An Experiment in the Optimal Precision of Contract Default Rules

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I. INTRODUCTION

This Article conducts an empirical experiment to shed light on a simply stated, but vexing, question in contract law: What is the optimal precision of legal default rules? Should lawmakers pick just one simple default rule for an entire legal system, or should they design more complex default rules to offer customized legal treatment for different markets—or even for different parties?

First, some brief background. Contract law is largely comprised of default rules, which govern an agreement when the parties fail to state their own terms. But contracting parties are usually free to change a disliked rule by substituting one of their own choosing. This default rule approach to contract law is widely celebrated for allowing private, made-to-order lawmaking. And over the past few decades, much of the academic literature on contract law has wrestled not with the default rule conceptualization, but rather with the choice of one particular default rule over another. Should a mailed acceptance, for

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1. The general topic of precision in contract default rules is lucidly described in Richard Craswell, Contract Law: General Theories, in 3 Encyclopedia of Law and Economics § 4000, at 4-5 (Boudewijn Bouckaert & Gerrit De Geest eds., 2000); see also Ian Ayres, Preliminary Thoughts on Optimal Tailoring of Contractual Rules, 3 S. Cal. Interdisc. L.J. 1, 1-17 (1993) (analyzing explicitly the default precision problem in terms of contract law). I have not seen any empirical research that is directly on point.

2. Craswell puts the problem this way: “If different rules would be efficient for different contracting pairs, the law must also decide the extent to which its default rules should be ‘tailored’, or customized to match the rule that would be most efficient for each individual contracting pair.” Craswell, supra note 1, § 4000, at 5.


4. Ayres & Gertner, supra note 3, at 87; Craswell, supra note 1, § 4000, at 1. Of course, some contract default rules are immutable, such that they may not be changed by private parties. See E. Allan Farnsworth, Contracts §§ 7.17, 12.18 (4th ed. 2004); U.C.C. § 2-102(2) (2004). The duty to contract in good faith and the prohibition against punitive liquidated damages are two prominent examples of this. See Farnsworth, supra, § 7.17, at 488-500, § 12.18, at 811-20; see also U.C.C. § 1-304 (2005) (imposing obligation of good faith); U.C.C. § 2-718(1) (2005) (requiring that liquidated damages be “reasonable in the light of the anticipated or actual harm”).


example, be valid when sent or when received? Must delivery of
bulk goods come all at once or is it okay to tender them piecemeal? A
great deal of scholarly work uses economic analysis to ask which
default rule will serve as a more efficient starting point for a given
issue in contract law.

But there is another dimension to the default, posed less
frequently, that also impacts how contract default rules will work.
Lawmakers are free to make different choices about how precise, or
granular, a default rule will be. Often one simple, but imprecise,
default rule is adopted across an entire legal system. For example,
when a breach occurs, unforeseeable consequential damages are not
normally recoverable throughout the United States—regardless of the
specific characteristics of the relevant market or contracting parties. Yet more precise default rules might also be crafted, rules that lead to
different outcomes for different markets or parties. Perhaps the most
famous instance of a more precise rule is the recurring distinction

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7. See RESTATEMENT (SECOND) OF CONTRACTS § 63(a) (1979) (stating that by
default an acceptance is valid "as soon as put out of the offeree's possession").
8. See U.C.C. § 2-307 (2005) (stating that by default, delivery must generally come
in single lots).
9. See Posner, supra note 6, at 834. Indeed, one of the strengths of the economic
approach over other schools of contract theory is that it provides a principled basis for
choosing among reasonable default alternatives. See, e.g., Richard Craswell, CONTRACT LAW,
(criticizing a non-economic approach to contract law as lacking a structured basis for selecting
default rules); Richard Craswell, In That Case, What Is the Question? Economics and the
Demands of Contract Theory, 112 Yale L.J., 903, 903-04 (2003). Of course, the economic
approach has also received ample criticism for its attempt to evaluate the "best" law. See,
e.g., BRIAN BIX, JURISPRUDENCE: THEORY AND CONTEXT 210-13 (3d ed. 2004) (offering an
overview of concerns related to the law and economics movement). But many recent insights
in contract theory have involved economic analysis, and this Article continues in that
tradition.
10. See Ayres, supra note 1, at 5; Ayres & Gertner, supra note 3, at 87-95; Craswell,
supra note 1, § 4000, at 4-5.
11. This rule comes from the famous case of Hadley v. Baxendale, (1854) 156 Eng.
Rep. 145, 145 (Exch. Div.), and it is widely considered to be one of the most important
principles of contract law. 3 E. ALLAN FARNsworth, FARNsworth ON CONTRACTS § 12.14, at
255-68 (3d ed. 2004); Grant Gilmore, THE DEATH OF CONTRACT 92 (Ronald K.L. Collins
ed., 2d ed. 1995); John Edward Murray, Jr., Murray ON CONTRACTS § 120, at 783-90 (4th
ed. 2001); Joseph M. Perillo, Calamari and Perillo ON CONTRACTS § 14.5, at 568-72 (5th
ed. 2003). The rule is not immutable, however, and parties may contract to permit recovery
of all (or no) consequential damages if they wish.
between merchants and nonmerchants in the Uniform Commercial Code (U.C.C.).

Continuing the prior example, a more precise rule could be crafted to allow all breached-against buyers to recover even unforeseeable consequential damages in some special markets—say health care or airplane travel—if there are good reasons to believe that such a rule would be better. And to take the precision further, even within a single market, certain types of buyers could be entitled to unforeseeable consequential damages by default—while other buyers in that market would not. Perhaps there are reasons to allow business travelers, but not pleasure travelers, to recover such damages from airlines. If lawmakers could identify salient characteristics, they might conceivably use greater precision to enact more efficient default rules.

Take the common analogy between default rules in contract law and default settings in computer software. As the comparison goes, when you unpack your computer from its shipping carton, it is already loaded with hundreds or thousands of default settings: your desktop has a specific (bland) look, your Web browser has default links to other Web sites, and your word processing software automatically opens with one-inch margins, just to name a few. Of course, you can then change these settings if your individual preferences differ from those initially loaded on the computer. Several commentators have made the point that contract default rules act in this same manner. They


13. I use this example only to illustrate the concept of differential legal treatment within a market and am not arguing that such a rule would be desirable (or even workable). Part of the challenge in designing complex default rules is identifying the salient characteristics that merit disparate treatment, and I have no evidence that business versus pleasure travel, for example, is such a variable.

14. See Ayres, supra note 1, at 4-6; Ayres & Gertner, supra note 3, at 91; Craswell, supra note 1, at 1-2.


16. See Ayres, supra note 15, at 898-99; Ayres & Gertner, supra note 3, at 91 n.24; Clark, supra note 15, at 1706 n.11.

17. Clark, supra note 15, at 1706 n.11.

provide you with a ready-to-go set of terms so you do not need to configure everything from scratch.

