real world as we know it, and from this the practical importance of the calculation of probabilities is derived.<sup>95</sup>

There are two classes of statistical frequency. First is *a priori* probability.<sup>96</sup> In these cases, the true frequency is known in the practical sense.<sup>97</sup> The class of outcomes is discrete and precisely defined, and the distribution of outcomes is clearly delineated over a large number of experiments. The simplest example is a coin flip. The second class of probability is "statistical judgment."<sup>98</sup> This version of probability is based on *a posteriori* data from which we infer a true frequency.<sup>99</sup> For example, from 1800 to 1802 in France, 110,312 boys and 105,287 girls were born, from which the mathematician Pierre-Simon Laplace inferred the chance of a boy newborn to be 51.2% as compared to 48.8% for a girl.<sup>100</sup> Thus, probability of a future event is inferred from judgment based on past experiences.

The reliability of approximation depends on the quality and quantity of data and their relationship to the premise and conclusion. It is imperative that "the class must be specified to which the proposition is being referred."<sup>101</sup> In some cases, the class can be determined narrowly: e.g., sex of newborns, coin flips, lawsuits filed in federal courts. But in most circumstances in the legal context, a single datum fits a number of classes. For instance, the number of federal

<sup>&</sup>lt;sup>94</sup> See id.

 $<sup>^{95}</sup>$   $\,$  John Maynard Keynes, A Treatise on Probability 94 (1921).

<sup>&</sup>lt;sup>96</sup> A.J. AYER, PROBABILITY AND EVIDENCE 27 (1972).

<sup>&</sup>lt;sup>97</sup> The exact probability of an event is unknowable because we can never replicate or measure the event to infinity. BULMER, *supra* note 93, at 5; *see* SERGIO M. FOCARDI & FRANK J. FABOZZI, THE MATHEMATICS OF FINANCIAL MODELING & INVESTMENT MANAGEMENT 166 (2004) ("If we accept a probability interpretation of reality, there is no way to leap to certainty.").

<sup>&</sup>lt;sup>98</sup> AYER, *supra* note 96, at 27.

<sup>&</sup>lt;sup>99</sup> KEYNES, *supra* note 95, at 102.

<sup>&</sup>lt;sup>100</sup> BULMER, *supra* note 93, at 3.

<sup>&</sup>lt;sup>101</sup> KEYNES, *supra* note 95, at 102.

lawsuits can be classified into simple subject areas such as specific causes of action, jurisdictional postures, forum and adjudicatory bodies, remedies sought, or combinations thereof. Such classifications, however, say little about the distinctions or similarities between one case and another in the same class. We can think in such crude approximations as "an ordinary tort case," "a securities class action," or "a commercial contract action," but what do these labels actually tell us about the class or each case relative to the class? Or, as Keynes asked, "[W]hat principle is there for uniquely determining the class, the truth-frequency of which is to measure the probability of the argument?"<sup>102</sup> Consider the possibility that case A belongs to classes  $C_1$  and  $C_2$ , where the probabilities are x and y, respectively. This suggests the seemingly unsettling possibility of a single proposition having multiple probabilities. In these cases, the instinct would be to take the most narrow, specialized class. But no matter how detailed a class is made to appear in the context of legal proceedings, experience tells us that there is usually an equally apt alternative class. If the class is narrowed to the logical end, it approaches the limit of one and the relevant premise merges with the probability proposition.<sup>103</sup> In most inquiries, the problem of determining the relevant class and defining the premise of the probability proposition is "insurmountable."104

Legal actions cannot be described in the narrow, symmetric manner that is required for measurement. Comparisons of frequencies or their rough qualitative substitute (prior personal experiences) is impossible due to practical and theoretical limitations. First, as a practical matter, the civil trial is an increasingly rare phenomenon and so the adequacy of the supporting data or experience is called into question.<sup>105</sup> Most attorneys and their clients lack sufficient trial experience to assess the probability of how a deliberative body would decide. The practice of most civil litigators is geared toward procedural processing, motions, and settlement positioning, and not toward conducting trials. What is the premise from which we sketch the class? What is the data

<sup>&</sup>lt;sup>102</sup> Id. at 103.

<sup>&</sup>lt;sup>103</sup> Id.

<sup>&</sup>lt;sup>104</sup> *Id.* In the field of evidence, the same problem of determining the relative cases presents itself. *See* Ronald J. Allen & Michael S. Pardo, *The Problematic Value of Mathematical Models in Evidence*, 36 J. LEGAL STUD. 107, 112 (2007) (noting that evidence may be a "member of an infinite number of reference classes, the boundary conditions of which can be gerrymandered in countless ways").

 $<sup>^{105}</sup>$  See Galanter, supra note 7, at 463 tbl.1, 507 tbl.4 (noting that from 1962 to 2002, the trial rate in federal civil actions declined from 11.5% to 1.8%; from 1976 to 2002 civil trials in twenty-two states declined from 36.1% to 15.8%).

or experience supporting the proposition? Ten jury trials? Twenty? Thirty?<sup>106</sup> How large is this data sample given the uniqueness of each case? To rely on frequency theory to predict legal decisions at trial would require a large set of data to support a probabilistic prediction.<sup>107</sup>

As for the theoretical problem, the facts of any given legal case are unique, the relevant class is but one, and thus data is nonexistent. Even something as mundane as the frequency of auto accidents has its limits. We can calculate the number of cars on the road, car types, driver demographics, drive time, geography, and frequency of accidents per car. These exercises are rote. Yet, aggregate frequency says very little about the "true" probability of any given accident. Consider the following: what is the probability that a 40-year-old driver, who has been driving since the age of 15 and has a virtually spotless accident record, would be involved in a serious accident on the 24 mile stretch of Kansas prairie on I-70 connecting Lawrence to Topeka during the pitch blackness of an early January morning in the middle of a severe ice storm? Unless these precise facts are repeated in a series of controlled experiments under the same or similar conditions, no statistician or actuary can calculate the probability of a serious accident in *this* circumstance.<sup>108</sup>

<sup>&</sup>lt;sup>106</sup> Fred Bartlit, formerly of Kirland & Ellis, is considered one of the best and most experienced civil trial attorneys in the country. *See* EMILY COURIC, THE TRIAL LAWYERS: THE NATION'S TOP LITIGATORS TELL HOW THEY WIN 1–39 (1988). According to the biographical information on his firm's website, he has tried 50 cases since 1970. Bartlit Beck Website, Fred H. Bartlit, Jr., http://www.bartlit-beck.com/lawyers/partners.asp (follow "Fred H. Bartlit, Jr." hyperlink) (last visited Oct. 1, 2006).

<sup>&</sup>lt;sup>107</sup> Even in such technical fields as aerospace engineering and risk management, the lack of data is an impediment. In assessing the Space Shuttle Challenger catastrophe, Nobel physicist Richard Feynman noted that NASA failed to define the appropriate premise for statistical calculations of catastrophic failure rates: "It is true that if the probability of failure was as low as 1 in 100,000 it would take an inordinate number of tests to determine it (you would get nothing but a string of perfect flights from which no precise figure, other than that the probability is likely less than the number of such flights in the string so far)." RICHARD P. FEYNMAN, CLASSIC FEYNMAN 467 (Ralph Leighton ed., 2006) (reprinting *Report of the Presidential Commission on the Space Shuttle Challenger Accident*, app. F (Personal Observations on the Reliability of the Shuttle) (Feb. 3, 1986)). Before the shuttle Challenger disaster in 1986, NASA estimated a catastrophic failure rate between 1/100 and 1/100,000. *Id.* Feynman noted in his report to President Reagan that one of the principle causes of the disaster was NASA's failure to understand the limitations of a frequency theory of probability. While NASA relied on a "high degree of mission success," it ignored previous instances of difficulties and near accidents. *Id.* The fundamental problem from the perspective of probability theory was defining the premise: is the class limited to catastrophic failure or does it include failures not resulting in catastrophe? Even in the most advanced sciences, statistical frequency is an elusive concept.

<sup>&</sup>lt;sup>108</sup> Telephone Interview with Larry Bruning, Chief Actuary, Kan. Dep't of Ins. (Nov. 2, 2005). Mr. Bruning stated that actuarial data is meaningless to the individual probability of any given event. *Id.* Such an event has no probability as it occurs within the context of a unique set of facts and the relevant class of comparison is one. Insurance is only possible because the law of large numbers can be used to measure frequency with respect to a large group. *See* SCOTT E. HARRINGTON & GREGORY R. NIEHAUS, RISK MANAGEMENT AND INSURANCE 57–60 (2d ed. 2004).

classifications for car accidents, deaths, and illnesses, are "random mass phenomenon[s], *unpredictable in certain details, predictable in certain numerical proportions of the whole.*"<sup>109</sup> While repeat players such as insurers and corporations can make decisions on the basis of aggregate risk, thus reducing the variance in a portfolio of lawsuits, an individual disputant cannot take the same approach because she is only interested in the value of *her* single, unique claim.<sup>110</sup> Accordingly, frequency theory is a limited concept for it "excludes a great number of judgments which are generally believed to deal with probability."<sup>111</sup> But this is not the death knell for probability in legal assessment.

*Inductive Probability*. Inductive probability is defined as "the degree of belief [at] which it is rational to place in a hypothesis or proposition on given evidence."<sup>112</sup> Probability is a proposition that can have various degrees of relationship to the corpus of knowledge. The philosopher Alfred Ayer characterized probability as judgments of credibility: "These are judgments to the effect that some particular event is likely to happen, or to have happened, or that one event is more likely to happen than another, though the degree of probability cannot, or cannot in any obvious way, be given mathematical expression."<sup>113</sup> Inductive probability is subjective, but subjectivity is not incompatible with rationality. A proposition is made probable not by mere belief, but by facts and inferences supporting that belief.<sup>114</sup> In the above example of the probability of a car accident, we may say that the "true" probability cannot be known (or does not exist), but we may still rationally believe that the chance of an accident is "significant," "insubstantial," or "quite

Thus, the judgment which assigns . . . to dying of lung cancer is, as I have said, statistical; but the judgment that such and such an individual smoker will probably die of lung cancer, if it is genuinely a judgment about this individual, and not just about the class of smokers to which he belongs, is a judgment of credibility.

<sup>&</sup>lt;sup>109</sup> GEORGE PÓLYA, 2 MATHEMATICS AND PLAUSIBLE REASONING 56 (1968).

<sup>&</sup>lt;sup>110</sup> See Rhee, supra note 12, at 238–39 (discussing the effect of repeat play on the level of risk-adjusted discounting in settlement value).

<sup>&</sup>lt;sup>111</sup> KEYNES, *supra* note 95, at 95. Keynes notes that even the sciences cannot rely in many cases on a frequency theory, citing Darwin's theory of evolution as an example. *Id.* at 108.

<sup>&</sup>lt;sup>112</sup> BULMER, *supra* note 93, at 5.

<sup>&</sup>lt;sup>113</sup> AYER, *supra* note 96, at 27–28. Ayer gives the following example:

*Id.* at 28. The physicist Feynman also approached the problem of a catastrophic failure in the Space Shuttle program in the similar manner of allowing for "engineering judgment." *See supra* note 107.

<sup>&</sup>lt;sup>114</sup> KEYNES, *supra* note 95, at 4. Keynes explained further that "judgments of probability, upon which we depend for almost all our beliefs in matters of experience, undoubtedly depend on a strong psychological propensity in us to consider objects in a particular light." *Id.* at 52.

high"—terms describing the individual weight of rational feeling toward the proposition and subject to the imprecision of language.

Statistical probability is a limited concept. In most situations, probability is a logical, not a mathematical, relationship among premises, facts, inferences, and conclusions.<sup>115</sup> Keynes provided the most vigorous articulation of inductive probability in *A Treatise on Probability*. There, he argued that inductive probability is a logical concept to which there are only "degrees of rational belief."<sup>116</sup> The inquiry goes to our understanding and perception of knowledge.

I maintain, then, in what follows, that there are some pairs of probabilities between the members of which *no* comparison of magnitude is possible; that we can say, nevertheless, of some pairs of relations of probability that the one is greater and the other less, although it is not possible to measure the difference between them; and that in a very special type of case . . . a meaning can be given to a *numerical* comparison of magnitude.

By saying that not all probabilities are measurable, I mean that it is not possible to say of every pair of conclusions, about which we have some knowledge, that the degree of our rational belief in one bears any numerical relation to the degree of our rational belief in the other; and by saying that not all probabilities are comparable in respect of more and less, I mean that it is not always possible to say that the degree of our rational belief in one conclusion is either equal to, greater than, or less than the degree of our belief in another.<sup>117</sup>

Outside of the special case of mathematical probability, probability is rooted in philosophy. Early philosophers believed that human experience provides the grounds for a rational belief that an event will occur.<sup>118</sup> The philosopher David Hume expressed the following sentiment:

Thus all probable reasoning is nothing but a species of sensation. [It is] not solely in poetry or music, we must follow our taste and sentiment, but likewise in philosophy. When I am [convinced] of any principle, [it is] only an idea, which strikes more strongly upon me. When I give the preference to one set of arguments above

<sup>&</sup>lt;sup>115</sup> Id. at 7.

<sup>&</sup>lt;sup>116</sup> Id. at 20.

<sup>&</sup>lt;sup>117</sup> *Id.* at 34.

<sup>&</sup>lt;sup>118</sup> Id. at 80.

another, I do nothing but decide from my feeling concerning the superiority of their influence.<sup>119</sup>

Mathematicians sought to replace the philosophical inquiry involving human sentiment and preferences with an empirical approach favoring objective data from past experiences, which Keynes noted would "have been a very astonishing discovery, and would . . . have gradually brought almost every phase of human activity within the power of the most refined mathematical analysis."<sup>120</sup> But the aspiration proved too much for the theory, and it was realized that the frequency theory required "not a wide experience or detailed information, but a completeness of symmetry in the little information there might be."<sup>121</sup> Only when the matter was simple—regardless of whether "balanced ignorance" made it so—could probability be removed from the realm of human feelings and into cold mathematics.<sup>122</sup>

## B. Probability and Legal Application

Looking to the field of law, Keynes wryly observed that "the lawyers have been more subtle in this matter than the philosophers."<sup>123</sup> He cited *Chaplin v*. *Hicks* as an example.<sup>124</sup> The case arose from a beauty contest involving ten districts. The contest drew six thousand applications. Five contestants from each district would be chosen as finalists. The fifty finalists would be personally interviewed by the defendant, and twelve contestants would then be

A judge who has long sat nisi prius ought gradually to acquire a fund of experience which enables him to represent the common sense of the community in ordinary instances far better than an average jury.... But it is obvious that the limit of safety in such cases, supposing no further elements present, could be determined almost to a foot by mathematical calculations.

OLIVER WENDELL HOLMES, J.R., THE COMMON LAW 111–29 (1881). But see Mars Steel Corp. v. Continental Bank N.A., 880 F.2d 928, 936 (7th Cir. 1989) ("Justice Holmes believed that courts would (at least, should) slowly reduce all of tort law to objective, readily applied rules. This is not viewed today as one of his more astute predictions.") (citations omitted). *Cf.* Blaak v. Davidson, 529 P.2d 1048, 1050 (Wash. 1975) ("Seldom, if ever, are the facts and circumstances surrounding a collision the same. Thus, particularly with respect to automobiles, the propriety of solidifying the law into mechanistic rules for universal application is dubious, and this legal reasoning or philosophy is clearly on the wane.").

<sup>&</sup>lt;sup>119</sup> DAVID HUME, A TREATISE OF HUMAN NATURE bk. 1, pt. 3, § 8, at 103 (L.A. Selby-Bigge & P.H. Nidditch eds., Oxford Univ. Press 1978) (1739).