But think about what software companies actually do. Certainly they do not use simple, one-size-fits-all default settings for all of their customers. Instead, they usually segment their customer base and give each group a different cluster of default defaults.\textsuperscript{19} To pick a software program that many of us use, consider how Westlaw tailors its default settings to different user groups.\textsuperscript{20} Law students start with one interface, “Law School Classic,” which offers quick access to legal cases and other databases commonly searched by students. Lawyers, however, receive an entirely different interface—one that may be tailored to the state or legal subject in which they practice. West has designed these more complex default settings because it has determined that different groups usually want to access legal information in a different manner. By making upfront efforts to match their default settings to the anticipated preferences of each segment of market users, West, and other software companies, hope to save more customers the bother of changing the defaults. They have decided that simple defaults are not the best way to meet their customers’ needs and that they can do better with more complex default algorithms.\textsuperscript{21}

In this same way, contract law could also set compound default rules to better serve different markets. One group of markets could get one set of starting conditions, and other groups could receive different legal treatment. Any party would presumably be free to change the default rule if he wished, unless there was a good reason to hold otherwise. At some point, of course, this segmentation may get out of hand and become too complicated to administer—just as it can for marketing executives.\textsuperscript{22} But because we live in a heterogeneous world,


\textsuperscript{21} One of the trickiest issues here involves identifying which market segment is making the purchase. In order for a segmentation to be actionable, marketing executives need some way of distinguishing each group. See Myers, supra note 19, at 20-28; Wedel & Kamakura, supra note 19, at 3-6.

\textsuperscript{22} To use the marketing jargon, a customer segmentation strategy must be designed to be “actionable,” meaning that there are not too many groups. See Forsyth et al., supra note 19, at 8-9. Limiting the total number of customer segments makes it easier for executives to categorize customers and design customized plans to serve each segment. \textit{Id}. More recently,
complex default rules in contract law could conceivably outperform simple ones. In other words, it is not obvious that the optimal number of segments is just one.

The trick, then, is determining whether more complex rules are worth the bother. Can lawmakers determine the characteristics that should give rise to disparate legal treatment? Is it too expensive to draft detailed defaults? Will judges know which rule to apply in a given contractual setting? And will parties even recognize which rule applies to their deal? For these reasons, some commentators have suggested that complex default rules are too unwieldy.\(^{23}\) Maybe it is better to have a simple, one-size-fits-all rule that everyone can plan around, instead of a complex rule that might be more expensive or troublesome to promulgate, transact with, and adjudicate.

Yet surely there must be some set of circumstances where compound default rules would be worthwhile. Exactly what does it take? And do we live in a world where those circumstances are ever present? Little analytical or empirical work has explicitly addressed this problem—which is not too surprising because it is a thorny one.

This Article uses empirical data and analytical modeling to explore this problem of default rule precision. I will not presume to offer a comprehensive theory, but the experiment should help to define the contours of the problem a bit more clearly.\(^{24}\) Empirical work is perfectly suited for gnawing at the corners of a tough problem, and hopefully this Article will make a little headway on the trade-offs between simple and complex default rules in contract law.\(^{25}\)

The main claim of this Article is that simple default rules often do seem better than complex ones—at least for the markets and rules used in this experiment. I am unable to draw more definitive conclusions because the work relies, at least in part, on assumptions

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some commentators have argued that technological advances have increased the optimal number of customer segments by making it easier to identify and serve more groups of customers with fewer customers in each group. **Myers, supra note 19, at 1-15; Wedel & Kamakura, supra note 19, at 3-6.**

23. **See, e.g., Alan Schwartz & Robert E. Scott, Contract Theory and the Limits of Contract Law, 113 Yale L.J. 541, 598-99 (2003) ("Default rules would be too expensive to create if efficient solutions were party-specific. Then there would need to be as many legal rules as there are sets of contracting parties.").**

24. **Several scholars have bemoaned the difficulty of such an endeavor. See, e.g., Ayres, supra note 1, at 2-3 ("It may be exceedingly hard, however, to provide a general theory ... in part because the topic is so amorphous.").**

for some of the variables. Overall, there are reasons to believe that contract law should usually prefer simple default rules and leave more detailed adjustments of these rules to the contracting parties.

I have organized the discussion as follows. Part II presents the problem of default rule precision in contract law, illustrated with analogies and examples from current doctrine. Part III develops an economic model of default rule precision using the Hadley rule on consequential damages—the classic testing ground for contract default rule theory. I then use this model to conduct several experiments on optimal default rule precision, drawing on empirical data from the field of marketing. Part III also discusses and tests the results, suggests some broader implications, and proposes additional research. Finally, a brief conclusion in Part IV sums up the findings.

II. THE PROBLEM OF DEFAULT RULE PRECISION

About ten years ago, Ian Ayres, building on earlier work by Louis Kaplow and others, developed a taxonomy of contract default rule precision. While there are many ways to look at the problem, I think Ayres's classification is very helpful and I will adopt it here. The goals of this Part, then, are to briefly describe the taxonomy and—because the issues here are difficult to discuss in the abstract—to illustrate how the classifications work with some concrete examples. Finally, I will frame the empirical experiment in Part III by discussing the potential benefits and drawbacks of complex default rules.

26. Russell Korobkin, The Status Quo Bias and Contract Default Rules, 83 CORNELL L. REV. 608, 616 n.21 (1998) ("Perhaps the most famous case in all of contract law, Hadley has become the example that default rule theorists most often employ to illustrate their conceptual arguments."). The Hadley rule features prominently in Ayres and Gertner's landmark article on penalty defaults, and it is often used to explain or test issues related to contract default rule theory. See Ayres & Gertner, supra note 3, at 101-04; see also, e.g., Adler, supra note 3, at 1547-54; Lucian Ayre Bechuck & Steven Shavell, Information and the Scope of Liability for Breach of Contract: The Rule of Hadley v. Baxendale, 7 J.L. ECON. & ORG. 284, 284-87 (1991); Jason Scott Johnston, Strategic Bargaining and the Economic Theory of Contract Default Rules, 100 YALE L.J. 615, 636-39 (1990) (analyzing the Hadley rule when sellers enjoy market power); Eric A. Posner, Contract Remedies: Foreseeability, Precaution, Causation and Mitigation, in 3 ENCYCLOPEDIA OF LAW AND ECONOMICS, supra note 1, § 4620, at 162-69.

27. Ayres, supra note 1, at 2-3. Ayres's work draws upon much of the previous literature on rules versus standards, but it relies, in particular, on Kaplow's economic treatment of the subject. See Ayres, supra note 1 passim (relying on Louis Kaplow, Rules Versus Standards: An Economic Analysis, 42 DUKE L.J. 557, 618-20 (1992)).
A. A Taxonomy of Contract Default Rules

According to Ayres, a useful way to categorize the choices available in the design of contract defaults is to map a law along two dimensions: complexity and timing (see Figure 1). The first dimension, complexity, seems straightforward enough. A law may either be simple and provide short, standardized treatment for everyone, or it may be complex, such that it carves out numerous exceptions or provides a detailed description of the relevant factors for adjudication. Complexity is, of course, a matter of degree, but a conceptual division might still be made.

FIGURE 1. Taxonomy of Default Rule Precision

<table>
<thead>
<tr>
<th>Complexity</th>
<th>Simple</th>
<th>Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Rule</td>
<td>Simple Standard</td>
<td></td>
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<tr>
<td>Complex Rule</td>
<td>Complex Standard</td>
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Ex Ante Content | Ex Post Content

Timing

The second dimension, timing, needs more explanation. There is an important difference between a law that has "content" before an individual acts and one that has "content" after an individual acts. To borrow from a popular example, a law requiring a driver to keep below sixty-five miles per hour has content before the driver ever steps on the

28. Ayres, supra note 1, at 3-4.
29. Id.
30. See Kaplow, supra note 27, at 568-71.
gas pedal. Everyone knows upfront the prescribed limits on behavior. By contrast, a law requiring a driver to “drive safely under the circumstances” receives its content after the action takes place. Only then can adjudicators look at the relevant factors—such as road quality, weather conditions, traffic density, and so on—to determine whether the driver obeyed the law.  

This timing dimension is a helpful way to distinguish legal rules from legal standards—and the trade-offs here raise classic jurisprudential concerns. For example, should lawmakers promulgate rules that predefine how gaps in a contract will be plugged, or should they adopt looser standards that will govern a contract after the fact—by taking account of industry custom and other circumstances surrounding the dispute?

32. See Kaplow, supra note 27, at 559-60.
33. As the debate runs, rules have the benefit of providing greater ex ante certainty in application of the law, but they are both under- and over-inclusive. Speed limits, for example, are easy to apply, but they allow drivers to legally go faster than they should in dangerous conditions and force them to go slower than they safely could when the roads are clear. Standards, on the other hand, make it harder to predict up front how a particular situation will be dealt with, but allow adjudicators more freedom to tailor the law appropriately. See, e.g., Douglas G. Baird & Robert Weisberg, Rules, Standards, and the Battle of the Forms: A Reassessment of § 2-207, 68 VA. L. REV. 1217, 1227-31 (1982) (discussing rule precision); Colin S. Diver, The Optimal Precision of Administrative Rules, 93 YALE L.J. 65, 65-71 (1983) (same); Avery Wiener Katz, The Economics of Form and Substance in Contract Interpretation, 104 COLUM. L. REV. 496, 496-501 (2004) (same); Duncan Kennedy, Form and Substance in Private Law Adjudication, 89 HARV. L. REV. 1685, 1687-1713 (1976) (same); Pierre Schlag, Rules and Standards, 33 UCLA L. REV. 379, 379-81 (1985) (same). One important concern involves the likely frequency of the conduct: a common event may merit the greater upfront costs that come with rulemaking, while it may be silly to draft a rule for an event that rarely occurs. See Ayres, supra note 1, at 9; Kaplow, supra note 27, at 588-93. Institutional competence is also important: Can legislatures write good rules? Can judges exercise standards soundly? Much of this debate combines the two dimensions and only compares simple rules with complex standards, but Kaplow demonstrates why it is helpful to disaggregate these two dimensions. Kaplow, supra note 27, at 588-93.
34. As an example of this, consider U.C.C. § 2-308(a) (2005), which states that unless the parties have otherwise agreed, “the place for delivery of goods is the seller’s place of business or if none, the seller’s residence.”
35. Much of the U.C.C. contains these types of default standards. See, e.g., U.C.C. § 2-305(1) (2005) (“The parties if they so intend may conclude a contract for sale even if the price is not settled. In such a case the price is a reasonable price at the time for delivery . . . .” (emphasis added)); id. § 2-309(1) (“The time for shipment or delivery or any other action under a contract if not provided in this Article or agreed upon shall be a reasonable time.” (emphasis added)). It is impossible to give content to these laws until the party’s specific actions have already taken place—so they can then be compared to commercial norms. Some commentators have argued that the U.C.C. is filled with default standards for political reasons related to its drafting process. See Alan Schwartz & Robert E. Scott, The Political Economy of Private Legislatures, 143 U. PA. L. REV. 595, 596-600 (1995).
Putting together these complexity and timing dimensions, then, leads to four types of defaults: (1) simple rules, (2) complex rules, (3) simple standards, and (4) complex standards.\textsuperscript{36}

To see the difference between these four types of laws, consider several possible ways that lawmakers might levy an income tax.\textsuperscript{37} A law requiring citizens to pay 20% of their gross income in taxes might be classified as Type 1: It provides a simple formula with \textit{ex ante} content.\textsuperscript{38} Much (but not all) of our current federal income tax code is a Type 2 law, that is, a very complicated formula with \textit{ex ante} content. It has meaning prior to the occurrence of the regulated action, but goes into extraordinary detail about exempt income, offsetting deductions, special credits, and the like. On the other hand, a law requiring taxpayers to “pay their fair share in taxes” might be considered a Type 3 law, because it is a standard where the meaning of “fair share” must be determined after the fiscal year passes.\textsuperscript{39} A Type 4 law would be one that takes this “fair share” standard, but then adds a list of several dozen criteria to determine what it means—say, annual income, total assets, intensity of use of government services, and so on.

Armed with this taxonomy of default rule architecture, I want to restate the focus of this Article. The experiments here speak primarily to the question of whether lawmakers should prefer simple rules to complex ones. In other words, are Type 1 laws better than Type 2 laws? This means I will largely dodge the tricky question of whether default rules are likely to function better than default standards. While this work may discuss the rules versus standards debate in passing, nothing in this Article empirically assesses whether it is better for lawmakers to lay down contractual gap-fillers at the outset or to adopt default standards that give content to missing terms after the fact.\textsuperscript{40} Nevertheless, I think the choice of simple versus complex default rules raises interesting and important issues that are worth pursuing. This

\textsuperscript{36} Ayres, supra note 1, at 3.
\textsuperscript{37} This illustration is adapted from Kaplow, supra note 27, at 566.
\textsuperscript{38} This assumes that gross income can be readily calculated under standard accounting principles. As the taxpayer’s financial situation grows more complicated, it might be argued that the rule is really a complex one because it will become increasingly difficult to determine what “gross income” means.
\textsuperscript{39} Kaplow, supra note 27, at 566.
\textsuperscript{40} Others have taken on this issue conceptually or theoretically, usually coming down on the side that default rules should be used over default standards. See Baird & Weisberg, supra note 33, at 1223; Schwartz & Scott, supra note 23, at 543-50. If so, this makes the question of whether lawmakers should enact simple rules or complex ones particularly important.
analysis also helps to establish a framework for conducting future empirical research on the optimal precision problem.

But what might a contract default rule look like under different levels of complexity? And how would lawmakers know which variables to use when segmenting a simple rule into a more complex one? I think it is helpful to consider an extended example, one that will form the basis of the experiment in Part III.

B. One Example: The Hadley Rule

The rule of Hadley v. Baxendale states that a party seeking to recover damages for breach may not include harm from unforeseeable consequential damages.\(^{41}\) The doctrine thus distinguishes the treatment of damages in contract law from that of tort law by limiting the penalties available for breach.\(^{42}\) Numerous scholars have pored over the merits of this rule—mostly from an economic point of view—and it has become a classic testing ground for various theories of contract default rules.\(^{43}\)

The typical analysis runs something like the following: A lawmaker must choose between a Hadley default rule or a more permissive default rule allowing breached-against parties to fully recover for their harm.\(^{44}\) Economic analysis is then used to consider


\(^{42}\) See Gilmore, supra note 11, at 49-53.