<sup>&</sup>lt;sup>120</sup> KEYNES, *supra* note 95, at 85. Oliver Wendell Holmes flirted with the idea that in many cases negligence could ultimately be reduced to mathematics given a sufficient amount of judicial experience in dealing with accidents:

<sup>&</sup>lt;sup>121</sup> KEYNES, *supra* note 95, at 85.

<sup>&</sup>lt;sup>122</sup> Id.

<sup>&</sup>lt;sup>123</sup> Id. at 24.

<sup>&</sup>lt;sup>124</sup> 2 K.B. 786 (1911).

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declared winners. The plaintiff received the top finalist vote in one of the ten districts, and so was one of the fifty finalists. Due to a scheduling mistake, the defendant failed to meet the plaintiff, thus denying her the opportunity to win. The defendant argued that the cause of action was too speculative, that even if she had interviewed her chances would have depended on his subjective views of beauty. The court rejected this argument and affirmed the jury verdict for the plaintiff. Lord Williams conceded that even accounting for her top placement in her district, the probability could not be estimated with reasonable precision.<sup>125</sup> Ordinarily market pricing resolves disputes over value. "Sometimes, however, there is no market for the particular class of goods; but no one has ever suggested that, because there is no market, there are not damages."<sup>126</sup> Where there is no competitive market, the law can assign a value through a reasonable "guesswork" as to what that value may be if such a claim was traded in a competitive market.<sup>127</sup> Thus, "rough justice" was done in spite of the incalculability of probability.<sup>128</sup>

Tort law also poses the problem of incommensurable probability. The burden of persuasion in civil actions is the preponderance of the evidence, which has been interpreted as a statistical concept of more likely than not.<sup>129</sup> But circumstances can test the limit of this concept, particularly in causation analysis.<sup>130</sup> A consistent view of probability, mathematically or inductively adduced, at times is impossible. For example, in *Gardner v. National Bulk Carriers, Inc.*, a sailor fell overboard sometime within a five and a half hour window.<sup>131</sup> Since the captain did not attempt a rescue, causation was an epistemological enigma. Noting "large number of successes" in rescue of sailors even long after they had been in the water, the court could only

<sup>&</sup>lt;sup>125</sup> *Id.* at 791.

<sup>&</sup>lt;sup>126</sup> Id. at 792. Lord Moulton also noted the problem of "market pricing." Id. at 795–96.

 $<sup>^{127}</sup>$  Id. at 792–93. Lord Farwell gave some weight to the fact that the plaintiff placed first in the semifinal balloting. Id. at 798–99.

<sup>&</sup>lt;sup>128</sup> KEYNES, *supra* note 95, at 27.

<sup>&</sup>lt;sup>129</sup> See Rhee, supra note 30, at 141 ("Courts dogmatically have adhered to the 51% preponderance concept, stating it in such precise mathematical terms, as if expert testimonies between 'equal chance' and 'more likely than not' have any meaningful distinction in these cases beyond the artful."); see, e.g., Davis v. P. Gambardella & Son Cheese Corp., 161 A.2d 583, 587 (Conn. 1960) (testimony of fifty–fifty chance held to be insufficient because an even chance is said to be a possibility and not a probability), overruled by Petriello v. Kalman, 576 A.2d 474 (Conn. 1990); Russell v. Subbiah, 500 N.E.2d 138, 141 (III. App. Ct. 1986) (holding that fifty–fifty chance of future injury failed to meet reasonable certainty standard).

<sup>&</sup>lt;sup>130</sup> Sometimes, it is a mathematical certainty that the preponderance of the evidence standard cannot be met although justice requires a remedy. This was the situation in the celebrated case of *Summers v. Tice*, 199 P.2d 1 (Cal. 1948), where two hunters each fired shotguns in the direction of the plaintiff, resulting in injury.

<sup>&</sup>lt;sup>131</sup> 310 F.2d 284 (4th Cir. 1962).

conclude that the ship's master was negligent by not pursuing "a reasonable possibility of rescue."<sup>132</sup> Under the circumstances of these "uncertain fact[s]," the burden of the risk of inaction falls on the master and not the sailor.<sup>133</sup> The jury was allowed to hear the evidence and form a rational belief on causation. The practical effect of this rule of law is that some cases will result in liability while others will not: There will be uncertainty in the individual case and thus no guarantee of individual justice, but over time aggregate justice will be done.<sup>134</sup>

Another example of the law's treatment of probability is *Haft v. Lone Palm* Hotel.<sup>135</sup> In that case, the question was whether the failure to post a warning sign in a swimming pool, in violation of regulations, could have caused the plaintiff's drowning. Causation, a probabilistic analysis, was impossible to determine in a credible fashion. If causation cannot be established by a preponderance of the evidence as a part of a prima facie case, the plaintiff loses. The court held that in this situation, the burden shifted to the defendant to show that the failure to warn did not cause the harm.<sup>136</sup> The ruling attempts to reconcile a lack of probability with legal policy.<sup>137</sup> Cases like *Haft* pose the problem of a "recurring miss," in which each individual case is uncertain as to the probability, but in the aggregate accidents occur. For example, over many iterations a failure to warn will in fact cause some hotel guests to drown, but there will be no way to predict which specific iteration will cause harm.<sup>138</sup> Stated differently, the legal problem concerned the reconciliation of uncertainty in each unique case with a "random mass phenomenon." By shifting the burden of proof to the defendant, the court allowed the jury to form a rational belief about the probability of causation.<sup>139</sup>

In each case, the court recognized that statistical probability did not exist. What was the probability that the beauty contestant would have been selected

<sup>&</sup>lt;sup>132</sup> Id. at 286 n.2, 287.

<sup>&</sup>lt;sup>133</sup> *Id.* at 288.

<sup>&</sup>lt;sup>134</sup> See Rhee, *supra* note 30, at 162 ("Society expects not correct individualized results—the primary concern of corrective justice theorists in this field—but a fair process that achieves overall corrective justice for plaintiffs and deterrence for defendants.").

<sup>&</sup>lt;sup>135</sup> 478 P.2d 465 (Cal. 1970).

<sup>&</sup>lt;sup>136</sup> Id. at 469.

<sup>&</sup>lt;sup>137</sup> See Saul Levmore, Probabilistic Recoveries, Restitution, and Recurring Wrongs, 19 J. LEGAL STUD. 691, 705–10 (1990).

<sup>&</sup>lt;sup>138</sup> *Id.* at 706; *see* Rhee, *supra* note 30, at 5 (increased risk should be compensated because it decreases a person's valuation).

<sup>&</sup>lt;sup>139</sup> Levmore explains the decision as the court's desire to reach an aggregate probabilistic outcome that does justice on a grander scale. Levmore, *supra* note 137, at 708.

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on the basis of her beauty? What were the odds that the sailor could have been saved? What was the chance that the motel guests would not have drowned? Albeit immeasurable, the probabilities were seen as less remote, lying in that spectrum of possibilities where educated speculation or conjecture is allowed, and therefore worthy of jury consideration.<sup>140</sup> In the absence of market pricing, juries were the ultimate arbiters of valuational uncertainty. The determinations of liability are subject to their rational, subjective beliefs.

Interestingly, when mathematicians considered the application of probability to legal actions, they rejected the notion that statistical probability could apply or that such probability was measurable. George Pólya examined the ways in which deliberative bodies construe the same facts and evidence:

Two people presented with the same evidence may judge it very differently. Two jurors who sat through the same proceedings may disagree: one thinks that the evidence introduced is sufficient proof against the defendant and the other thinks that it is not. Such disagreement may have [a] thousand different grounds: people may be moved in opposite directions by fears, hopes, prejudices and sympathies, or by personal differences. Perhaps, one of the jurors is stupid and the other is clever, or one slept through the proceedings and the other listened intently. Yet the personal differences underlying the disagreement may be more subtle. Perhaps both jurors are honest and reasonably unprejudiced, both followed the proceedings with attention, and both are intelligent, but in a different way. The first juror may be a better observer of demeanor. He observes the facial expressions of the witnesses, the tics of the defendant; he notices when an answer is haltingly given; he is impressed by quick motions of the eyes and little gestures of the hands. The other juror may be a less skillful observer of facial expressions, but a better judge of social relations: he understands better the milieu and the circumstances of the people involved in the case. Seeing the same things with different eyes, honestly and not unintelligently, the two jurors come to opposite conclusions.<sup>1</sup>

Because there is no way to model human intelligence at work in the legal process, Pólya believed that patterns of plausible inference may rationally diverge in probability analysis.<sup>142</sup> Below is Michael Bulmer's opinion on the subject:

<sup>&</sup>lt;sup>140</sup> See infra note 228.

<sup>&</sup>lt;sup>141</sup> PÓLYA, *supra* note 109, at 110.

<sup>&</sup>lt;sup>142</sup> *Id.* at 111 ("[T]wo persons presented with the same evidence and applying the same patterns of plausible inference may honestly disagree.").

In a civil action, on the other hand, the jury, if there is one, will find for the party which they consider to have the higher probability of being correct in its assertions. The probability which it is the function of the jury to assess is clearly not a statistical probability; for each trial is unique and cannot be considered as one out of a large number of similar trials. What the jury does is to decide, after hearing the evidence, what, as reasonable men, they ought to believe and with what strength they should hold that belief.<sup>143</sup>

Finally, Keynes was skeptical of the notion that legal probabilities could be reduced to some empirical concept, divorced from the feelings of the parties.

How does the matter stand, then? Whether or not such a thing is theoretically conceivable, no exercise of the practical judgment is possible, by which a numerical value can actually be given to the probability of every argument. So far from our being able to measure them, it is not even clear that we are always able to place them in an order of magnitude. Nor has any theoretical rule for their evaluation ever been suggested.

The doubt, in view of these facts, whether any two probabilities are in every case even theoretically capable of comparison in terms of numbers, has not, however, received serious consideration. There seems to me to be exceedingly strong reasons for entertaining the doubt.<sup>144</sup>

These observations are obvious but worth emphasizing. Legal probability is immeasurable, indeterminate, and subjective. Yet law and economics literature models probability as an empirical concept to be treated in the same class as cash expenditure of transaction cost, which *is* quantifiable and subject to reasonable forecasting. This flawed assumption creates an insurmountable problem of compatibility. Probability can only be assessed in a qualitative manner, with imprecise language as the only medium of communicating complex sentiments and thoughts. Thus proposition *A* is said to be more likely than proposition *B*, though it may not be known by how much or precisely why one feels this way. Legal probability is not empirical in the sense of frequency of a discrete, narrowly defined, repeating event; it is empirical in the sense that it is formed on "beliefs that we cannot strictly prove but to which we attribute various degrees of likelihood."<sup>145</sup>

<sup>&</sup>lt;sup>143</sup> BULMER, *supra* note 93, at 6.

<sup>&</sup>lt;sup>144</sup> KEYNES, *supra* note 95, at 27–28.

<sup>&</sup>lt;sup>145</sup> FOCARDI & FABOZZI, *supra* note 97, at 166.

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In addition to relying on a faulty concept of probability, the standard economic model also views probability in the singular. However, if multiple probabilities can coexist, widely divergent views on probability are rational. Again, Keynes dealt with this problem:

Some sets of probabilities we can place in an ordered series, in which we can say of any pair that one is nearer than the other to certainty,— that the argument in one case is nearer proof than in the other, and that there is more reason for one conclusion than for the other. But we can only build up these ordered series in special cases. If we are given two distinct arguments, there is no general presumption that their two probabilities and certainty can be placed in an order.<sup>146</sup>

The problem of multiple probabilities is seen in *Laidlaw v. Sage*.<sup>147</sup> There, the defendant physically moved the plaintiff in front of him, using the plaintiff as a human shield against an assailant with a bomb. The plaintiff was unaware of the deadly situation and was injured when the bomb exploded. The defendant testified that he never touched the plaintiff before the explosion, thus factually contesting an essential element of the tort of battery;<sup>148</sup> but he also testified that he did nothing unconsciously, spontaneously, or without deliberation, thus supporting plaintiff's factual theory of an intentional act.<sup>149</sup> The defense's theories were: (1) no physical contact occurred and so no battery could have occurred (factual argument); (2) even if contact occurred, there was no battery as a matter of law because the act was in furtherance of selfpreservation (legal argument). This case illustrates the possibility of multiple probabilities in any given case. How can the probabilities of the legal argument be weighed against the factual argument? The nature, reasoning, and methods of these arguments are entirely different. The parties had divergent, but rational beliefs about them. These beliefs cannot be ranked in an ordered series and given comparative weight. It would be tempting to analyze these arguments as an "if-then" decision tree and calculate conditional probabilities. Let P(f) and P(l) be the probabilities of the defendant prevailing on the factual and legal arguments such that:  $P_d = P(f) + (1 - P(f)) \times P(l)$ , and  $P_p = (1 - P(f)) \times P(l)$ P(f) x (1 - P(l)) where  $P_d + P_p = 1$ . Do we believe that deliberative bodies, explicitly or implicitly, think in such linear terms? Do we trust the accuracy of

<sup>&</sup>lt;sup>146</sup> KEYNES, *supra* note 95, at 37–38.

<sup>&</sup>lt;sup>147</sup> 52 N.E. 679 (N.Y. 1899).

<sup>&</sup>lt;sup>148</sup> *Id.* at 682; *see* RESTATEMENT (SECOND) OF TORTS §§ 13, 18 (1965) (defining harmful and offensive contact).

<sup>&</sup>lt;sup>149</sup> Laidlaw, 52 N.E. at 685; see RESTATEMENT (SECOND) OF TORTS § 8A (1965) (defining the element of intent).

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these calculations? Or do they provide a false sense of empirical rigor? Such inquiry limits the analysis to narrow parameters, amounting to deliberate ignorance of the complexities of a true probabilistic analysis. For instance, the conditional probability analysis fails to consider the covariance of the factual and legal arguments in the deliberative process, the interplay between the strengths of facts, legal arguments, and liability. The influences of these factors are real, suggesting that the calculation of probabilities is not a single parameter function, but instead entails a whole host of factors that would be impossible to capture in an objective analysis.

The workings of intelligence do not fit any notion of symmetry<sup>150</sup> and only "balanced ignorance" can produce the desired calculation. Case theories may not exist in one plane of "truth." Cases like *Laidlaw*, while unique in facts, are common in that they have multiple probabilities based on competing or complementary planes of legal theory and factual contention.<sup>151</sup> It would be difficult to rank the arguments in an ordered series. Most cases are subject to multivariate decision-making processes in which there are various paths to resolution without the decisions falling into the realm of reversible error.<sup>152</sup>

From the outset it was clear that the two kinds of reasoning have different tasks. From the outset they appeared very different: demonstrative reasoning as definite, final, "machinelike"; and plausible reasoning as vague, provisional, specifically "human." Now we may see the difference a little more distinctly. In opposition to demonstrative inference, plausible inference leaves indeterminate a highly relevant point: the "strength" or the "weight" of the conclusion. This weight may depend not only on clarified grounds such as those expressed in the premises, but also on unclarified unexpressed grounds somewhere in the background of the person who draws the conclusion. A person has a background, a machine has not. Indeed, you can build a machine that will draw demonstrative conclusions for you, but I think you can never build a machine that will draw plausible inferences.

PÓLYA, supra note 109, at 115-16.

<sup>&</sup>lt;sup>150</sup> Pólya discussed the nature of plausible reasoning, a distinctly asymmetric and human form of intelligence.