\(^{43}\) See Adler, supra note 3, at 1547-54; Ayres & Gertner, supra note 3, at 87-95; Ian Ayres & Robert Gertner, Strategic Contractual Inefficiency and the Optimal Choice of Legal Rules, 101 Yale L.J. 729, 734-35 (1992); Bebchuk & Shavell, supra note 26, at 284-87; Johnston, supra note 26, at 615-20. More recently, I have used methods similar to the ones used in this Article to empirically test the Hadley rule against one permitting full recovery of consequential damages. See George S. Geis, Empirically Assessing Hadley v. Baxendale, 32 Fla. St. U. L. Rev. 897, 897-903 (2005).

\(^{44}\) See, e.g., Posner, supra note 6, at 836-37 (discussing the choice between actual and average damages). A third possibility is a default rule allowing no consequential damages to be recovered for breach. In fact, many parties apparently seek this legal treatment by contracting around the Hadley default rule in their agreements. Douglas G. Baird et al., Game Theory and the Law 281 n.16 (1994); 3 Farnsworth, supra note 11, § 12.14, at 268; Richard A. Epstein, Beyond Foreseeability: Consequential Damages in the Law of Contract, 18 J. Legal Stud. 105, 118 (1989). This zero-liability-for-consequential damages-default rule was also considered for adoption by some members of the drafting committee for the 2003 amendments to article 2 of the U.C.C.—although no formal proposal was ever put forward. Geis, supra note 43, at 907 n.49. Most of the literature on Hadley, however, only weighs the effects of a Hadley rule versus a full-damages rule, thus assuming implicitly that the seller is best positioned to take precautions against breach. This assumption is questionable if robust third-party insurance markets exist for the given market, but I am not aware of empirical studies on this point.
the incentives arising under each default and whether those incentives will lead to a socially preferable outcome.45

Analysis of the efficiency effects under these two rules grows complicated quickly, and the best rule will ultimately depend on several variables.46 One concern, however, is particularly important: the distribution of buyer valuations.47 If most buyers have a relatively low valuation for the given good or service—and just a few buyers place very high valuations on the product—then, other things being equal, the Hadley rule is likely to be the economically superior rule.48 This is true because the few, high-value buyers can contract around a Hadley default to obtain full damages49 more cheaply than the many low-value buyers can contract around a full-damages default.50 Conversely, if the distribution of valuations contains mostly high-value buyers, then a full-damages default might be better.51

However, this analysis assumes that just one simple default rule must be chosen for everyone. Lawmakers could conceivably adopt more complex defaults, tailored to the most salient variables in the economic models of Hadley. The recovery of unforeseeable consequential damages might, for example, be linked directly to buyer valuations for a market or contracting party.

To see what a more complex default rule on consequential damages might look like, consider three archetypes. First, we might apply one simple rule equally to everyone in a legal system. For

45. See Adler, supra note 3, at 1547-54; Ayres & Gertner, supra note 3, at 87-95; Bebchuk & Shavell, supra note 26, at 284-87; Johnston, supra note 26, at 636-39.

46. Bebchuk & Shavell, supra note 26, at 284-87.

47. See Posner, supra note 6, at 836-37, 853-54 (describing the economic models of Hadley, but also questioning whether empirical analysis of the relevant variables is possible).

48. Id.

49. Contracting for full damages in this manner will then create seller incentives to take efficient precautions against breach for these high-value buyers. See ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 299-306 (4th ed. 2004).

50. Again, it is important to emphasize that this is only true if the other variables do not differ greatly between low-value buyers and high-value buyers. For example, if there are enormous transaction costs for high-value buyers to contract around a default rule, then this analysis will not hold. See Geis, supra note 43, at 947-49; Russell Korobkin, Empirical Scholarship in Contract Law: Possibilities and Pitfalls, 2002 U. ILL. L. REV. 1033, 1058. Differences in the probability of incurring consequential damages with breach between these two groups might similarly change the analysis. See Adler, supra note 3, at 1551. Nevertheless, the distribution of buyer valuations is likely to have the greatest impact on the optimal default rule and is probably the most important variable to ground in empirical data.

51. This is true under the same logic: with these conditions it will be less costly for the few low-value buyers to contract around a full-damages default (and receive fewer precautions for a cheaper price) than for the many high-value buyers to contract around a Hadley default.
example, all unforeseeable consequential damages are unrecoverable. This is, of course, current law. Second, we might have a more complex rule that is tailored to individual markets. For example, unforeseeable consequential damages are unrecoverable in markets A, B, and C (where most buyer valuations are low), but recoverable in markets X, Y, and Z (where most buyer valuations are high).\footnote{A related option is to state more generally that markets will receive the default rule that is appropriate for their buyer valuation curve. This would be more of a default standard, in that it would be harder to know upfront how a given market would be treated. A hybrid rule could be promulgated by listing a few illustrative markets that will receive each type of treatment and then stating the general standard that will apply for everyone else.} By matching legal treatment to a key variable underlying the efficiency of damage recovery regimes, lawmakers might be able to write a better rule—although there are certainly other costs that would need to be considered.\footnote{See infra Part II.D. This Article suggests, in fact, that these costs may often outweigh efficiency gains from complex defaults.} And third, we could have a default standard that is tailored to individual parties. For example, unforeseeable consequential damages are unrecoverable if the buyer is a low-value buyer (relative to the rest of the buyer population in that market), but they are recoverable if the buyer is a high-value buyer. This default would go even further by linking damage recovery to individual characteristics.

Which rule is better? Well, this question can be empirically tested using the existing economic models of Hadley and buyer valuation data from several diverse markets. The additional efficiency benefits that come from adopting a complex default rule can be weighed against the costs of greater precision. Before turning directly to the empirical experiment, however, I want to step back and consider these potential benefits and costs of complex default rules.

\section*{C. Why Complex Rules Could Conceivably Outperform Simple Ones}

If all market participants were alike, it would be fairly straightforward to craft a simple default rule that was optimal for everyone. By determining the preferences or characteristics of a few contracting parties, lawmakers could infer that everyone faces identical circumstances and they then could choose the default rule that maximizes social welfare. In this hypothetical world, there would be no need for complex default rules, because just one approach would be best for all.\footnote{Ayres, supra note 1, at 13.}
But contracting parties are not clones, obviously, and it is this diversity in preferences and behavior that opens the door to the possibility of gain through more complex default rules. If the salient differences between market participants can be identified and measured, then this work might form a basis for writing segmented default rules—rules that give two or more groups a different starting point for a given area of contract law.

These complex default rules offer at least two theoretical benefits. First, lawmakers might be able to reduce the total transaction costs of contracting by initially giving more parties their preferred terms. By logical necessity, the use of a simple default rule with heterogeneous buyers requires some parties to incur transaction costs to bargain to their optimal contract. Those who dislike a given default rule have to take action to replace it. A more complex law might conceivably save these transaction costs if—and this is a big if—lawmakers can identify the right contexts for offering differential treatment.

To take a simple example, suppose there are only two markets in an economy—the sale of football tickets and the sale of Winnebago RVs—and that lawmakers must choose a default rule for whether payment may be tendered by personal check. Ninety percent of all football fans prefer a default that says no (they do not want to be stuck holding the bank draft of some stranger five minutes before kickoff and they expect to pay in cash when they are buying). But ninety percent of all RV buyers and sellers prefer a default that says yes (it is more convenient, and sellers usually run credit checks anyway). If the lawmakers enact a simple default allowing personal checks, then most football fans will have to incur transaction costs to change this rule; if the lawmakers enact a simple default barring checks, then most RV buyers will have to incur the transaction costs. However, if the lawmakers adopt a more complex rule—no for football, yes for RVs—then just the few, unconventional buyers in each market will need to incur transaction costs on this term.

From a social welfare standpoint, then, this ability to pre-identify different classes of parties and craft a background rule suited to each

group could result in net savings. With complex default rules, more parties might receive their preferred legal treatment automatically—without needing to expend resources to adjust the default—and lawmakers could conceivably cut the overall transaction costs of contracting.

The second possible benefit of complex default rules is rooted in the insight that some parties will not bother to change a disliked term.\textsuperscript{58} This is most likely to happen when the benefits of moving to a different term are small, and thus outweighed by the transaction costs of making the change. Complex default rules might allow these parties to receive a more efficient contract by supplying their preferred term.

The easiest way to see this benefit is to start with a simple, one-size-fits-all default rule and imagine three types of parties: those who prefer the rule, those who hate it, and those who dislike it just a little. The first group does nothing and is happy. The second group incurs some transaction costs to change the rule and is happy. The third group, although preferring a different term, does not find it worthwhile to expend the transaction costs necessary to change the default rule and unhappily accepts the suboptimal contract.

Complex default rules could theoretically solve this problem by allowing this last group to receive their preferred term automatically—assuming, again, that lawmakers can recognize and provide the treatment desired by the third group. Thus, complex defaults are not just about saving transaction costs; they might also create more efficient contracts—ones that would never be created under a simple default.

This may seem like a small benefit. After all, if a party really wants a given term, then he should be willing to incur the transaction costs of changing it. By definition, perhaps, this benefit only extends to situations where the parties do not care all that much about the default—assuming that transaction costs are modest. However, if many parties face this situation, then the overall impact could still be significant. And if bounded rationality, or some other cognitive bias, prevents parties from taking action to change a default rule, then the effects here may be more profound. Russell Korobkin, for example, has argued that contract default rules may be sticky, such that parties may not make a change even when the benefits of a different term

\textsuperscript{58.} See Korobkin, supra note 26, at 609-12.
outweigh the transaction costs.\textsuperscript{59} If so, the ability of complex rules to offer a superior matching of default terms to underlying preferences becomes more important.\textsuperscript{60}

So these two effects—reduced transaction costs and more efficient contracts—are the primary theoretical rewards of complex default rules.\textsuperscript{61} Of course, this is only half the story: Complex default rules might also introduce new costs.

D. Why Complex Rules May Not Be Worth the Bother

Crafting and implementing complex default rules raises a host of potential concerns, any of which could make it better to abandon the whole endeavor. In this Subpart, I briefly consider four of these concerns: promulgation costs, adjudication costs, error costs, and transaction costs.

Perhaps the most obvious drawback is that complex default rules are likely to cost more to promulgate than simple default rules.\textsuperscript{62} With simple default rules, lawmakers need only select one approach for everyone.\textsuperscript{63} With complex default rules, lawmakers must first identify the salient characteristic or characteristics that merit disparate treatment. They then need to determine how many defaults to use for that legal issue. Finally, they must decide how to slot market participants into each branch of the rule. Imagine the costs required to gather buyer valuation data for hundreds of submarkets in order to craft a very granular default rule on consequential damages.

Along these lines, Alan Schwartz and Robert Scott have recently argued in an influential article, that it is futile for lawmakers to try to

\textsuperscript{59} See id. at 611-12.

\textsuperscript{60} This cognitive bias is excluded from the experiment in Part III; parties are assumed to contract around a default whenever the benefits outweigh transaction costs—unless they are mistaken about the applicable default rule. See infra Part III.A.

\textsuperscript{61} Complex default rules may have other complex defaults may have other advantages. For example, they might allow lawmakers to craft better penalty defaults by selecting multiple, undesired starting points for different contracting groups. See Ayres & Gertner, supra note 3, at 95-107 (describing how penalty default rules could conceivably lead to greater economic efficiency). Complex penalty defaults could theoretically cause more parties to take action to change the status quo, reducing the information asymmetry problems that penalty defaults seek to fix. An attempt to model these effects, however, is outside the scope of this Article.

\textsuperscript{62} See Kaplow, supra note 27, at 568-69.

\textsuperscript{63} And even selecting one default can often be difficult, as evidenced by the complex negotiations required to revise the Restatement of the U.C.C. See, e.g., Schwartz & Scott, supra note 35, at 596-600 (discussing the difficulties faced by private law-making groups in crafting revisions to the U.C.C.).
predict what contracting parties will normally prefer. In their view, lawmakers cannot hope to figure out what terms most private contracting parties would seek to include in their contracts, at least in part because people have such widely heterogeneous preferences. Thus, any attempt to impose complex default rules will be a misguided effort by lawmakers—very expensive and likely to fail.

Related to this promulgation concern is an institutional question: Who will do this? On one hand, it is hard to imagine judges assembling the resources necessary to determine the salient characteristics and craft complex defaults for different contracting segments through the common law. Perhaps it would be better for state legislatures to take this on, or maybe better still for a group like the American Law Institute or the National Conference of Commissioners on Uniform State Laws to somehow find the resources. Yet these organizations may also find it difficult to muster the funds or consensus needed to develop efficient, workable, and complex default rules.

And even if lawmakers are able to write complex default rules, courts or arbitrators must then be able to pick which aspect of the rule applies in a given contractual dispute. This brings up the second main concern raised by complex default rules: greater adjudication costs on the back end. Selecting and applying the appropriate default rule may or may not be a tricky task, depending on the underlying factual setting. The split in the U.C.C. between merchants and nonmerchants, for example, seems fairly workable, although even here there are plenty of cases litigating whether a party to the dispute is a merchant under the U.C.C.'s classic definition. But as default rules grow more

64. Schwartz & Scott, supra note 23, at 594 (“[M]ost state-created defaults will be useless or inefficient. Firms would prefer the state not to create inefficient defaults because firms will contract out of them; thus, the only effect these defaults will have is to increase transaction costs.”); see also Ayres, supra note 1, at 14 (“[A]ny contractual provision that a legislature could write ex ante, corporations could write better.”) (quoting Ian Ayres, Making a Difference: The Contractual Contributions of Easterbrook and Fischel, 59 U. Chi. L. Rev. 1391, 1414 (1992) (book review))).


66. Id. at 598-605; Robert E. Scott, Rethinking the Default Rule Project, 6 Va. J. 84, 87 (2003) (arguing that “state rule creation itself may seldom be cost justified”).


68. To pick just three recent cases debating whether one party is a merchant under the U.C.C. § 2-104(1) definition, consider Deaver v. Auction Block Co., 107 P.3d 884, 891 (Alaska 2005) (deeming an online fish-market auctioneer a merchant buyer); R.F. Cunningham & Co. v. Driscoll, 790 N.Y.S.2d 368, 370 (N.Y. City Ct. 2005) (holding that a purchasing farmer was a merchant with regard to a disputed soybean contract); and Brandt v.
complex, such that there are many segments of market participants receiving customized legal treatment, it will likely become much more expensive to administer the rule. Parties may dispute their group assignments, and judges will need to sort it all out.