<sup>&</sup>lt;sup>151</sup> Laidlaw was tried and appealed four times in the New York trial and appellate courts. 52 N.E. at 682. The Court of Appeals ultimately held that the "law presumes that an act or omission done or neglected under influence of pressing danger was done or neglected involuntarily." *Id.* at 685 (internal quotation marks omitted). This rule is based on the "maxim that self-preservation is the first law of nature." *Id.* Although the ruling is certainly plausible, it is equally plausible that self-preservation should come with the price that those injured in the pursuit of this right should be compensated as in the case of necessity. *See* Vincent v. Lake Erie Transp. Co., 124 N.W. 221, 221 (Minn. 1910) (indicating that a plaintiff under extreme distress may still be liable for injury done to a defendant's property).

<sup>&</sup>lt;sup>152</sup> See Rhee, supra note 30, at 157 ("Under this view, reversible error can be understood to occur when a deliberative body arbitrarily increases the general risk of a litigant beyond the range of rational multivariate decision-making.").

Probability then can be no more than the ex ante degrees of rational belief in the plausibility of these decision paths, irrespective of the ex post result.

# C. Weight, Variance, and Confidence

The standard model assumes that probability captures the risks associated with the dispute and appropriately discounts value. Probability defines the relation between the premise and known facts. It gauges rational belief at any given period, but does not measure how that belief may change over time or the confidence attributed to it. As more facts are disclosed, probability may move up or down, but the weight of the relevant evidence always increases. Keynes distinguished the two concepts as this: "The weight, to speak metaphorically, measures the sum of the favourable and unfavourable evidence, the probability measures the *difference*."<sup>153</sup> This Article modifies Keynes's definition: Weight W is the ratio of known information to knowable information as perceived by the parties. In any given dispute, there is imperfect information because (1) certain information is unknowable or unpredictable despite the best efforts of the parties (e.g., the decision standard of the deliberative body),<sup>154</sup> or (2) there is information asymmetry or undiscovered information. Imperfect information constitutes the uncertainty.<sup>155</sup> Thus, weight is a key factor of dispute risk.

The following hypothetical illustrates the difference between probability and weight.<sup>156</sup> Plaintiff went into defendant's hospital for a simple appendectomy and came out of surgery comatose. The coma was induced when she vomited into the breathing tube and suffered brain damage from asphyxiation. Because discovery has yet to begin, there is little factual development. The plaintiff's attorney undertakes the representation because he thinks: *The damages are significant and a comatose plaintiff would engender* great sympathy. I have a decent chance of winning this case at trial if it goes that far, and besides, there's a good chance that the defendant will settle. But I have to consider that the hospital has a powerful presence in this community and a good record of defending medical malpractice cases. The lawyer's

<sup>&</sup>lt;sup>153</sup> KEYNES, *supra* note 95, at 77.

<sup>&</sup>lt;sup>154</sup> The decision standard is the collective predispositions, life experiences, and unknown dynamics among people, all of which combine to apply the given law and weigh the presented facts.

<sup>&</sup>lt;sup>155</sup> See infra Part IV.C; see also Bebchuk, supra note 38 (discussing the problem of imperfect information).

<sup>&</sup>lt;sup>156</sup> This hypothetical is derived from the film *The Verdict* (20th Century Fox 1982) (based on BARRY C. REED, THE VERDICT (1980)).

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assessment is rational. Probability derives from the logical connections among known facts. Under the notice pleading doctrine, a plaintiff is not required to investigate a claim in great detail.<sup>157</sup> There is a limit to private investigation without the force of law or mutual cooperation and, therefore, the discovery process is seen as the primary method to investigate facts. At the start of any case, there is significant uncertainty. The attorney knows only that plaintiff went into a routine surgery and came out horribly injured, an event giving rise to a suspicion of negligence.<sup>158</sup> If pushed for the probability of a favorable outcome, perhaps this attorney may reasonably say "fifty–fifty,"<sup>159</sup> not in the sense that the frequency is 50%, but that one proposition seems just as good as the other.<sup>160</sup>

Note that an unknown cannot influence probability and so it is irrelevant to an analysis of probability. In other words, if  $\lambda$  represents the anticipated influence of an unknown fact, then  $P = \lambda \cdot P$ . Probability cannot change even as the parties understand that there are unknown facts that may influence the case. Probability is derived from the relationship among *known* facts and is independent of weight. There is an important implication here: Because the concept of probability cannot account for weight, the standard model implies that weight is irrelevant.<sup>161</sup> Accordingly, the sooner the settlement, the greater is the potential economic benefit. As we will see, this implication cannot hold.

Weight is important because it affects the perception of variance, defined as the degree of deviation of outcome from expectation. Unless a matter is certain, every forecast has a margin of error.<sup>162</sup> It would be foolish to believe that one's best forecast would always be correct. Thus, the smaller this margin, the more one is confident in one's forecast. The measure of

<sup>&</sup>lt;sup>157</sup> The rules of procedure require attorneys to have conducted "an inquiry reasonable under the circumstances." FED. R. CIV. P. 11(b). Notice pleading practice only requires that the complaint be a "short and plain statement of the claim." FED. R. CIV. P. 8(a).

<sup>&</sup>lt;sup>158</sup> *Cf.* Ybarra v. Spangard, 154 P.2d 687 (Cal. 1944) (complication resulting from an unusual injury after routine surgery gave rise to *res ipsa loquitor* when multiple medical professionals were involved in treatment of patient).

<sup>&</sup>lt;sup>159</sup> Lawyers would be "wise to refrain from issuing advice in such quantitative terms." Detlev F. Vagts, *Legal Opinions in Quantitative Terms: The Lawyer as Haruspex or Bookie?*, 34 BUS. LAW. 421, 428 (1979). Indeed, most lawyers do not quantify the chances of success. *Id.* at 422–23.

<sup>&</sup>lt;sup>160</sup> The response would be consistent with the statistical "Principle of Indifference, which states that two events are equally probable if we have no reason to suppose that one of them will happen rather than the other." BULMER, *supra* note 93, at 8.

<sup>&</sup>lt;sup>161</sup> In the standard formulation,  $V = P \times J \pm T$ , there is no term that accounts for the influence of variance. See supra Section II.C.

 $<sup>^{162}</sup>$  In statistics, a confidence interval of a probability can be calculated to determine a margin of error. See infra notes 165–69.
confidence in one's expectation is variance. The concepts of probability and confidence are sometimes confused. For example, in ordinary speech, when a person says, "I'm 99% sure of proposition X," there are two potential meanings: (1) "If the event were to repeat 100 times, I believe that X will occur 99 times," or (2) "I believe more likely than not that X will occur and I'm very confident of my prediction." The former is a comment on probability, and the latter is really a statement of confidence. Thus, probability and confidence are distinct.

The importance of confidence cannot be underestimated. In the context of investment, confidence is a factor of economic decision making. In his landmark economic treatise, *The General Theory of Employment, Interest, and Money*, Keynes noted that in the macroeconomic context, investment decisions are affected not only by forecasts of prospective yield, but also the state of confidence in those forecasts: "If we expect large changes but are very uncertain as to what precise form these changes will take, then our confidence will be weak."<sup>163</sup> Because attaching great weight to uncertain matters would be "foolish," the capital investment rate "depends on the *confidence* with which we make this forecast [return]—on how highly we rate the likelihood of our best forecast turning out quite wrong."<sup>164</sup>

In the hypothetical negligence case above, consider how the level of confidence would affect decision making. We first ask: how much variance can we expect from the expectation of the initial case assessment of probability to the ultimate outcome? "Quite high" must be the answer because the case would be highly sensitive to new information. The attorney cannot be confident in his "fifty-fifty" assessment. This lack of confidence has practical implication on settlement. Assume that medical malpractice cases involving asphyxiation during anesthesia are common and that data on damages is plentiful. For simplicity of analysis and communication, assume that a finding of liability would result in expected damages of \$2 million and that probability is measured as a numeric value between 0 and 1. Both parties independently assess the chance of plaintiff winning at 40%. Transaction cost for trial would be \$200,000 for each party, and the attorneys' fees are payable regardless of the result. The standard economic model prescribes that the rational choice is to settle. Plaintiff's minimum settlement value is  $V_p = \$2 \text{ million } x 40\% -$ \$200,000 = \$600,000. Defendant's maximum settlement value is  $V_d = $2$ 

 <sup>&</sup>lt;sup>163</sup> JOHN MAYNARD KEYNES, THE GENERAL THEORY OF EMPLOYMENT INTEREST AND MONEY 148 (1962).
<sup>164</sup> Id.

million  $x \ 40\% + \$200,000 = \$1$  million. The contract zone is \$400,000, suggesting an excellent possibility of settlement.<sup>165</sup> Equitable settlement suggests a value of \$800,000. In practice, is settlement this simple? Before answering this question, we further assume the improbable: The parties agree on the basic drivers of settlement valuation; they act rationally and without emotional noise; they refrain from gamesmanship that jeopardizes settlement; and agency cost is zero.<sup>166</sup> The standard model suggests that settlement is the only rational choice. The parties' probabilities converged, and they hold an identical view of the case. Even under these implausible conditions, however, would the parties settle early in practice or in theory? "No" must be the answer. Foregoing settlement is the only rational choice. This answer may surprise some, but the reason lies with uncertainty. From the defendant's perspective, it is difficult to write a check for as much as \$1 million upon the filing of a complaint even if repeat play consideration is not an issue. Potential liability may be high, but the hospital may have a viable defense as yet unknown. Since the unknown cannot influence probability, the standard model fails to account for uncertainty. Although there is a probability (of the inductive kind), the weight here cannot justify a rational valuation. From the plaintiff's perspective, any substantial offer would be enticing. Subjective heuristics may result in an acceptance to "lock in" a gain.<sup>167</sup> But acceptance may result in leaving money on the table, a common fear among all parties in a negotiation. The offer must be either fair or unfair, but there is little factual support for a reasoned distinction. Settlement is a speculative gamble because it is unsupported by an adequate valuation. Thus, there is an option value of litigation that must be considered.

Foregoing settlement is contrary to the prescription of the economic model, which says that settlement is imperative upon an agreed assessment, existence of transaction cost surplus, and minimization of strategic and behavioral barriers to settlement. With the assumption of risk neutrality, probability outcome is the only relevant consideration and variance of outcome matters

<sup>&</sup>lt;sup>165</sup> See POSNER, supra note 22, at 567 ("Perhaps the best guess is that the larger the settlement range the likelier a settlement is, but the longer the negotiation of the settlement is likely to take.").

<sup>&</sup>lt;sup>166</sup> See Ronald J. Gilson & Robert H. Mnookin, *Disputing Through Agents: Cooperation and Conflict Between Lawyers in Litigation*, 94 COLUM. L. REV. 457 (1994) (discussing agency as playing a beneficial role in resolving disputes); Gross & Syverud, *supra* note 2, at 348–52; Johnson, *supra* note 25, at 568–69 (describing the incentives of attorneys under various fee arrangements); Geoffrey P. Miller, *Some Agency Problems in Settlement*, 16 J. LEGAL STUD. 189, 194–95 (1987).

<sup>&</sup>lt;sup>167</sup> This sentiment is consistent with Amos Tversky and Daniel Kahneman's theory that people are risk averse as to locking in gains and risk seeking in avoiding losses. *See generally* JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES, *supra* note 23.

not.<sup>168</sup> But the uneasiness we feel is related to *weight*. At this stage in the litigation, the parties should not settle in theory and would not settle in practice because the underlying *variance* of the case is too great. While the parties may have assessed probability, *confidence* in that assessment is low due in part to low weight and high variance. Speculation—a proposition without sufficient basis in information—is not desirable in a decision process. Thus, confidence is independent of probability, correlated with variance, and dependent on weight.

Continuing the hypothetical, assume that plaintiff can leverage her position by betting on her case with a bookmaker at 2-3 odds.<sup>169</sup> With a \$400,000 bet she can win \$600,000 if she wins her case, thus leveraging her litigation position.<sup>170</sup> (We ignore the obvious problems of moral hazard, attorney ethics, and contract enforceability, as well as the impossibility of creating gaming odds of legal actions where a party partly controls the game outcome absent pari-mutuel betting among a group of gamblers.) The plaintiff's range of payoffs increases from [\$1.8 million, -\$200,000] to [\$2.4 million, -\$600,000]. Is this strategy rational? "No" must be the answer. It is not because she increased her risk exposure, for this is simply her risk preference, but rather because this risk exposure was assumed speculatively. The uncertainty is great enough that no rational person would leverage or hedge the position by placing a bet on the outcome of the litigation with a third-party bookmaker outside of the utility of gambling. If a bet is to be made at all, it must be in furtherance of value maximization and not speculation.<sup>171</sup> As Nobel laureate Harry Markowitz observed in his seminal article Portfolio Selection, most investors consider "yield to be a good thing; risk, a bad thing; gambling, to be

<sup>&</sup>lt;sup>168</sup> For example, it is irrelevant for the purposes of settlement whether a lawsuit is expected to yield binary judgments of [51, 49] or [100, 0], since the expected value is the same 50. Obviously, in the practical world, this difference would matter greatly as the former is virtually a certain result and the latter is a risky outcome.

<sup>&</sup>lt;sup>169</sup> Leveraging a position describes the accumulation of a significant risk without appropriate hedging. *See* Rhee, *supra* note 30, at 133–34 n.107. On the other hand, hedging eliminates or minimizes the exposure to a specific risk by offsetting any downward movement of that risk with a matching upward movement in another financial instrument.

<sup>&</sup>lt;sup>170</sup> By taking this bet, plaintiff would essentially engage in a derivative transaction in which she leverages (or increases) the risk of the underlying asset, i.e., the litigation. *See generally* JOHN C. COX & MARK RUBINSTEIN, OPTIONS MARKETS (1985); JOHN C. HULL, OPTIONS, FUTURES AND OTHER DERIVATIVES (5th ed. 2002).

<sup>&</sup>lt;sup>171</sup> Simple risk management techniques can be applied to reduce the variance of outcome while maintaining the expected value. *See* Rhee, *supra* note 12, at 202–04 (arguing that risk mitigation enhances the asset value of a lawsuit).

avoided."<sup>172</sup> Since the plaintiff's bet would be speculative, a rational attorney could not advise it.

Assume now that litigation advances through discovery. Weight increases substantially. Plaintiff still assesses a 40% chance of winning a \$2 million judgment and this view is now "reasonably firm." If the plaintiff loses, she should be liable for attorneys' fees of \$200,000, a more likely than not expected event. She has an option of pursuing an unhedged position or a hedged strategy to mitigate downside risk. Without a hedge, the payout is still [\$1.8 million, -\$200,000] with a net expected value of \$600,000. A hedge can reduce the risk to the original neutral position of no loss. The plaintiff could place a \$300,000 bet against her case on 3-2 odds: if she wins her case, she gains \$1.8 million net of attorneys' fees. less \$300,000 in hedging loss for a total yield of \$1.5 million; if she loses her case, she incurs attorneys' fees of \$200,000, which are offset by a hedging gain of \$200,000 for a net zero. The range of payouts is [\$1.5 million, \$0]. The hedged position still has the same expected value of \$600,000 but provides insurance against downside risk by decreasing the variance of return. Under these conditions, would the plaintiff be rational in hedging? "Yes" must be the answer. In effect, she bought a put option to protect against a decline in the value of the underlying asset (the lawsuit).<sup>173</sup> Since the hedged strategy reduces variance of cash flow, and thus reducing risk, it is superior even though the expected values may be the same. Under an expected value analysis, there is no difference between the valuation at the beginning of the case, the unhedged valuation at the end discovery, and the hedged valuation. It is indifferent to differences in risk profiles. Expected value assesses a probabilistic quantity of a cash flow, but importantly does not assess the *auality* of the cash flow.<sup>174</sup>

Probability and weight are independent, which is to say that their movements are uncorrelated. Weight rises with every disclosure of relevant evidence, while probability may rise or fall independently.<sup>175</sup> Yet there is confusion in the legal literature on this point. Consider Posner's explanation for the timing of settlements.