Of course, the greater adjudication expense might still be worth the effort. Coming back to the earlier example of corporate customer segmentation, it would certainly be cheaper for marketing executives to abandon all efforts to segment their customers and just give everyone an identical product or service. Yet, firms are often willing to incur the extra costs of promulgating and administering group differentiation to receive the theoretical benefits explored above. Even corporations, however, recognize that there is a limit to this: A segmentation must be actionable, that is, simple enough to identify which customer belongs in a given segment and simple enough to allow the company to develop tailored, but effective, offerings for each unique segment. In this same way, any attempt to use complex default rules in contract law must recognize that greater granularity makes adjudication exponentially more expensive.

Unfortunately, adjudicators will inevitably get some of their classification decisions wrong, and this leads to the third potential cost of complex defaults: error. With multiple default rules to choose from for a given legal issue, courts may mistakenly impose an inefficient term on the parties—one different from the intended legal default rule. With a simple default rule, by contrast, there is no need for a judge to decide whether Rule A or Rule B governs; she can just apply the one, legally mandated term. Or if the parties take action to override the default rule, then the judge can apply their stated preferences. Either way, there is less room for error.

To see one way that judicial error might arise, imagine that two parties are transacting in a legal system where, by default, Group A recovers full consequential damages for breach and Group B recovers no consequential damages. The parties know that they are in Group A, and because the seller is an efficient insurer against breach, they decide not to change the default rule. In essence, the buyer pays more to bundle an insurance contract with performance. But if it is possible

\[Bos\text{on Scientific Corp.}, 792 N.E.2d 296, 297 (III. 2003) (litigating whether a hospital was a merchant of a medical device).\]

69. See Myers, supra note 19, at 11-15; Wedel & Kamakura, supra note 19, at 3-6.

70. See Wedel & Kamakura, supra note 19, at 3-6.

71. Of course, there may still be a dispute over whether the parties have taken sufficient action to override a disliked default rule. In other words, even with a simple default rule we may see judicial error. See Ayres, supra note 15, at 897-99.
for the court to misidentify the parties as being in Group B, then the seller may not fear full-damage liability and will not take efficient precautions. In short, there is a net social loss because the buyer's attempt to purchase insurance is undermined by the possibility of court error.

Adjudication only occurs when there is a dispute, obviously, and a moral hazard problem underlies this type of judicial error. One party might anticipate the possibility of gain by arguing for a different legal classification only some of the time—when it brings her private benefit. Thus, in the previous example, the seller is happy to accept the higher price paid by members of Group A when the contract is formed. But once there has been a breach, the seller has reason to argue that this contract should be governed by the rule of Group B. Inefficiencies might be introduced whenever one party is able to gain an advantage by persuading a court that a different aspect of a complex default rule applies to their contract.

Error might also arise if the parties themselves mistakenly believe that a different default rule applies. A misguided seller may take action that is inefficient for a particular buyer, for example, if she misunderstands the applicable default rule. And similarly, a buyer may behave in a suboptimal way if he thinks another rule will be used. These errors are probably the trickiest type of cost to analyze and might lead to a variety of distortions.

Finally, and perhaps counterintuitively, a fourth type of cost might arise with complex default rules: an increase in the overall transaction costs of contracting. This may seem strange initially—one of the primary benefits of complex default rules, after all, is a reduction in systemwide transaction costs. But under certain circumstances, parties could conceivably incur additional costs to spell out the details of their agreement. Consider the plight of the Group A buyer in the previous example. He knows that he should receive full consequential damages by default, but if he anticipates that the court may apply the

72. And in a competitive environment, we might expect that members of Group A are likely to pay more than members of Group B, all other things being equal. See supra note 43 and sources cited therein.

73. This point is also related to the contracting literature on verifiability. In other words, the parties themselves may know a buyer's valuation type, but this fact may not be obvious to a court and it may be difficult to convey the truth to a court in the face of a legal dispute. See Robert E. Scott & George G. Triantis, Anticipating Litigation in Contract Design, 115 Yale L.J. 814, 818 (2006).

74. See Schwartz & Scott, supra note 23, at 594.

75. See supra notes 55-61 and accompanying text.
wrong default in error, then the buyer may find it worthwhile to state the damage provision explicitly in the contract. The fear of judicial mistake might undermine any potential transaction costs savings. It could even cause all groups—those who like the current default rule, as well as those who want to change it—to document their desired term.

Transaction costs could also increase with complex default rules if the parties are not sure into which group they fit. Instead of conducting legal research on the issue, the parties may decide to just incur the costs of writing their desired term into the contract. Or parties may opt out of the legal framework by replacing complicated default rules with simple ones—not because they are more efficient, but merely because the parties do not wish to take time to learn how the complicated default rules will affect their deal. Thus complex default rules may actually boost transaction costs by introducing new reasons for parties to go through the hassles of stating their preferences.

In summary, complex contract default rules may create at least four new costs. They may be more expensive for lawmakers to write. They may be more expensive to adjudicate. They may lead to greater error. And they may lead to higher transaction costs.

More generally though, the choice between simple and complex rules can be linked to two different legal philosophies. On one hand, it might be better to keep default rules as simple as possible and let market forces override the default rules as necessary. It is impossible

76. See Ayres, supra note 1, at 10 (“Contracting parties may avoid the costs of becoming informed about a default standard or rule by instead bearing the costs of explicitly contracting around the rule.”); Kaplow, supra note 27, at 619 (“Background laws raise different issues, and therefore would require that yet another framework be created.”). Clayton Gillette also suggests that commercial law may have unique considerations related to the optimal precision question. See Clayton P. Gillette, Rules, Standards, and Precautions in Payment Systems, 82 VA. L. REV. 181, 186 (1996).

77. Ayres, supra note 1, at 9-10; Kaplow, supra note 27, at 619-20.

78. There is ample evidence of individual submarkets where the participants have taken it upon themselves to carve out specialized systems of contract default rules. Over the past decade, Lisa Bernstein, for example, has documented how players in markets as diverse as cotton, diamonds, and grain have developed vast systems of commercial law uniquely tailored to their specific industry. See Lisa Bernstein, Private Commercial Law in the Cotton Industry: Creating Cooperation Through Rules, Norms, and Institutions, 99 MICH. L. REV. 1724, 1741 (2001). By replacing public law with their own legal systems, these players are able to compose highly tailored default rules that are uniquely suited to their commercial contexts. Id. (“They reduce the cost of entering into an agreement by providing a comprehensive set of well-tailored default rules . . .”). One might argue that this evidence that private parties will elect to opt out of public contract default rules means that lawmakers should not bother writing complex defaults. See Schwartz & Scott, supra note 23, at 594.
to completely abandon the default rule project, of course, because at some level of abstraction, contract law is comprised of default rules by logical necessity. 79 Even a rule striking down all contracts that fail to state sufficient terms is, itself, a default rule. 80 But under a minimalist philosophy, lawmakers should keep default rules as simple as possible and let individual parties change what they dislike.

On the other hand, it is not self-evident that the optimal level of granularity for all areas of contract law is just one crude default rule. The U.C.C. offers at least two types of treatment for many issues, distinguishing merchants from ordinary folks. 81 Scholars have also suggested that contract law might draw a meaningful legal distinction between small and large businesses. 82 Should there be just two groups getting a different slate of default rules? Three? Ten? How can we evaluate these different approaches?