<sup>&</sup>lt;sup>172</sup> Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77, 91 (1952); *see* KEYNES, *supra* note 163, at 148 ("It would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain.").

 $<sup>^{173}</sup>$  A put option is the right, but not the obligation, to sell an asset at a fixed price before the expiration of the option. *See* Cox & RUBINSTEIN, *supra* note 170, at 3.

 $<sup>^{174}</sup>$  See Rhee, supra note 12, at 202–04 (assessing the quality of an expected cash flow is critical to an asset pricing model of valuation).

<sup>&</sup>lt;sup>175</sup> KEYNES, *supra* note 95, at 72.

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A final question about settlement is, when does it occur? It can be at any time in the course of a legal dispute, including before suit is filed and after judgment is rendered by the trial court. Many cases in fact are settled on the eve of trial. It might seem that the probability of settlement would rise as a lawsuit progressed through pretrial discovery and other preparatory stages and on into trial, because the parties would be obtaining more and more information about the likely outcome at trial and therefore their estimates of that outcome would be more and more convergent. But this ignores the fact that as a lawsuit progresses, the incremental cost of litigation versus settlement declines. So, on the one hand, the perceived benefits of litigation are declining (those being a function of the parties' mutual optimism, which should decrease as they learn more about the case), but, on the other hand, so are the costs—if sunk costs are ignored, as rational persons will do.<sup>176</sup>

This explanation exposes the conceptual limits of the standard model. It suggests that litigation incentivizes continued litigation. Spent transaction costs are sunk costs and thus irrelevant.<sup>177</sup> Continued litigation reduces transaction cost relative to the stake; all else being equal, it follows that continued litigation should reduce the incentive for settlement.<sup>178</sup> With the assumption of risk neutrality, the prediction would be that continued litigation would yield many trials. But we know from experience that continued litigation ultimately leads to many settlements. Posner explains this anomaly by suggesting that the probability delta  $(P_p - P_d)$  also becomes smaller due to increased information resulting from litigation. However, this explanation is too convenient. It assumes a single "true" probability that remains to be discovered by the parties as their assessments become "more and more convergent." This analysis confuses the distinction between weight and probability. Increasing weight does not necessarily produce convergence of probability. The intensity of divergent beliefs may rationally strengthen with increased weight.<sup>179</sup> Convergence is a theory assumption that fails to reflect

<sup>&</sup>lt;sup>176</sup> POSNER, *supra* note 22, at 574.

<sup>&</sup>lt;sup>177</sup> See supra note 5.

<sup>&</sup>lt;sup>178</sup> See Wittman, supra note 39, at 320 ("The choice between a settlement and a trial depends not upon sunken costs but only upon future costs not yet incurred.").

<sup>&</sup>lt;sup>179</sup> The empirical evidence supports the phenomenon of divergence. *See* Elizabeth F. Loftus & Willem A. Wagenaar, *Lawyers' Predictions of Success*, 28 JURIMETRICS J. 437, 450 (1988) (presenting empirical findings that suggest "lawyers tended to be overconfident, in general, but especially so in cases in which they initially made highly confident predictions" and suggesting a "range of human inferential shortcomings"); George Lowenstein & Don A. Moore, *When Ignorance Is Bliss: Information Exchange and Inefficiency in Bargaining*, 33 J. LEGAL STUD. 37, 37 (2004) ("[S]hared information, if open to multiple interpretations, is likely to be interpreted egocentrically by the disputants, which can cause beliefs to diverge rather than converge."); *cf.* 

the malleability of rational belief and the complexities of human intelligence at work.

The suggestion here is not that there is no correlation between perceptions of the direction of relevant evidence. Even agreement or noncontradiction as to direction of the evidence need not lead to convergence of belief. For example, a plaintiff may depose a witness and conclude afterwards that the deposition was "very helpful," while the defendant, listening to the same deposition, may think it was "slightly detrimental" or "neutral." In most cases there is no single, objective weight to a piece of evidence. The weight is always contextual, and it is not necessarily a zero sum proposition. Even if the general direction of the evidence is perceived to be the same or nonconflicting, variance of interpretation and effect on case theory play a significant role. The application of legal evidence always has a number of possibilities. Over a period of time, the difference in shades of beliefs, even if directionally consistent, may produce significant divergence as the sum product of total weight.

A simple stylized experiment illustrates this point. Assume an arbitrary starting point measurement of 0. Forty different pieces of evidence are introduced at forty discrete time periods. With each disclosure, one party views the evidence as "strongly favorable," "favorable," or "neutral," and arbitrary numbers 2, 1, and 0 are assigned to these terms for pro forma measurement purposes. The opposing party also views the same piece of evidence as "strongly unfavorable," "unfavorable," or "neutral," and numbers are assigned 2, 1, and 0. If one party views a piece of evidence as "strongly favorable" and the other views it as "strongly unfavorable," there is perfect interpretive correlation. Each party would then receive 2 points, and so their assessments would remain the same. Under these conditions, the greatest divergence of view on any evidence is "strongly (un)favorable" to "neutral." The views are randomly selected by an equal probability, random number function. Even under this condition of high interpretive correlation, disparities of assessment as measured by the aggregate number appear frequently. At times, the assessments closely track each other, but at other times there are significant divergences. Granted these figures are arbitrary, but this simple

KEYNES, *supra* note 95, at 171 ("[T]he evidentiary weight of an argument rises, though its probability may rise or fall, with every accession of relevant evidence."); PóLYA, *supra* note 109, at 111 ("[T]wo persons presented with the same evidence and applying the same patterns of plausible inference may honestly disagree.").

example shows that assessments can diverge even as information is interpreted in a nonconflicting manner by opposing parties.

Furthermore, consider the complicating phenomenon that rational parties may actually disagree on both impact and direction of evidence. While it is true that convergence occurs, perhaps with some frequency, divergence is also common in contested actions. In many cases, there is not simply one plausible theory of the case. If evidence is contextual, it may be construed in an egocentric way. This may not be as irrational as it seems. A dispute is a battle of ideas, and since the decision of the deliberative body is unpredictable, holding an egocentric view is consistent with the rational condition of selfinterest. After all, in an adversarial contest, why should a party interpret an ambiguous piece of evidence against one's case when it could be interpreted in one's favor? The ambiguity of interpretation would factor into one's confidence in the proposition, but unnecessary concessions of argument would not be expected of rational parties. It is unclear whether convergence or divergence is the underlying cause of settlement or trial. We can safely assume that convergence is not uncommon and that settlements occur in many cases because of it, but beyond this obvious point it is conjecture to suggest that convergence is the primary reason for the high level of observed settlements in practice, particularly in the later stages when the incentive of transaction cost savings is diminished with the accumulation of sunk costs. In any given case, the "random walk" of a dispute may lead to substantial divergence of probability assessment between rational parties.

# D. Random Walk Down Litigation Lane

The above hypothetical case assumes that risk hedging or leveraging strategies are available. If legal assessment could be reduced to measurable probabilities, we would expect an active gaming market. But even though such oddities as political and military events are wagered on, a gaming market in legal proceedings does not exist. Even if betting was legal, the overwhelming majority of actions would be ill-suited for wagering. The reasons are fairly obvious. Litigants may engage in "insider trading" by undermining their cases for profit or otherwise rigging the bet. Information is opaque, variables are practically unlimited, and the nature of uncertainty cannot be captured in the simplistic terms needed for gaming. Even the simple task of defining the triggering contingency is elusive in litigation; questions like "who won" and "by how much" are not always easy to answer. Collectively, these uncertainties and risks are too variable, indeterminate, and subjective.

The standard model assumes a fixed decision standard.<sup>180</sup> Judged against this fixed point is probability. If the parties cannot settle, it is deemed that one or more are optimistic.<sup>181</sup> The problem is that the decision standard can never be known ex ante. In a market, buyers and sellers set the price, and in an efficient market the price has a tendency to track intrinsic value, though that value is difficult to ascertain. Although parties may hold rational yet divergent views on value, they also recognize that future prices cannot be consistently predicted. What will Microsoft's stock price be in two years? Will the price of oil rise or fall? Will a jury be persuaded by the case theory? We can make rational estimates of a range of values based on generally accepted pricing convention, but we recognize that there is no goose that lavs the golden eggno assurance that the application of any pricing technique will predict the indeterminate future. Economic research dating back to 1900 by Louis Bachelier has shown that "the market, the aggregate of speculators, at a given instant can believe in neither a market rise nor a market fall, since, for each quoted price, there are as many buyers as sellers."<sup>182</sup> All subsequent research has shown that individual market participants cannot predict future market prices relative to the expected market return, despite the vast wealth of public data.183

When the public markets attempt to assess legal outcomes, the results are not any better. In study of the Texaco–Pennzoil litigation, David Cutler and Lawrence Summers observed that Pennzoil's value gained only one-sixth of Texaco's loss and so there was net wealth loss of \$3.4 billion where one would

<sup>&</sup>lt;sup>180</sup> See supra Part II.C.

<sup>&</sup>lt;sup>181</sup> See supra note 46.

<sup>&</sup>lt;sup>182</sup> PETER L. BERNSTEIN, CAPITAL IDEAS: THE IMPROBABLE ORIGINS OF MODERN WALL STREET 20–21 (1992) (quoting LOUIS BACHELIER, THE THEORY OF SPECULATION 26 (1900)) (internal quotation marks omitted).

<sup>&</sup>lt;sup>183</sup> See Eugene F. Fama, *The Behavior of Stock-Market Prices*, 38 J. BUS. 34, 34 (1965) ("[T]he future path of the price level of a security is no more predictable than the path of a series of cumulated random numbers."); M.G. Kendall, *The Analysis of Economic Time-Series—Part I: Prices*, 116 J. ROYAL STAT. SOC'Y 11, 11 (1953) ("In a series of prices which are observed at fairly close intervals the random changes from one term to the next are so large as to swamp any systematic effect which may be present. The data behave almost like wandering series."); Holbrook Working, *A Random-Difference Series for Use in the Analysis of Time Series*, 29 J. AM. STAT. ASS'N. 11, 12 (1934) (Subsequent changes in wheat prices are "largely random and unpredictable.").

expect neither net loss nor net gain.<sup>184</sup> The litigation was of public record, followed by a wide audience, with no indication of asymmetric information.<sup>185</sup> Even under these conditions, however, the "market inefficiently valued the claims of the two companies."<sup>186</sup> The unpredictability of legal action created a cost of financial distress to Texaco, which increased Texaco's discount rate reflecting its cost of capital. This cost of uncertainty resulted in value leakage to Texaco that could not be captured by Pennzoil.<sup>187</sup> The inference is that the value leakage would not have occurred if the public market could have efficiently valued the legal dispute, i.e., accurately assessed the probability of success. Although the payment of a judgment is always zero sum, the valuational considerations are not necessarily so. In the public market at least, uncertainty creates a cost that was not captured as a surplus by the opposing side.<sup>188</sup> This empirical evidence suggests that the concept of a cost of resolution goes far beyond transaction cost.

The basic problem presented in Texaco–Pennzoil is also seen in the simplest of tort cases. Imagine a two car accident. The parties are similarly situated in credibility and resources, and one says the light was green and the other says the light was red. Even a panel of neutral legal experts may disagree as to the outcome of this simple case. The suggestion is not that ex ante estimation of the decision standard is inappropriate. This task is part and parcel of the business of dispute resolution. Rather, it is that the decision standard is a variable point. It does not exist ex ante as a fixed reference point that the parties must discover, but is simply an ex post result that the parties

<sup>&</sup>lt;sup>184</sup> David M. Cutler & Lawrence H. Summers, *The Costs of Conflict Resolution and Financial Distress: Evidence from the Texaco–Pennzoil Litigation*, 19 RAND J. ECON. 157, 158, 160 (1988). The Texaco–Pennzoil litigation was covered extensively in the Virginia Law Review's Symposium on the Law and Economics of Bargaining. See Stephen M. Bundy, *Commentary on "Understanding* Pennzoil v. Texaco": *Rational Bargaining and Agency Problems*, 75 VA. L. REV. 335 (1989); David A. Lax, *Commentary on "Understanding* Pennzoil v. Texaco": *Market Expectations of Bargaining Inefficiency and Potential Roles for External Parties in Disputes Between Publicly Traded Companies*, 75 VA. L. REV. 367 (1989); Robert H. Mnookin & Robert B. Wilson, *Rational Bargaining and Market Efficiency: Understanding* Pennzoil v. Texaco, 75 VA. L. REV. 295 (1989).

<sup>&</sup>lt;sup>185</sup> Cutler & Summers, *supra* note 184, at 169.

<sup>&</sup>lt;sup>186</sup> Id.

<sup>&</sup>lt;sup>187</sup> Id. ("The principal uncertainties revolved around likely legal judgments that both parties had equivalent capacities to predict."). Other financial economic studies support Cutler's and Summers's observations of value leakage. See Sanjai Bhagat et al., The Costs of Inefficient Bargaining and Financial Distress: Evidence from Corporate Lawsuits, 35 J. FIN. ECON. 221, 228 (1994) ("These results are consistent with the asymmetric effects documented in the Cutler and Summers (1988) study of Pennzoil v. Texaco."); Kathleen Engelmann & Bradford Cornell, Measuring the Cost of Corporate Litigation: Five Case Studies, 17 J. LEGAL STUD. 377 (1988) (examining, among other cases, Pennzoil v. Texaco).

<sup>&</sup>lt;sup>188</sup> See Bhagat et al., supra note 187, at 233 ("Our results indicate that lawsuits are not zero-sum games.").

achieve if they opt for trial. Because it is impossible for any party to know whether he has accurately estimated its location ex ante (irrespective of the rationality of that estimate), any theoretical framework that compares a party's beliefs to a fixed decision standard from a normative perspective is tautological because it assumes knowledge that cannot be known.<sup>189</sup>

It can never be assumed that parties should try to accurately predict the decision of the deliberative body because this assumes a level of predictive power beyond the credible allowance of a rational person. The suggestion here is *not* that case outcomes are so random that any endeavor to predict results is a fool's errand; rather, it is simply that the degree of precision implied by the standard economic model is fool's gold.<sup>190</sup> Just like stock prices, perceived case value fluctuates upon incorporation of new information.<sup>191</sup> In the markets, speculators can reasonably believe that a stock's price will trade within a broad range, but prices within this range may move stochastically upon the disclosure of new information and events. Each person may hold a rational belief about such matters based on information and application of valuation conventions (and indeed a market cannot exist absent these differences), but there cannot be an expectation that any individual belief is accurate as to the expected return since "the mathematical expectation of the speculator is zero."<sup>192</sup>

The case assessment of a civil action follows a random walk like that of a stock.<sup>193</sup> The up–down movement of probability (expectation) is a function of information dissemination. For illustrative purposes we can model the random movements of legal assessment in a highly simplified form. An assessment starts at any arbitrary point a and, after wandering through a discrete time

<sup>&</sup>lt;sup>189</sup> But see Priest & Klein, *supra* note 1, at 4 (suggesting an empirical model to select disputes suitable for litigation as opposed to settlement).

<sup>&</sup>lt;sup>190</sup> Disputes come in all flavors. Some are rather simple and typically settled early and routinely, while others are more complex and tend to be disputed more. *See* H. LAURENCE ROSS, SETTLED OUT OF COURT: THE SOCIAL PROCESS OF INSURANCE CLAIMS ADJUSTMENTS 133–35 (1980) (noting that simple cases are "routinized" in insurance claims process).

<sup>&</sup>lt;sup>191</sup> See Fama, supra note 183 (discussing various forms of the "efficient" market model).