Ultimately, the problem should be an empirical one. Data and analysis on actual markets, preferences, transactions, and costs are needed to test the intuitions of those who argue that complex default rules are not worth the effort. They may be right. But conversely, empirical analysis could conceivably suggest that our legal system would be better off adopting more precise default rules—at least for some issues in contract law. What would it take to reach such a conclusion? And does this world exist, or should we just reject the hypothesis and use very simple rules across the entire realm of contract law? The next Part launches an empirical experiment that tries to shed a tiny beam of light on these questions.

III. CONDUCTING THE EXPERIMENT

This Part turns to the heart of the Article, an empirical experiment in the optimal precision of contract default rules. Subpart A describes the model used for the test, which involves the Hadley default rule and the availability of unforeseeable consequential damages for breach. Subpart B presents and describes the data populating the model—all of which has been borrowed from research in the fields of marketing and economics. Subpart C conducts the

79. See Craswell, supra note 1, at 2.
80. Id.
81. See supra note 12 and accompanying text.
82. Larry Garvin has recently suggested that small businesses face unique contracting circumstances and should perhaps receive specialized legal treatment for some issues. See Larry T. Garvin, Small Business and the False Dichotomies of Contract Law, 40 Wake Forest L. Rev. 295, 295-99 (2005).
analysis. By running a series of Monte Carlo simulations, I am able to analyze whether a simple or complex default rule is likely to prove more efficient for the sample economic system created in this experiment. As we shall see, these simulations find that the simple default rule usually generates greater welfare than the complex default rule. This finding is limited, however, because I use assumptions for several variables in the model. Subpart D seeks to extrapolate the results by conducting sensitivity analysis on the primary assumptions.

A. The Model

The overall goal of this experiment is to replicate an economic system comprised of 500 buyers in five different markets. Each buyer is interested in purchasing from just one market and will have a unique valuation for the product in that market (drawn randomly from a prespecified, and empirically grounded, distribution). On the other side of the transaction, every market has one seller who will elect to offer low, medium, or high precautions in the fulfillment of the contract—based initially on her understanding of the overall distribution of buyer valuations. Low precautions are less expensive, but they also increase the probability that the seller will breach the contract. High precautions cost more, but they decrease the chances of a breach. Buyers may then choose to negotiate a different level of precautions from the seller by incurring additional transaction costs.

After determining buyer and seller characteristics for the economic system, I will then examine how two different contract default rules—a simple uniform rule and a complex market-based one—will affect the economy's total social welfare. Essentially, I ask which default rule causes buyers and sellers to write contracts leading to the greatest expected utility net of transaction costs. In other words, I create a simple economic world and then split it into two parallel universes; each universe gets a different type of default rule, and I will see which one yields the best outcome. After doing this once, I will draw another random sample of 500 buyers and five sellers and will

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83. In other words, consistent with most literature discussing the Hadley rule, sellers are assumed to know the overall distribution of buyer valuations, but not the specific valuation of each buyer seeking to write a contract. Sellers are also assumed to lack monopoly power. Cf. Bebchuk & Shavell, supra note 26, at 284 (stating that promisors lack knowledge about the value of the contract to the promisee unless such information is expressly communicated).

84. I define "best" in terms of the outcome yielding the highest social welfare, defined as utility minus transaction costs. Cf. Posner, supra note 55, at 1583-84 (focusing solely on costs).
complete the process once again. And again. In fact, I will do this thousands and thousands of times—until it becomes clear whether one of the default rules triumphs over the other.

FIGURE 2. Overview of the Experiment Design

1. Random determination of markets and valuations for 500 buyers and five sellers

2. Each buyer chooses whether to contract and (if so) whether to negotiate specific precautions

3. Seller chooses a precaution level for each buyer

4. Social welfare calculated under two different default rules (simple and complex)

1. Step One: Creation of the Economy

   Here is how the model works in more detail (see Figure 2). I start the analysis with 500 buyers and randomly assign each buyer, with equal probability, to one of five different markets. Each buyer is then given a private valuation for his product, again chosen randomly from an empirically derived distribution of values for that market. I next make an assumption to split the valuation between general damages and unforeseeable consequential damages. General damages always occur with breach; consequential damages only occur some of the time. Finally, each buyer is assigned a transaction cost figure; this is

85. This assignment of buyers to markets is then held fixed for the duration of the experiment. In other words, the product mix does not change during the repeated trials—only the valuation that the buyers place on those products. I do examine the effects of shifting the overall product mix during the sensitivity analysis. See infra notes 164-166 and accompanying text.

86. The shape and parameters of the probability distribution differ for each market; the selection of these markets and the data underlying the valuation distributions are described in detail infra Part III.B.

87. Specifically, an initial portion of the valuation is assumed to represent general damages. The number should also be understood to include foreseeable consequential damages—the point is that this amount of damages will be recoverable under a Hadley rule. The amount of general damages differs across the five markets, but it is held constant for each of the buyers within a market. The balance of the buyer's valuation is assumed to represent unforeseeable consequential damages. If the random number chosen for any buyer's valuation is less than the general damages assumption, all damages are deemed general. See Geis, supra note 43, at 914-15. I initially attempt to choose a reasonable split by selecting the number at the first quartile of the data for the general damages assumption. I also test the sensitivity of the results to this assumption. See infra notes 167-169 and accompanying text.

88. Furthermore, each buyer faces a different chance of incurring consequential damages to incorporate effects from advanced economic models of the Hadley rule. See Adler, supra note 3, at 1547-54. Specifically, the likelihood of a given buyer suffering consequential damages with breach is selected from a normal probability distribution with a mean of 80%, a standard deviation of 5%, a minimum value of zero, and a maximum value
an additional expense that will be incurred only if he seeks to negotiate for a specific level of seller precautions.\textsuperscript{89}

On the other side of the economy, five sellers are selected—one for each market—and given unique characteristics related to their contractual performance.\textsuperscript{90} As mentioned earlier, each seller may take low, medium, or high precautions for each contract. Greater levels of precautions increase the probability of successful performance, but also cost more. Medium precautions are calculated to maximize expected social welfare given the overall distribution of buyer valuations for the market. Thus, each seller might offer an intermediate contract reflecting the average desire of the buyer population, a contract providing greater certainty of performance for an additional price, or a contract providing less certainty of performance at a discount. The probability of success associated with each precaution level is also determined randomly for each seller (from predefined, reasonable distributions of parameters) in order to test a wide range of market scenarios.\textsuperscript{91}

of 100\% (the tails of the normal distribution below zero and above 100\% are distributed proportionately along the rest of the curve).

89. This transaction cost figure is again selected by assumption and differs for each of the five markets: Cake = 0.05, Mugs = 0.88, MP3 = 1.05, NFL = 1.15, and Blood = 29.54. I usually selected these transaction cost assumptions by adding .05 to the fifth percentile value in the empirical data for each market. But because the NFL and Blood data distributions have a large initial value, I used 10\% of the median number for NFL and the forth percentile value for Blood. Unfortunately, I lack empirical data on the transaction costs for these markets and have simply chosen a reasonable estimate. The experiment would be richer if the transaction cost estimates could also be derived empirically. However, I do test these assumptions further in the sensitivity analysis. \textit{See infra} notes 170-172 and accompanying text.