<sup>&</sup>lt;sup>192</sup> BERNSTEIN, *supra* note 182, at 21 (quoting BACHELIER, *supra* note 182).

<sup>&</sup>lt;sup>193</sup> See FOCARDI & FABOZZI, supra note 97, at 219–32 (discussing random walk and Brownian motion characteristics of stock movements). George Pólya is credited with coining the term "random walk." See GERALD L. ALEXANDERSON, THE RANDOM WALKS OF GEORGE PÓLYA 51 (2000) (discussing "his 1921 paper on random walk, a phrase used for the first time by Pólya"). But the term shows up in other scientific and mathematical inquiries published around the turn of the century. An early reference appeared as a problem submitted by Professor Karl Pearson in 1905. Karl Pearson, *The Problem of the Random Walk*, 72 NATURE 294 (1905).

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period, ends at point z. Litigation is not static, so a party cannot rationally expect this assessment to remain still from points a to z. An incremental packet of information can move an assessment [+m, 0, -m] with equal probability as to direction. Under these conditions, case assessment proceeds as a trinomial walk in which each assessment is subject to a random equal probability motion at each interval. Even a simple litigation under these parameters can start to unravel into widely divergent random paths. Figure 1 shows an iteration of twenty different assessments moving in a trinomial random walk.<sup>194</sup>

# Figure 1



The nature of litigation is stochastic,<sup>195</sup> and thus a common quip among lawyers is that "your case is never as good as when it first walked in your office." Although the dispersion pattern of individual assessments is random, the average value at the end point z is virtually the same as the starting value at point a, and the twenty data points take a distribution around a.<sup>196</sup>

<sup>&</sup>lt;sup>194</sup> The formula used to generate the graph is:  $P_{(i+1)} = P_i + f(r)$  where  $r_i = [m, 0, -m]$  and is generated by a random equal probability function f(r).

<sup>&</sup>lt;sup>195</sup> A stochastic process is a continuous parameter process. *See generally* EMANUEL PARZEN, STOCHASTIC PROCESSES (1962).

<sup>&</sup>lt;sup>196</sup> I started *a* at an arbitrary number of 50%, and assigned a value for *m* as 2%. Under this iteration, the mean value of all twenty points at *z* was 50.2%, though the spread of outcomes is significant. Obviously, individual litigants are only concerned about the outcome of their own cases. The potential variability of outcomes creates the uncertainty that must be resolved through valuation.

*Collectively*, there is an underlying order to the aggregate mass as would be expected in a random mass phenomenon. Individually, however, the random movements are precisely that—random and unpredictable. This stylized exercise illustrates the paradox of probability in bargaining theory. The expected value has not changed much; yet the possible outcomes are variable. Uncertainty is the governing condition in a lawsuit. Variance measures risk, but it is unaccounted for in the standard model. If a disputant is a repeat player, like an insurance company or a casino, it can "play the odds" by holding a portfolio that diversifies away much of this variance of outcome.<sup>197</sup> If not, however, expectations based on aggregate data should have little influence on decision making. Relevant are factors that influence the assessment in *this* case, not some average from a class (even if we ignore the thorny problem of defining a class). Aggregate analysis can show the forest in its morning glory but not the light that dances inside the dew on any given tree.

One other point is noteworthy. Figure 1 shows that the potential variance as measured by deviation from any current point to the final end point z decreases as a case moves closer to z. In the legal context, we can expect that the range of error in assessment narrows as the case approaches trial due to better information. Thus, increased litigation reduces volatility of expected outcome.<sup>198</sup>

### IV. A PRICE THEORY OF LEGAL BARGAINING

#### A. Cost-Benefit Analysis

In criticizing the standard model, this Article does not reject a cost-benefit analysis. But the approach taken thus far in scholarly literature is practically and theoretically problematic. Standard cost-benefit analysis tends to emphasize completeness of evaluations, a requirement that is ill-suited to the

<sup>&</sup>lt;sup>197</sup> See Rhee, supra note 12, at 238–39 (noting that repeat players can take a risk-neutral approach toward valuation that minimizes the risk-adjusted discount).

<sup>&</sup>lt;sup>198</sup> This is consistent with several financial economic principles. Under the Black-Scholes option pricing theory, time lapse decays option value because a shorter time span means less variance of the underlying asset price, which is a determinant of option value. Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637, 638 (1973) ("Normally, the value of an option declines as its maturity date approaches, if the value of the stock does not change."). In terms of stock price, the general observation is that "the size of a market fluctuation tends to grow larger as the time horizon stretches out." *See* BERNSTEIN, *supra* note 182, at 21. A prediction of next day price change is less volatile than a prediction of a one year forward price.

valuational ambiguities of legal bargaining.<sup>199</sup> Amartya Sen notes that standard cost-benefit analysis "requires not only that each consequence be identified and known... but also that the weights, at the appropriate point, are definitive and unique."<sup>200</sup> This thought echoes the conditional limitations of mathematical probability, i.e., "completeness of symmetry."<sup>201</sup>

The assumptions of the existence of an objective decision standard and the parties' predictive powers to discover it create a complete information system wherein the primary source of the unknown is information asymmetry among parties.<sup>202</sup> The solution to the problem is based on a mutual discovery of the objective standard. The sentiment prefers a complete system wherein valuations can be ordered rather than a system wherein optimization of choice may not be feasible. But this sentiment conflicts with the empirical observation of the practical world. Uncertainty begets the legal dispute, and so we must consider the impact of litigation risks, transaction cost, probability, weight, confidence, variance, and risk preferences. The complexity is great.

Valuational ambiguity and inability to order values need not preclude a cost-benefit analysis, however. Sen argues the following:

When a particular exercise of cost-benefit analysis ends up with a complete ordering and a clearly optimal outcome (or an optimal set of outcomes), then that may be fine and good. But if that does not happen, and the valuational ordering is incomplete, then maximization with respect to that incomplete ranking is the natural way to proceed. This may yield several maximal solutions that are not comparable with each other, and it would make sense to choose one of them. If the valuations come in the form of ranges of weights, we can also do sensitivity analysis of the effect of reducing the ranges of variations on extending the generated partial ordering. The extent of imprecision can be reflected in the assessment, and the choices can be systematically linked to the valuational ambiguities.<sup>203</sup>

This analytic approach echoes the logic of Keynesian probability theory.<sup>204</sup> This philosophy of cost-benefit analysis avoids the pitfalls of "arbitrary

<sup>&</sup>lt;sup>199</sup> Amartya Sen, Rationality and Freedom 565 (2002).

<sup>&</sup>lt;sup>200</sup> *Id.* at 563.

<sup>&</sup>lt;sup>201</sup> Supra note 121 and accompanying text; see supra Part III.A.

<sup>&</sup>lt;sup>202</sup> See, e.g., POSNER, *supra* note 22, at 569 ("All that is necessary [for a failure of settlement] is that each party have private information, that is, information not available to the other party.").

<sup>&</sup>lt;sup>203</sup> SEN, *supra* note 199, at 565.

<sup>&</sup>lt;sup>204</sup> KEYNES, *supra* note 95.

completion in terms of imperious valuational judgments or capricious epistemic assessments."<sup>205</sup> A cost-benefit analysis is possible if we recognize that, under conditions of uncertainty, its product may not be optimization of choice (the best feasible choice given a defined set of options), but rather maximization (a choice not worse than any other option).<sup>206</sup> Under this framework, the selection of litigation and trial can be analyzed with greater complexity and avoids algebraic reductions that simply do not correspond to reality.

## B. Intrinsic Value, Noise, and Litigation Risk

What is the value of a disputed legal claim? To answer, it is helpful to take a detour and see how the financial market works in a broad sense. In his influential essay, Noise, Fischer Black observed that market participants trade on either information or "noise."<sup>207</sup> Noise is "the arbitrary element in expectations," the diverse array of unrelated elements that causes price to deviate from intrinsic value.<sup>208</sup> Trading on information is profitable while trading on noise is not.<sup>209</sup> Noise trading is "the essential missing ingredient" in a liquid. efficient market.<sup>210</sup> If information is perfect and price always equals intrinsic value, there would be no rationale to trade since there would be no profit opportunity. "The price of a stock reflects both information that information traders trade on and the noise that noise traders trade on."<sup>211</sup> The noise in price creates profit opportunities and incentivizes information traders to trade. Noise and information are at constant tug-of-war with noise pulling price farther away from intrinsic value and information pushing it closer. The problem from the standpoint of the speculator is that "[t]here will always be a lot of ambiguity about who is an information trader and who is a noise trader."<sup>212</sup> Thus, noise clouds value.

<sup>&</sup>lt;sup>205</sup> SEN, *supra* note 199, at 565.

 $<sup>^{206}</sup>$  Id. at 181–82. Optimization is the best choice in a defined set of options. Maximization is a choice that can be made in ambiguity and incompleteness. Id.

<sup>&</sup>lt;sup>207</sup> Fischer Black, *Noise*, 41 J. FIN. 529 (1986). Fischer Black, along with Myron Scholes, developed the Black-Scholes option pricing model. *See infra* note 250. Scholes won the Nobel Prize in economics in 1997. Press Release, The Royal Swedish Academy of Sciences (Oct. 14, 1997), http://nobelprize.org/nobel\_prizes/ economics/laureates/1997/press.html. Black died in 1995, making him ineligible to receive the award. *Id.* 

<sup>&</sup>lt;sup>208</sup> Black, *supra* note 207, at 529, 530.

<sup>&</sup>lt;sup>209</sup> *Id.* at 531.

<sup>&</sup>lt;sup>210</sup> Id.

<sup>&</sup>lt;sup>211</sup> Id.

<sup>&</sup>lt;sup>212</sup> *Id.* at 532.

A profound paradox of an efficient market is that it causes prices to be less perfect, and this inefficiency is the substance of its existence.<sup>213</sup> The price of a stock tends to move back to intrinsic value over time, but its relative position is not fixed or knowable: "All estimates of value are noisy, so we can never know how far away price is from value."214 Expected value-the touchstone of standard cost-benefit analysis-is an elusive concept, and perhaps inconsistent with the informational limitations of the practical world.<sup>215</sup> Given these conditions, Black speculated that "an efficient market [is] one in which price is within a factor of 2 of value, i.e., the price is more than half of value and less than twice value."<sup>216</sup> This factor of two is "arbitrary" but intuitively "reasonable" in light of the impossibility of empirical testing.<sup>217</sup> The nature of an efficient market is such that price swings back and forth within a broad range and it is never known whether price is aligned with value or who has a superior conception of valuation. There is never a long-term equilibrium state of efficient convergence of price to value.

Applying these concepts to the legal market, we see that if information was perfect and noiseless (a Coasian condition), there would be no litigation or settlement as there would be no dispute. But knowledge is based on incomplete information and imperfect future projections, and it supports divergent beliefs bounded by plausible reasoning.<sup>218</sup> Describing litigation as indeterminate is not enough, however. It would be disappointing if at the end of the theoretical inquiry there is only randomness. Fortunately, this is not the case. Although reliable predictability may be an impossible goal qua the individual case, we can still understand the complex system by which disputes are resolved.

To understand dispute risk, we must first unpack the components of litigation uncertainty. There are uncertainties associated with facts and laws, judges and juries, attorneys and clients, and strategy and serendipity. Beyond

<sup>213</sup> Id..

<sup>&</sup>lt;sup>214</sup> *Id.* at 533.

<sup>&</sup>lt;sup>215</sup> Black asked, "Why do people trade on noise?" *Id.* at 534. Utility from gambling is one answer. Another answer is that a noise trader thinks she is an information trader. If so, Black questioned the value of the classical concept of expected utility maximization: "Once we let trading enter the utility function directly (as a way of saying that people like to trade), it's hard to know where to stop. If anything can be in the utility function, the notion that people act to maximize expected utility is in danger of losing much of its content." Id.

<sup>&</sup>lt;sup>216</sup> Id. at 533. <sup>217</sup> Id.

<sup>&</sup>lt;sup>218</sup> Such omniscience as to even past and present information is difficult, if not impossible. See H. Richard Uviller, The Advocate, The Truth, and Judicial Hackles: A Reaction to Judge Frankel's Idea, 123 U. PA. L. REV. 1067, 1076 (1975) (truth takes "plural forms" and is "multifaceted").

these are the financial risks. A plaintiff asserts a legal claim, which may be "bought" by a defendant either voluntarily or by forced purchase; similarly, a defendant asserts a defense, which may be "bought" by a plaintiff. One seeks the highest price, and the other seeks the lowest. If a lawsuit is considered a market transaction, then portfolio theory sheds some light on the nature of litigation risk.

In *Portfolio Selection*, Markowitz mathematically proved that for each level of risk there was an efficient portfolio of diversified assets that maximized returns.<sup>219</sup> In so doing, he classified two kinds of risk in a portfolio. Market risk is the systemic risk that diversification cannot reduce, such as the risks of market downturn, interest rate movements, political events, and regulation.<sup>220</sup> Unique risk is the risk associated with an investment in a particular stock, such as management quality, financial resources, and, in the era of Enron, ethical risk.<sup>221</sup> Markowitz theorized that a well-diversified portfolio can mitigate unique risk and approximate market risk.<sup>222</sup> In an uncertain world, risk and reward are conjoined twins. His key insight was not that risk was bad per se, but that unnecessary risk was not good.<sup>223</sup> Thus, portfolios can be mathematically structured so that for each level of risk appetite there is a maximized expected return.<sup>224</sup>

In an earlier article, I applied Markowitz's insight to the legal process, and isolated two primary components of uncertainty involved in a lawsuit:

<sup>&</sup>lt;sup>219</sup> Markowitz, *supra* note 172, at 77. Before the publication of this article, the market did not understand the nature of financial risk in stock selection. "Throughout most of the history of stock markets . . . it never occurred to anyone to define risk with a number. Stocks were risky and some were riskier than others, and people let it go at that. Risk was in the gut, not in the numbers." BERNSTEIN, *supra* note 51, at 247. This problem was identified in Graham and Dodd's classic treatise on security valuation, which set forth the following theory of stock valuation: "The value of a common stock depends entirely upon what it will earn in the future." BENJAMIN GRAHAM & DAVID DODD, SECURITY ANALYSIS: THE CLASSIC 1940 SECOND EDITION 351 (1962). Yet, when Graham and Dodd stated this "complete revolution in the philosophy of common-stock investment," they were unable to quantify the risk for "lack of well-defined and authoritative views" on valuation. *Id.* at 352, 362. Thus, in 1940, they counseled that valuation was largely a qualitative, judgmental exercise and stocks should be valued on qualitative assessments that are "reasonable." *Id.* at 362, 363–71.

<sup>&</sup>lt;sup>220</sup> See Markowitz, *supra* note 172, at 79 ("Diversification cannot eliminate all variance."). Market risk is sometimes called systemic or undiversifiable risk. BREALEY ET AL., *supra* note 5, at 162 n.27.

<sup>&</sup>lt;sup>221</sup> Unique risk is sometimes called unsystemic risk, residual risk, specific risk, or diversifiable risk. BREALEY ET AL., *supra* note 5, at 162 n.26.

<sup>&</sup>lt;sup>222</sup> Markowitz, *supra* note 172, at 79.

 $<sup>^{223}</sup>$  Markowitz observed that most investors "consider yield to be a good thing; risk, a bad thing; gambling, to be avoided." *Id.* at 91.

<sup>&</sup>lt;sup>224</sup> *Id.* at 79 ("There is a rate at which the investor can gain expected return by taking on variance, or reduce variance by giving up expected return.").

General risk encompasses the systemic process risk associated with the legal forum, which can be seen as a market. This market risk constitutes the uncertainty associated with the decisions of the jury and the judge, who are influenced by their life experiences. opinions, predispositions, and the prevailing community standards. General risk is unrelated to the case, and is systemic to all lawsuits brought before deliberative bodies. It not only includes the risk of unpredictable human interactions, but also unpredictable discretionary decisions where there are two or more decision paths, neither of which could be classified as wrong or irrational in the sense of reversible error. Under this view, reversible error can be understood to occur when a deliberative body arbitrarily increases the general risk of a litigant beyond the range of rational multivariate decision-making. A lawsuit with only general risk is akin to a game of pure chance. The matter is left purely to the deliberative bodies without input or influence, and it is no surprise that many practicing trial lawyers consider the unpredictability and randomness of a trial as akin to a pure gamble.

*Unique risk* is the risk associated with the specific case. This risk is comprised of two general categories: the totality of the factual and evidentiary circumstances and the substantive and procedural laws specifically applicable to the case. Unique risk encompasses such factors as the strength of the facts, the likeability and sympathy elements of the client, the quantity and quality of witnesses, and other circumstances of the case such as the skill of the lawyers and financial resources of the parties. The substantive law is also a key determinant. The law can skew the risk for one party or another, and often the risk is allocated based on various policy and efficiency grounds. All of these factors combine to create the unique risk profile for any given case. Unique risk converts a lawsuit from a game of chance to a game of skill in which some of the randomness or unpredictability can be influenced.<sup>225</sup>

ROSS, supra note 190, at 113.

<sup>&</sup>lt;sup>225</sup> Rhee, *supra* note 30, at 157–58 (emphasis added and footnotes omitted). This theory is consistent with general market practices as seen in the insurance industry.

In evaluating the serious case, a large number of variables are taken into account. Among these are the obvious out-of-pocket costs, along with an allowance for the pain, suffering, and inconvenience of the claimant. In addition, evaluation of the serious injury claim includes attention to aspects of the case that, while formally irrelevant to value, would be expected to exert influence if litigation were in fact undertaken. Among these are the sympathetic or antipathetic characteristics of the parties who might appear: the claimant, the insured, and witnesses. Age, race, sex, and occupation are said to be relevant, as well as more subjective attributes such as over-all impression of veracity. The reputed skill of the attorneys and the nature of the court in which the case might be brought are also considered.

Litigation risk is not a unity. Because general risk  $R_g$  is systemic, it is not subject to mitigation short of illegal action (e.g., a bribe or other undue influence).<sup>226</sup> Only settlement terminates exposure to general risk. The elimination of variance is a key advantage of settlement over trial, all else being equal (a significant condition).<sup>227</sup> Fact finding and liability determination, in the absence of omniscience, are subject to a degree of constant risk.<sup>228</sup> As for unique risk  $R_{\mu}$ , some aspects are within the sphere of influence. Facts and case theories are influenced by the intellectual capital invested in the case. Labor increases the chance of success in the constant competition of ideas.<sup>229</sup> Nevertheless, there is a limit to the power of creativity Sometimes, facts are facts and laws are laws. and industry. In these circumstances, the challenge is to understand the contours of the risks, and an attorney as an advocate is fundamentally a risk manager.<sup>230</sup>

A legal dispute is traded in the sense that claims are priced, bought, and sold per settlement or judgment. It is not a typical commodity, however.<sup>231</sup> From the perspective of valuation, the problems are three. First, each dispute has a unique set of buyers and sellers, and no other market participants can

Whenever facts are in dispute or the evidence is such that fair-minded men may draw different inferences, a measure of speculation and conjecture is required on the part of those whose duty it is to settle the dispute by choosing what seems to them to be the most reasonable inference.

<sup>&</sup>lt;sup>226</sup> Some of the common practices of trial lawyers are best seen as a way to understand or mitigate the general risk associated with each case. *See* Galanter, *supra* note 7, at 517 (noting the increasing use of jury consultants and public relations consultants).

<sup>&</sup>lt;sup>227</sup> See Rhee, supra note 12, at 229 (noting that the elimination of variance is the primary inducement to settlement).

<sup>&</sup>lt;sup>228</sup> The recognition of variance is seen in *Lavender v. Kurn*:

<sup>327</sup> U.S. 645, 653 (1946).

<sup>&</sup>lt;sup>229</sup> See Bruce L. Hay, *Effort, Information, Settlement, Trial*, 24 J. LEGAL STUD. 29 (1995) (discussing the relationship between effort and trial results); Posner, *supra* note 1, at 419 ("A change in the stakes will affect the amount of money that the parties spend on litigation and this in turn will alter the probabilities of a particular outcome."); *see also* Hickman v. Taylor, 329 U.S. 495, 516 (1947) (Jackson, J., concurring) ("Discovery was hardly intended to enable a learned profession to perform its functions either without wits or on wits borrowed from the adversary.").

<sup>&</sup>lt;sup>230</sup> See Ronald J. Gilson, Value Creation by Business Lawyers: Legal Skills and Asset Pricing, 94 YALE LJ. 239, 243 (1984) (attorneys are "transaction cost engineers" who promote efficient prices); Rhee, *supra* note 12, at 253–56 (discussing the role of attorneys in enhancing the asset value of a lawsuit).

<sup>&</sup>lt;sup>231</sup> See Laurence H. Tribe, Trial by Mathematics: Precision and Ritual in the Legal Process, 84 HARV. L. REV. 1329, 1376 (1971) (Lawsuit is "a complex pattern of gestures comprising what Henry Hart and John McNaughton once called 'society's last line of defense in the indispensable effort to secure the peaceful settlement of social conflict." (quoting Henry M. Hart, Jr. & John T. McNaughton, Evidence and Inference in the Law, in EVIDENCE AND INFERENCE 48, 52 (Daniel Lerner ed., 1959)).

enter the transaction, creating a problem of liquidity and price transparency.<sup>232</sup> Second, a related problem, the asset for sale is not fungible, and so a market for the sale and purchase of legal claims (disputed rights), even if permitted under law, is not possible. Third, unless a private agreement is reached, a forced transaction can be imposed, and this carries significant risk.<sup>233</sup> These traits dictate the pricing mechanisms.

The uniqueness of each case disaggregates the legal market into single transactions of noncompetitive pricing. Superficial similarities with other cases may yield some insight, but ultimately each case stands on its unique portfolio of risk. Even for a repeat player, trading on aggregate or composite data runs the risk of trading on noise. Since price efficiency cannot be achieved in the traditional sense, the goal of dispute resolution should be transactional efficiency, defined not in terms of transaction cost economics, but in terms of pricing that is achieved at the lowest cost of resolution. In many cases, the transaction cost associated with litigation is only a secondary contributor to the total cost of a dispute. Cutler and Summers observed that "legal disputes can impose large costs on a firm, and that the indirect effects of conflict on profitability can be substantially greater than the direct expense of the litigation."<sup>234</sup> A similar study of public market reaction to lawsuits has concluded that transaction costs are "relatively small" compared to the indirect cost of financial distress (i.e., the cost associated with uncertainty arising from the litigation).<sup>235</sup> While this Article does not suggest that most lawsuits are comparable in scale to Texaco-Pennzoil or other large litigation involving public companies, the larger point is that potential transaction cost savings can pale in comparison to a misstep in valuation even in ordinary cases. Thus, the true economic cost of a dispute is not synonymous with transaction cost.

The cost of resolution is akin to a corporation's cost of equity, the measurement of a firm's enterprise risk, in the sense that the cost is imbedded in the valuation. The value of a case must incorporate an appropriate risk adjustment. Although the standard model correctly perceives the "litigation

<sup>&</sup>lt;sup>232</sup> Prices in the commercial context are made more transparent by a liquid market. *See* FOCARDI & FABOZZI, *supra* note 97, at 31 ("Pricing efficiency refers to a market where prices at all times fully reflect all available information that is relevant to the valuation of securities."); *see also* Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383, 384 (1970).

<sup>&</sup>lt;sup>233</sup> Cornell, *supra* note 12, at 175 ("When a lawsuit is filed, the defendant is forced to write litigation options at prices that depend on the plaintiff's cost of pursuing the suit.").

<sup>&</sup>lt;sup>234</sup> Cutler & Summers, *supra* note 184, at 170.

<sup>&</sup>lt;sup>235</sup> Bhagat et al., *supra* note 187, at 222–23.

investment" through the lens of cash flow analysis,<sup>236</sup> it errs by equating transaction cost surplus with transactional efficiency. No pricing theory of dispute resolution is complete without the incorporation of the cost of uncertainty into valuation. Rational settlement should be struck only under one condition—when prices converge after consideration of the appropriate risk premium or discount. This statement requires some unpacking.

At the start of any case, the uncertainty is great. If risk is relevant to the question of valuation, then it must figure prominently into the calculus. Consistent with the principles of portfolio theory and the Capital Asset Pricing Model ("CAPM"), this uncertainty discounts the value of the lawsuit to a value that is less or more than the purely probabilistic expected value.<sup>237</sup> At this early stage, settlement may be difficult because continued litigation presents an opportunity for information acquisition, which is categorically a good thing.<sup>238</sup> The question for each party is: do we speculate by settling now, and if so, what is the price at which we are incentivized to take the gamble? Settlement terminates the option value of continued litigation, i.e., opportunity for information acquisition. The plaintiff adds a premium to his settlement demand, and the defendant discounts the counteroffer accordingly. A blind adherence to expected value would suggest that uncertainty does not affect value because it presumably cuts both ways. This is akin to a gamble on a coin toss; the risk is irrelevant because it cuts both ways. We can agree that the fate of an ambiguous right should not be left to the proxy of an arbitrary outcome. The plaintiff and defendant apply a premium and discount, respectively, which create a valuation gap. Conventional wisdom explains this phenomenon in terms of strategic behavior: A party seeks to grab a bigger share of the surplus, "anchor" the claim, or posture for positional bargaining.<sup>239</sup> While these strategic considerations may be true, they are an incomplete explanation. Odd is the thought that highly trained participants of the legal market would misprice settlement on the chance that the other party is naïve or foolish when

<sup>&</sup>lt;sup>236</sup> See Cornell, supra note 12, at 173; Johnson, supra note 25, at 573 (describing the "litigation investment"); Trubek et al., supra note 2, at 76 (characterizing litigation as "an investment process").

<sup>&</sup>lt;sup>237</sup> See Rhee, supra note 12, at 238–39.

<sup>&</sup>lt;sup>238</sup> "It is common to say that conflicts can be resolved more easily under full information, when all parties concerned understand the consequences of the alternative possible policies or other decisions." Kenneth J. Arrow, *Information Acquisition and the Resolution of Conflict, in* BARRIERS TO CONFLICT RESOLUTION 258, 259 (Kenneth Arrow et al. eds., 1995).

<sup>&</sup>lt;sup>239</sup> This "inefficiency" could be rooted in a conflict of interest between attorneys and agency costs. *See* Jonathan T. Molot, *How U.S. Procedure Skews Tort Law Incentives*, 73 IND. L.J. 59, 69–72 (1997) (discussing problem of conflict of interest relating to fees). However, I question whether a systemic problem is sustainable in a large, competitive market for legal services.

the risk of continued expenditure of transaction cost is significant.<sup>240</sup> It suggests a degree of irrationality among peers of relatively equal competence and training,<sup>241</sup> and would portray them as performing a ritualistic mating dance having little chance of consummation. At some point, market participants would have realized that there is little arbitrage opportunity from reflexive valuational posturing, and such reflexive behavior would have naturally diminished to a marginalized level. But this is not the empirical observation. The problem of valuation is a constant in dispute resolution, and the incorporation of a premium and discount may simply reflect the valuational uncertainty at hand. The explanation for the seemingly strategic, perhaps inefficient, behavior is that a fundamental economic mechanism is at work rather than mass irrationality by a trained group of professionals.

From the perspective of market pricing, a wide bid-ask spread is indicative of significant uncertainty associated with the underlying asset. It is often said that a defendant is a buyer of the plaintiff's claim. In this context, he is the market maker in the dispute, available to "buy" the claim at prices he sets. But this analogy is incomplete because the plaintiff, too, is a market maker since she can buy the defendant's option to contest the dispute.<sup>242</sup> Accordingly, in the beginning each party will "bid" the least favorable terms to the other and "ask" the most favorable subject only to the consideration of a forced sale, which increases in likelihood as the case progresses.<sup>243</sup> This valuation gap is

<sup>&</sup>lt;sup>240</sup> Journalistic accounts noted that Texaco and Pennzoil failed to strike a bargain because of mutual animosity. Cutler and Summers dismissed the notion that emotional noise or irrational motives played a role: "Two billion dollars, however, seem like a lot to pay to engage in pique." Cutler & Summers, *supra* note 184, at 169.

<sup>&</sup>lt;sup>241</sup> I do not suggest that the talent level in the legal profession is consistent. Marc Galanter notes that corporations can afford to pay highly specialized attorneys, who presumably are well-skilled in their trade. *See* Marc Galanter, *Planet of the APs: Reflections on the Scale of Law and its Users*, 53 BUFFALO L. REV. 1369, 1407–10 (2006); *see also* Marc Galanter, *Why the "Haves" Come Out Ahead: Speculations on the Limits of Legal Change*, 9 LAW & SOC'Y REV. 95, 114–19 (1974). The point is well-taken. My suggestion is that as a general observation, attorneys receive comparable education and training. From this beginning, rewards of their profession, I believe, is in direct relation to the sweat of their labor.

<sup>&</sup>lt;sup>242</sup> See Rhee, supra note 12, at 226–27 (discussing the mutual market-maker role of parties in a lawsuit).

<sup>&</sup>lt;sup>243</sup> This is consistent with Guthrie's regret aversion theory, which posits that parties make bargaining decisions so as to minimize the emotion of post-transaction regret. *See* Chris Guthrie, *Better Settle Than Sorry: The Regret Aversion Theory of Litigation Behavior*, 1999 U. ILL. L. REV. 43, 45 (1999). Settlement is by no means less risky. Under this view, we see how trust between parties or the simplicity of a case reduces uncertainty and thus the risk adjustment required to settle. *See* Gilson & Mnookin, *supra* note 166, at 564 ("When opposing lawyers know and trust each other, we believe there often will be substantial opportunities for both parties to benefit by reducing transaction costs."); G. Richard Shell, *Opportunism and Trust in Negotiating Commercial Contracts: Toward a New Cause of Action*, 44 VAND. L. REV. 221, 282 n.256 (1991) (trust is a significant factor in bargaining though not emphasized in economic literature because it lacks the quality of quantification).

not static, but instead changes with, among other things, the expenditure of transaction costs.

Transaction cost controls the flow of information and thus reduces uncertainty.<sup>244</sup> As a matter gets closer to trial, information asymmetry diminishes due to disclosure requirements and incentives to disclose voluntarily.<sup>245</sup> In this process, each new piece of information has less impact on weight, and so weight increases, but at a diminishing marginal rate as each incremental fact has less overall impact.<sup>246</sup> Figure 2 illustrates the marginal utility of information acquisition and the marginal utility of transaction cost.

<sup>246</sup> This relationship can be mathematically represented. Let  $I_i \in I$  where I is the set of all relevant, knowable information pertaining to the dispute. We assume for simplicity that each packet of information  $I_i$ 

has equal weight (impact). Weight is a function of information acquisition:  $W = \prod_{i=1}^{n} \frac{I_i}{I}$ . The change in

weight is measured by  $f(w) = W_{i+1}/W_i - 1$ . The marginal utility of transaction cost is measured by the rate of change in the weight per time. See Cooter & Rubinfeld, supra note 2, at 1072 ("The derivative [function] can be thought of as the marginal productivity of plaintiff's effort at trial.").

<sup>&</sup>lt;sup>244</sup> The most important economic concepts of the past thirty years have been information dispersion and uncertainty. *Three Nobel Laureates on the State of Economics*, CHALLENGE, Jan.–Feb. 2000, at 6, 19 (interview with Kenneth Arrow).

<sup>&</sup>lt;sup>245</sup> A lawsuit changes the nature of the game. Information must now be disclosed under the rules of procedure. *See* FED. R. CIV. P. 26, 30–37, 41(b), 45. Positive information serves no purpose if it is ultimately kept in secret. Negative information will be kept private so long as it is ethical to do so. Verification is more costly but also more reliable because disclosure is subject to judicial sanctions, professional discipline, and reputational harm.





At the beginning of a case, the risk associated with the lack of information is great. Each party applies a risk adjustment to valuation—a premium for the plaintiff and a discount for the defendant. Valuations are initially repelled by the mutual incorporation of a risk adjustment, creating a valuation delta. As uncertainty is reduced, delta converges consistent with diminishing marginal utility of transaction costs.<sup>247</sup> The result is an increased propensity to settle, all else being equal (on this point, note that weight and probability are independent such that it is impossible to predict the "random walk" of the case assessment based upon the knowledge that unknown information will be disclosed in the future). Contrary to the standard model, probability does not necessarily converge, so much as the risk adjustments are mutually reduced as litigation progresses and weight increases. Thus, in many meritorious actions, litigation is not a waste, but rather an essential ingredient of the dispute resolution process.

The risk adjustment is best understood as the opportunity cost of using a different pricing mechanism. Each party has a unilateral procedural option to

<sup>&</sup>lt;sup>247</sup> See Arrow, supra note 238, at 259 (Better information in the decision-making process is superior "provided of course that the gain in outcome is sufficient to compensate for the cost of acquiring the information.").

elect trial.<sup>248</sup> Since settlement terminates this option, each side must be compensated for its forbearance.<sup>249</sup> This legal option has tangible value.<sup>250</sup> The option value is the greatest in the beginning. The benefit of information acquisition is the greatest at the start of a case, independent of the expectation that the unknown information will benefit a particular party. Although it is irrational to believe that unknown information yet to be disclosed will be beneficial, it *is* rational to seek disclosure of this information because uncertainty is reduced. As the case approaches trial, the option value diminishes until expiration at judgment. The greater the uncertainty surrounding the case, the greater is the benefit of continuing the litigation. This explains why settlements still occur in advanced stages of litigation when a great portion of the transaction cost has become sunk cost—the diminished relevance of transaction cost is offset by the diminution of option value.<sup>251</sup>

## C. Variance, Probability, and Risk Preference

If probability defines the subjective expectation of an outcome, variance defines the confidence associated with that belief. Variance depends on a number of factors. As seen, the point in time in litigation is a crude approximation of weight and is important because the potential divergence of a "random walk" from the original point is greater with time. Imperfect information arises not only from information asymmetry (a problem of dissemination), but also from the unknowable nature of some knowledge (a problem of epistemology). If the parties believe that there is a substantial amount of unknowable information, the perception of variance would naturally rise. We consider also the unique risk of a case—its simplicity or complexity and the state of information pertaining to the laws and facts applicable to the case. Lastly, variance depends on general risk: the degree to which the jurisdiction or deliberative body is perceived to be predictable. One suspects

<sup>&</sup>lt;sup>248</sup> Posner calls this option a "bilateral monopoly." POSNER, *supra* note 22, at 567. But an option analogy works better because it connotes a financial instrument that can be valued, if only conceptually.

 $<sup>^{249}</sup>$  The parties may "net out" the mutual options by engaging in a swap transaction. *See* Rhee, *supra* note 12, at 244. If, however, the option values are different, there still remains a residual option value held by one party.

<sup>&</sup>lt;sup>250</sup> The value of a financial option is calculated by the Black-Scholes option pricing model, which is a differential equation that considers the permutations of six variables affecting option value (stock price, strike price, risk-free rate, dividend yield, time to maturity, and variance). Black & Scholes, *supra* note 198; *see also* JOHN C. COX & MARK RUBINSTEIN, OPTIONS MARKETS 1204–12 (1985) (presenting the Black-Scholes formula and the underlying mathematical concepts); HULL, *supra* note 170, at 157 (same).

 $<sup>^{251}</sup>$  See Rhee, supra note 12, at 240–45 (discussing the real option of litigation and its relationship to lawsuit valuation).

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that this factor is not dramatically different across various jurisdictions, though this assertion would be difficult to prove one way or the other.

Variance is the error term that captures the totality of the information risks, and it can be expressed as  $\sigma = f(W, R_u) + R_g$ . The limit of perfect disclosure is general risk where  $\sigma = R_g$ . Variance, a measure of risk, is a proxy for the confidence in one's assessment of probability, or stated differently the degree to which the forecast could be wrong. Risk, then, is one of the most important factors in valuation and investment.<sup>252</sup>

Under the standard model, risk neutrality eliminates via assumption the most difficult element in the analysis of legal valuation. Figure 3 below illustrates the selection hypothesis of the standard model. It shows that the selection of trial and settlement depends on the ratio of the probability difference multiplied by the expected judgment amount over the aggregate transaction cost surplus. If this ratio is greater than 1.0, then trial must be the result. The selection horizon, marked by the dotted line, is the point at which a party is indifferent between trial and settlement. Under the standard model, variance plays no role in valuation or the selection process, and thus the slope of the selection horizon is vertical. Moreover, the x-intercept is the ratio 1.0, a point at which the difference in risk neutral valuation equals the transaction cost surplus.

<sup>&</sup>lt;sup>252</sup> In the corporate finance context, variance and valuation are intimately linked. As with option valuation, variance is the key variable in determining a firm's cost of equity. Unlike options, however, variance of earnings reduces the value of a firm. *See id.* at 202–08 (discussing the application of option pricing and capital asset pricing models on legal valuation).



## Figure 3

This Article posits that risk is the governing condition in a lawsuit, and thus risk neutrality cannot be the basis of a theory of legal valuation. If a lawsuit is considered a capital asset that is expected to generate a future, uncertain cash flow (a negative cash flow for a defendant), variance must reduce the value of the asset and conversely increase the negative value of the liability.<sup>253</sup> The selection of settlement and trial depends on a number of factors. Transaction costs play a key role, of course. This Article does not dispute the rule of thumb that says the greater the relative value of transaction cost, the greater is the possibility of a settlement. Transaction cost plays a greater role in smaller, more routine cases where it simply does not make sense to spend significant costs.<sup>254</sup> In cases where the damages are substantial or the case is otherwise more complex, however, transactional efficiency involves more than transaction cost efficiency.

As discussed above, the value of the litigation option diminishes as a case proceeds closer to trial. During this time, the variance of a case assessment also diminishes with information acquisition. The net result is that the option value of continued litigation tends to diminish while the risk adjustment to

<sup>&</sup>lt;sup>253</sup> See id.

<sup>&</sup>lt;sup>254</sup> Most simple cases are processed routinely and a certain degree of "routinization" takes hold. *See* Ross, *supra* note 190, at 133–35. However, the forecasting of judicial outcomes is "certainly more complex and more sensitive to the particular aspects of a given claim than procedure used in routine cases." *Id.* at 115.

settlement also tends to decrease with less uncertainty. During this time, a party continuously assesses her confidence in the expected result at trial. High variance (low confidence) tends to produce settlement because it eliminates exposure to high risk. Similar to the treatment of highly volatile earnings in the markets, high variance discounts valuation. Accordingly, if both parties perceive high variance of trial outcome, the risk adjustment to expected value discounts valuations further and thus settlement valuations tend to converge. Variance is simply one part of the equation, however. Greater difference in probabilistic assessments obviously undermines settlement, and so a high enough to discount trial valuation below settlement valuation, parties would likely opt for trial where their views are divergent *and* where both are highly confident of their respective beliefs. These observations are intuitive.



Figure 4 illustrates the interaction of variance and probability, which is a variation of the traditional risk–return horizon seen in finance theory. The location and slope of the selection horizon determines one's preference for settlement and trial. Unless risk neutrality and rational expectation are assumed,<sup>255</sup> the location and slope of the selection horizon is unique to each party. Its location, as determined by the x-intercept, indicates the degree of

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<sup>&</sup>lt;sup>255</sup> See supra Part II.C.

risk preference: if the selection horizon moves laterally to the right (see above arrow), trial is less preferred than settlement, indicating a stronger degree of risk aversion, and vice versa. If parties are risk neutral, the selection horizon would be located near the equilibrium point where  $(P_p - P_d) \times J \approx B$ . The slope would be vertical as well since variance would not affect the choice between settlement and trial (see above dotted line). Because we do not expect most people, practically or theoretically, to ignore uncertainty of return, uncertainty *must* affect the location of the selection criteria in most cases.<sup>256</sup> The selection horizon is typically shifted to the right of the risk neutral valuation. This is marked by the solid sloped line. A shift of the selection horizon to the right means that the risk preferences of most people would dictate that the uncertainty of trial is disfavored. This phenomenon is consistent with the empirical observation that most cases tend to settle.

In addition to the location of the selection horizon, we must also consider its slope.<sup>257</sup> The slope is the measure of the cost of variance, defined as the degree to which a quantum of risk results in a discount given the opportunity cost of the value (asset or liability) at stake. The greater this cost, the greater a quantum of risk will result in a discount to value at stake. Accordingly, it is the discount rate applicable in the valuation of a disputed right, and each party has a unique cost of variance depending on one's circumstance.

Moreover, each case does not impact the parties similarly. It is entirely possible, and in some circumstances probable, that the parties calculate different risks even when they perceive the facts and laws similarly. Consider, for example, a repeat player who would be less sensitive to the outcome of a particular case than a single-play party because a diversified portfolio reduces the variance from unique risk. The risk assumed is only the undiversifiable general risk. These parties have lower cost of capital because diversification reduces the variance of outcomes. In other words, corporations and their shareholders can diversify their business mixes and holdings in a way that reduces or eliminates the variance of any single case. This is not the case with single-play parties, such as most individuals, who must assume both the general and unique risks of each dispute. Moreover, we also expect that one's wealth relative to the disputed stake has a role in the perception of risk. The

<sup>&</sup>lt;sup>256</sup> Indeed, even insurance companies, pure players in the risk trade, apply a "danger value," which is a premium in excess of the expected value to eliminate exposure to a potentially severe jury verdict, when a case presents a potential for a low frequency, high severity payout. Ross, *supra* note 190, at 202.

<sup>&</sup>lt;sup>257</sup> A positive slope value means that for every change in the x value there is a corresponding change in the y value, noted as dy/dx, such that dy/dx > 0.

typical case may represent a small portion of the wealth of a large institutional party, and thus the impact of any case on one's wealth may be small. But as we saw in the Texaco–Pennzoil litigation, large, undiversifiable lawsuits can increase even a large firm's cost of capital. These effects are also seen in Some single-play parties, such as wealthy people, may be individuals. insensitive to risk due to a diminishing marginal utility of money. On the other hand, a single-play party whose legal dispute constitutes a substantial portion of his wealth may be highly sensitive to the variance of outcome since the risk cannot be diversified away or hedged in some form. As discussed, the only "hedge" against this risk constitutes valuational concessions during the bargaining process. The cost of capital here would be more, and this would be reflected in a discount in the value of the asset. The important point here is that the perception of risk can not only be understood from a case-specific viewpoint, but also from a broader viewpoint of one's portfolio for a repeat player and wealth (or capital holding).

The intuition is, then, that the selection horizon slopes positively: as variance rises to complete uncertainty of outcome, parties would settle rather than submit to a seemingly random, arbitrary system of justice. Lower variance tends to facilitate trial, resulting in a positive slope. This is contrary to Priest and Klein's conclusion that greater uncertainty of outcome tends to produce trials.<sup>258</sup> My intuition follows from asking this simple question: what is the most extreme condition under which trial is virtually guaranteed to occur? It is when the probability delta is the greatest and there is near-perfect information (and so variance is low and confidence is high). This Article uses the term "near-perfect" because general risk can never be eliminated. The decision standard is neither fixed nor known; instead there is perfect dissemination of knowable information, and thus confidence in assessment is the highest. Moreover, since probability is not an objective reference, a highprobability delta can coexist with near-perfect information. We can easily see how people would be willing to bet bigger with an increased confidence in the expected payoff. Believing this to be the case, parties would proceed to trial instead of settling. Conversely, when delta is zero and there is near-perfect information, settlement and trial are synonymous resolutions because all disputes would be resolved. Coasian transaction cost economics governs as a dominant solution, and so we would expect a settlement consistent with the standard model. Again, this is implied by a positively sloping selection horizon. Moreover, recall that variance depends on weight, unique risk, and

<sup>&</sup>lt;sup>258</sup> See supra Part II.B.

general risk. General risk is systemic and constitutes a constant baseline risk that all parties incur in any litigation. In the above Figure 4,  $R_g$  is marked by the horizontal dashed line. Assume that  $R_g$  in a hypothetical jurisdiction was extraordinarily high for whatever reason; it would rise, and if it rises high enough, no party would ever take a meritorious case to trial because the endeavor may be akin to playing a game of pure chance, a speculative endeavor that rational parties would avoid.<sup>259</sup> In the face of such circumstances, parties would always settle rather than submit to a process that is perceived to be entirely random. Again, this condition is met only if the selection horizon slopes positively, implying that trials are most likely when delta is high and variance is low.

The last factor in the selection hypothesis of settlement and trial is individual risk preference. This preference determines the location of each party's selection horizon. Risk aversion shifts the selection horizon to the right (see arrow in Figure 4), expanding the settlement and contracting the trial zone. Risk-averse people tend to prefer settlement to trial, and vice versa. Individual risk preference implies a *cost of risk preference*, defined as the discount or premium given for the preference for a certain result measured as the difference between the risk-neutral value of a variable outcome and the value at which the individual is indifferent between the sum certain and that risk-neutral value.

Unlike the more abstract cost of resolution, we can infer a concrete cost from insurance profitability data. An insurer, a pure player in the risk trade, prices its premium so that premium covers the expected actuarial loss plus cost of operations plus profit. The insurance market is competitive, and so premiums represent efficient prices.<sup>260</sup> The industry measures profitability by a combined ratio defined as [(Incurred Losses) + (Operating Expenses)] ÷ (Earned Premiums). This basic insurance formula has not changed since the days of Adam Smith and the inception of Lloyd's of London.<sup>261</sup> Most policyholders understand, if only implicitly, that their premiums are in excess of their expected actuarial loss because insurers expect to pay expenses and

<sup>&</sup>lt;sup>259</sup> Of course, frivolous cases would be brought in great numbers if the justice system was perceived as arbitrary.

<sup>&</sup>lt;sup>260</sup> See Letter from Chairman Warren E. Buffett to Shareholders of Berkshire Hathaway, Inc. 6 (Feb. 28, 2005) ("price competition in insurance is usually fierce"), http://www.berkshirehathaway.com/letters/2004ltr.pdf.

<sup>&</sup>lt;sup>261</sup> SMITH, *supra* note 50, at 125 ("[C]ommon premium must be sufficient to compensate the common losses, to pay the expense of management, and to afford such a profit as might have been drawn from an equal capital employed in any common trade.").

earn a profit. The payment in excess of actuarial risk, including the opportunity cost of capital on unearned premium, is a reasonable approximation of the average cost of risk aversion for catastrophic risk. Because a risk-neutral person would avoid purchasing insurance unless mandated by law, a risk-averse policyholder buys the elimination of risk at the cost of risk aversion.<sup>262</sup> Based on this reasoning, the implied cost of catastrophic risk aversion is approximately 30% of the actuarial risk.<sup>263</sup> In other words, a highly risk-averse person would accept approximately \$70 rather than take a chance at an expected value of \$100.

Although most people are risk averse, the cost of risk aversion is probably less than insurance data would suggest. First, since insurance typically protects against catastrophic loss, risk aversion is linked to the marginal utility of wealth.<sup>264</sup> Unless the lawsuit involves a dispute over a catastrophic or high value loss, risk aversion is expected to be less.<sup>265</sup> Second, we must remember that attorneys are repeat players. To the extent that they have influence over the settlement, which is to say they have a significant role, their judgment may temper the risk-averse tendencies of their clients. In sum, we expect risk-averse parties in the aggregate to discount their valuations, but at levels less than 30%.

<sup>&</sup>lt;sup>262</sup> See Price v. Marshall Erdman & Assocs., Inc., 966 F.2d 320, 327 (7th Cir. 1992) (rationale of insurance is the desire to avoid risk at a cost).

<sup>&</sup>lt;sup>263</sup> The average incurred loss and operating expense have been 79.2% and 25.6% of premiums, respectively, and so the average combined ratio has been 104.8%. *See* BEST'S AGGREGATES & AVERAGES—PROPERTY/CASUALTY 90 (2005) (average data collected for 5 years from 2000 to 2004 and from 2356 property and casualty insurance companies). Note that 100% represents the entirety of the collected premium, and the industry incurred a 4.8% loss on operations from underwriting. These figures suggest that 20.8% of premiums went to operating expenses of the industry. The average return on invested assets for the industry has been 5.2%. *Id.* at 88. This figure includes yields on earned premiums, surplus, and unearned premiums belonging to the policyholders who forego their opportunity cost of capital by paying premiums upfront. To approximate the earnings on unearned premiums, we could estimate the weighted average of unearned premiums as half of the premiums submitted at the beginning of the year. This implies a 2.6% contribution to the policyholder's cost of insurance. The cost of risk is stated as a percentage of the actuarial risk, which is the expected value of the loss. If investment yield is added to the cost, the cost of risk aversion is: (20.8% + 2.6%)  $\div$  79.2% = 30% (rounded).

<sup>&</sup>lt;sup>264</sup> Anecdotally, I tested this calculation on my family over dinner one night. I asked, "How much would you take in a fixed value instead of a lottery ticket with a 50–50 chance of winning \$20,000?" The answers were in the range of \$6000 to \$9000, suggesting they were risk averse (as most people are). I also presented the same hypothetical to my first-year Torts class of about eighty students, and the cost of risk aversion appeared to range from approximately \$1000 to \$4000. Of course, this is hardly scientific, but it suggests that the range is probably reasonable and varies according to individual risk preferences and marginal utility of wealth.

<sup>&</sup>lt;sup>265</sup> This is not to suggest that many cases do not present claims for catastrophic loss. Certainly many tort claims involve significant injury for which money damages may provide an incomplete remedy.

The practical implication of risk aversion is that repeat players tend to be risk neutral, allowing a portfolio approach toward risk management, a luxury that most people lack. The end result is that variance from unique risk can be reduced. Of course, the better repeat player focuses on the unique details of each case with an eye toward the aggregate whole, thus trading on information rather than noise. Risk-neutral parties, like insurance companies, will obtain a greater share of any settlement because they can extract yield from the differences in both risk preferences and risk discount. Likewise, if most corporations are repeat players, this fact has significant implications for whether corporate defendants in tort actions are appropriately deterred by tort law and its remedies. Thus, while this Article assumes a single play scenario, the most practical effect of a repeat play scenario is the shifting of the selection horizon to the left (against settlement) for a repeat player, which creates a valuational separation against a single play party.

### D. Selection of Settlement and Trial

How do parties value a disputed legal claim? In The Nature of the Firm, Coase explained that there is "a cost of using the price mechanism."<sup>266</sup> The key assumption of the Coase Theorem is that economic assets are allocated efficiently under "conditions of perfect competition," where "the price system is assumed to work smoothly (that is, costless)."<sup>267</sup> A rational choice between two economic options can only be made if "we know the value of what is obtained as well as the value of what is sacrificed to obtain it."<sup>268</sup> The fundamental problem in the valuation of a legal dispute is that there is no market for competitive pricing and uncertainty is the governing condition of a lawsuit.<sup>269</sup> Coase posited that substantial transaction cost may be expended for the "rearrangement of legal rights," and the standard economic model assumes this cost to be the cost to accessing the pricing mechanism.<sup>270</sup> Litigation reduces variance through increased weight and insight into the nature of unique and general risks, allowing parties to assess value based on information. The expenditure of transaction cost is the primary cost in this process. But

<sup>&</sup>lt;sup>266</sup> Ronald H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386, 390 (1937). This cost explains the existence of firms, which reduces the "cost of negotiating and concluding a separate contract for each exchange transaction which takes place on a market." *Id.* 

<sup>&</sup>lt;sup>267</sup> Coase, *supra* note 27, at 6.

<sup>&</sup>lt;sup>268</sup> *Id.* at 2.

<sup>&</sup>lt;sup>269</sup> See Cooter, supra note 20, at 17 ("However, there is another obstacle [to bargaining] of an entirely different kind, namely the absence of competitive price.").

<sup>&</sup>lt;sup>270</sup> Coase, *supra* note 27, at 15.

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regardless of how much is spent, disputants can never simulate conditions of market pricing and significant valuational uncertainties always exist. The key insight of this Article is that transaction cost of litigation, primarily a cash item, is not synonymous with the true economic cost of resolution. The true economic cost must incorporate the entire portfolio of dispute risk.

Probability and variance are the key determinants of value. Under this scheme, each party has a selection horizon *H* that is unique to her risk preference. The case assessment *S* is a point in a matrix where  $S = [P_i, \sigma_i]$ . As noted before, these points move as a random walk through the litigation process. Probability and variance are subjectively perceived and rational parties may have widely divergent views. This is consistent with Black's concept that price fluctuates within a broad range in a liquid, efficient market. Accordingly, consider the positions of three disputants *A*, *B*, and *C* in Figure 5.





Unique risk preferences and costs of variance yield different locations and slope values of the selection horizons  $H_a$ ,  $H_b$ , and  $H_c$ . Based on the position of one's case assessments relative to one's selection horizon, individual preferences are seen:  $S_a$  is in a quadrant where A tends toward settlement;  $S_b$ 

tends toward trial; and  $S_c$  is indifferent since it lies on the selection horizon  $H_c$ . We can denote beta  $\beta$  as the shortest distance from the case assessment *S* to one's selection horizon *S'* such that  $\beta = |S' - S|$ . In the above, betas are measured as *a* for A and *b* for B. Beta is the risk adjustment, which is a function of probability, variance and risk preference. Since A prefers to settle,  $\beta(a)$  is the maximum discount A is willing to concede to settle. Conversely, since B prefers trial,  $\beta(b)$  is the premium B must be offered to settle rather than go to trial.

Under this scheme, it is apparent that the standard economic model is not a general economic model of bargaining, but rather a special case where the case assessments for both parties lie on their respective selection horizons. No risk adjustment would be made and so valuation is simply  $V = P \times J \pm T$ . Settlement would hinge on whether there is a contract zone of overlapping valuations. Thus, under this special condition, probability and transaction cost are the most predominant factors in the selection process in this special case.

In most cases, however, the assessments lie outside of the selection horizon, and thus risk adjustment plays a prominent role in the pricing of a disputed claim. Consider the case of plaintiff A versus defendant C in Figure 5. Their probability assessments are identical and so delta is zero. The application of the standard model would result in certain settlement since both probability assessments are the same. But this conclusion fails to consider the difference in their perceptions of variance and the selection horizons. A tends to settle while C is neutral on the selection. The prospect of settlement depends on the offsets of the risk adjustments, transaction cost savings, and differences in the risk-neutral valuations, at the end of which valuations must intersect. The starting point is simply expected value, where  $(P \times J)$  denotes the amount a party expects if liability is found, discounted by the intensity of one's feelings. It is human nature that the stronger one feels about the rightness of a position, the less she is prone to compromise. The resulting values, denoted as  $V_a$  and  $V_c$ , are then subject to a risk adjustment. Here, A prefers to settle given his position and thus is open to a risk adjustment to price in the form of a discount to settlement valuation. The amount of this risk adjustment varies with each party. This variance does not depend on a reference to some fixed decision standard, but instead is a function of the location of one's assessment S relative to one's selection horizon H. In this case,  $\beta(a)$  is the risk adjustment. On the other hand, C is neutral and so no risk adjustment is made. Lastly, we cannot ignore the value of the litigation option as discussed before. The value of the option, denoted  $\pi$ , depends on the degree of uncertainty: If one party perceives variance to be higher, the procedural option value should be higher than the other party's. Under this set of pricing conditions, settlement occurs where  $V_a - \beta(a) - T_a + \pi_a \leq V_c + T_c - \pi_c$ . Otherwise, the settlement price mechanism fails to resolve the dispute, and the selection of the unilateral trial option is inevitable.

Consider now the case of A versus B. Their perceptions of the case are markedly different. B feels strongly about his case and also believes the variance of this case assessment to be low. The location of his assessment relative to the selection horizon suggests a strong preference for trial, but as before, A prefers settlement. Under this condition, both A and B discount their respective settlement valuations. Under this set of pricing conditions, settlement occurs when  $V_a - \beta(a) - T_a + \pi_a \leq V_b - \beta(b) + T_b - \pi_b$ . Mutual risk adjustments tend to offset, meaning the plaintiff's concession on valuation is negated by the defendant's valuational demand. As a result of this dynamic, this case resembles the risk-neutral valuation of the standard model and is highly susceptible to various factors that may push the case one way or the other.

This pricing model explains why, outside of small, routine cases, transaction cost may not be the central inquiry in meritorious actions. On the one hand, it is a curious phenomenon that, despite seemingly endless complaints about the high cost of litigation, parties continue to litigate as a way to resolve disputes. Surely, one would think that the legal market would make adjustments over the course of many years and make the process more efficient. On the other hand, we see that such expost rationalization fails to consider the fact that valuation is always an ex ante forward-looking exercise. Uncertainty is the governing condition of a meritorious legal action. Transaction cost is a source of surplus, but it is also the price of better assessments of probability and variance. This assessment then determines the risk adjustment, which is imbedded in the valuation and, as Summers and Cutler observe, can exceed the value of the transaction cost surplus by many fold.<sup>271</sup> Without an adequate determination of probability and variance, case assessment is incomplete and settlement can be a speculative gamble. Valuational gains can offset cash outlays. The critical inquiry is the proper balance.

<sup>&</sup>lt;sup>271</sup> See supra note 234 and accompanying text.

Under this pricing theory, the valuation of an ambiguous legal claim involves assessments of probability, weight, unique risk, general risk, and cost of risk preference. These concepts are linked by well-established principles of financial economics. Ultimately, a party must ask two fundamental questions. What is the risk? How does it affect price? In theory, principles of financial economics answer both questions. In practice, the analogy to financial economics is limited. The public markets can quantify, for example, the cost of equity, option value, and firm value.<sup>272</sup> Much of the work is rote, except that as Black alluded, the art of practical finance involves the effort to distinguish information from noise.<sup>273</sup> Here, too, at the bottom of the analytical well is subjective belief. Beneath the enormous sophistication of the financial markets is the collective push and pull of ideas on valuation where the mathematical expectation of a market participant is zero. The art of legal valuation is more subjective than economic asset valuation. While law and economic literature attempts to instill analytic rigor to the process, there are limitations. Only the cost of risk preference is a hard number. Concepts of probability, weight, unique risk, and general risk are highly subjective, susceptible to multiple plausible interpretations. Nevertheless, a substantial majority of cases settle. Given the complexities of the interactions, it may seem like a miracle that any case settles. But we expect rational parties to hone in on the broad range of pricing needed for transactional efficiency. Despite the noise inherent in subjectivity and inquiries into the unknown, most parties can price an ambiguous claim in a way that ultimately reaches settlement. Indeed, the dynamic uncertainty of a stochastic process suggests that at various points in the litigation process, the valuations of parties will intersect, and perhaps on more than one occasion. That so many cases settle suggests the legal market works efficiently despite the noncompetitive nature of prices. That said, the inability to settle need not be the indication of error, but simply the limitations of an illiquid pricing mechanism.

<sup>&</sup>lt;sup>272</sup> See Black & Scholes, *supra* note 198, at 638 (proposing a theory of option valuation); Markowitz, *supra* note 172, at 91 (proposing Portfolio Theory); William F. Sharpe, *Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk*, 19 J. FIN. 425, 436–42 (1964) (proposing the Capital Asset Pricing Model). Unlike some other branches of economics, financial economics enjoys a tangible "symbiosis" between theory and application in market practices. Sam Peltzman, *The Handbook of Industrial Organization: A Review Article*, 99 J. POL. ECON. 201, 211 (1991).

<sup>&</sup>lt;sup>273</sup> See supra Part IV.B.
## CONCLUSION

Bargaining theory is endlessly fascinating because it is infinitely complex. Each insight adds a detail to the mosaic, but complete clarity is elusive. The standard economic model paints the subtleties of human intelligence at work with sweeping impressionistic strokes. The picture portrays human behavior in a static, linear manner when the general observation is that it is subject to complex, stochastic processes where uncertainty is the norm and the future is unpredictable. The broad brushstrokes fail to capture the nuances. The purpose of this Article is to step back and consider whether the portrait sufficiently resembles our observation of the world. I have concluded that it is a flawed vision of the general system of bargaining.

Fundamentally, a legal dispute involves the valuation of an ambiguous claim. Both settlement and litigation seek to resolve that uncertainty. Upon settlement or final judgment, there is absolute certainty. Before this point in time, however, there is only varying degrees of risk and perceptions of risk and reward. Settlement and litigation are best seen as pricing mechanisms of an ambiguous legal claim. By focusing on probability and transaction cost, the standard economic model fails to incorporate all risks into its valuation model, and thus the true economic cost of resolution is not reflected in the valuation. It overstates the measurability of probability, which is really gauged only by the intensity of a person's rational belief in a proposition and the importance of transaction cost economics. Although economic theory in legal bargaining can be seen as an attempt to mimic a costless Coasian world, we should not forget that Coase assumed "conditions of perfect competition" and that transaction cost is the cost of accessing the pricing mechanism. Even an infinite expenditure of transaction cost cannot achieve conditions of market competition because each transaction is noncompetitive. Nor is it feasible to accurately predict price. What remains are varying degrees of perceived uncertainty, and the parties must adjust their price in accordance with these perceptions. Thus, the cost of using the pricing mechanism must be more than transaction cost and must include the entire cost of dispute resolution. This cost includes transaction cost and a risk adjustment to the anticipated cash flow

Settlement and litigation involve different packages of risk. A selection theory cannot ignore this duality. It is stipulated that a trial is a risky endeavor. But a settlement can be no less risky. A blind settlement is foolhardy; a settlement under uncertainty, disquieting; a settlement with complete information, preferable. The selection of settlement or trial involves a complex valuational calculus that is not captured by the current understanding. The concept of value is relative. Under the standard economic model, value is relative to the concept of a fixed decision standard. I reject that approach. Under this Article's pricing theory, value is relative to each party's selection horizon, which is only in part influenced by the perception of the decision standard. Settlement occurs only if the pricing conditions allow a "trade" in which each side can profit from the pricing mechanism. If not, the pricing mechanism for trial provides the superior return. Thus a normative division between settlement and litigation does not exist. Rather, most trials result from rational choices in the face of dynamic uncertainty. If so, trials have been falsely maligned as economically wasteful activity, a thought that is unfortunately axiomatic in the current intellectual environment. The implication of restoring the reputation of a trial as a useful function is vast, touching on virtually every aspect of the administration of justice.