90. These characteristics are different for each seller, but they do not change among buyers in a market for a given iteration. In other words, each seller will offer the same three possible contracts to all buyers in that market.

91. The parameter distributions for high and low seller precautions are grounded in assumptions rather than empiricism. Low precautions are successful under a normal distribution curve with a mean of 50\% and a standard deviation of 3\% for every market. The cost of a seller taking low precautions is selected at the tenth percentile for the raw data, but in the NFL and Blood market, this number is 35\% and 25\% of the median for the market, respectively. Medium precautions are successful under a normal distribution curve with a mean of 70\% and a standard deviation of 3\%. The cost of medium precautions is taken from the fifteenth percentile number in the raw data for Cake, Mugs, and MP3, from 50\% of the median value for NFL, and from 40\% of the median value for Blood. High precautions are successful under a normal distribution curve with a mean of 90\% and a standard deviation of 3\%. The cost of high precautions is chosen from the thirtieth percentile number in all of the five markets. The methods for estimating seller precautions sometimes differ between markets because I want to set initial conditions where the average buyer is best served through medium precautions and because I want to encourage a diverse range of market scenarios as the trials are repeated. Here are the exact numbers used for seller precaution costs:
Once this work is complete, we now have a simple economy and can watch how the players interact. But first, I copy the economy into two parallel universes and give each universe a different type of default rule. Universe 1 gets a simple Hadley rule denying unforeseeable consequential damages in all markets. Universe 2 gets a more complex rule, where the recovery of unforeseeable consequential damages is linked to the market's valuation distribution: Markets where more buyers have low valuations receive a Hadley default rule and markets where more buyers have high valuations receive a full-damages default.\(^2\) Because each universe is governed by a different default rule, buyers and sellers may behave very differently. This will impact the type of contracts that parties write, as well as the total social welfare created under each system.

2. **Step Two: Buyer Behavior**

The experiment then moves to the second step, where each buyer must decide whether to contract, and if so, whether to negotiate for a specific level of precautions. This decision will depend on four factors: the utility derived from each of the three possible contracts,\(^3\) the transaction costs required to negotiate a specialized contract, the additional costs or gains (if any) that come from revealing private information—here, the probability of incurring consequential

<table>
<thead>
<tr>
<th>Market</th>
<th>Cost of Low Precautions</th>
<th>Cost of Medium Precautions</th>
<th>Cost of High Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cake</td>
<td>0.30</td>
<td>0.50</td>
<td>0.90</td>
</tr>
<tr>
<td>Mugs</td>
<td>1.70</td>
<td>2.50</td>
<td>3.80</td>
</tr>
<tr>
<td>MP3</td>
<td>2.00</td>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td>NFL</td>
<td>4.00</td>
<td>5.70</td>
<td>9.00</td>
</tr>
<tr>
<td>Blood</td>
<td>202.30</td>
<td>323.70</td>
<td>516.40</td>
</tr>
</tbody>
</table>

\(^2\) This means that under a complex default rule, three markets continue to receive a Hadley rule: Mugs, MP3, and NFL. The other two markets, Cake and Blood, now get a full damages rule by default. For the economic logic underlying these rule assignments, see supra notes 46-51 and accompanying text.

\(^3\) Or more precisely, the extent to which the buyer benefits by moving from the default contract to his preferred contract. The utility derived under each level of seller precautions is calculated by the following formula: Utility\(_x\) = \(((1 - PROBCD) \ast (GD \ast PROBx - COSTx)) + (PROBCD \ast ((GD + CD) \ast (PROBx - COSTx)))\) (where \(x\) is low, medium, or high). (“PROBCD” is the probability of incurring consequential damages, “GD” is general damages, “PROB” is the probability of successful contract performance, “COSTx” is the cost of contracting, and “CD” is consequential damages.) The buyer’s best contract can then be determined by looking at which level of seller precautions yields the greatest utility. Buyers who derive no positive utility under any level of precautions are deemed null buyers and are excluded from further analysis.
damages—to the seller, and the legal default rule governing consequential damages.

In both default rule universes, buyers will sort into four groups. First, those with a very low valuation will not wish to contract under any level of precautions and will drop out of the analysis (null-value buyers). The other three groups of buyers—those preferring low, medium, or high precautions—derive positive utility and will want to write some type of contract. But they may or may not choose to negotiate for their best contract, depending on the size of the benefit, the costs of revealing their type, and the underlying default rule. Let us examine this more closely for each of the two different universes.

FIGURE 3. Buyer Decision Flowchart For Simple Hadley Default Rule

 Buyers facing the simple default of Universe 1 know that their agreement will be governed by the Hadley rule—no matter the market—and that sellers will take medium precautions by default. An additional information cost arises when buyers suffer consequential damages with a higher than expected probability: sellers will take advantage of the information by charging a higher price. See Adler, supra note 3, at 1565. Conversely, if the probability of incurring consequential damages is below average, then the buyer will enjoy a lower price (assuming perfect competition). The model assumes no verifiability problems related to the disclosure of this information.

95. This is true because sellers are unable to identify a buyer’s valuation type (by assumption) and will simply offer a contract designed to reflect the expected preferences of the entire buyer population pool. Medium precautions have been selected initially to best serve average buyer preferences. See supra notes 90-91 and accompanying text.
This means that medium-value buyers will not bother to negotiate their preferred terms explicitly. Low-value buyers also lack incentives to reveal their valuation type under a Hadley default rule and will keep silent. But, as illustrated in Figure 3, high-value buyers face a more complex decision. They will weigh the incremental benefits enjoyed by moving to high precautions against the transaction and information costs that would be incurred. In other words, a high-value buyer will contract for high precautions when the utility gained by moving from a medium precaution contract to a high precaution contract exceeds the costs of doing so.

The complex, market-based default rule of Universe 2 will alter the way that some buyers behave. Figure 4 illustrates these changes. First, contracting buyers may become frustrated with a complex

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96. See Adler, supra note 3, at 1565; Ayers & Gertner, supra note 3, at 102; Posner, supra note 6, at 855-63.

default rule and will not wish to determine whether a Hadley or full-damages rule governs their transaction.98 These buyers choose to opt out of the analysis, by incurring transaction costs, to negotiate their best contract no matter what the circumstances.99

Second, each contracting buyer may now make a mistake about the default rule governing his transaction.100 If the market really receives a full-damages default, this means that mistaken high-value buyers will behave as if they were in a Hadley market and possibly contract for high precautions according to the logic described in Figure 3. Mistaken low-value buyers in this market will never contract for low precautions—even when it is in their economic interest to do so. Conversely, if the market really receives a Hadley default, mistaken high-value buyers will behave as if they are in a full-damages market and never negotiate for special precautions. Mistaken low-value buyers may choose to negotiate for low precautions in this market when they normally would not.

Finally, what happens to buyers who do not opt out or make mistakes? Those contracting in a market governed by the Hadley rule will follow the logic of Figure 3, and high-value buyers may contract for high precautions if the benefit is great enough. But high-value buyers no longer have reason to incur transaction costs if the market has a full-damages default—they will be fully compensated in the event of breach. In fact, high-value buyers will want to hide in the pool of other buyers in order to avoid paying more for a high-precaution contract.101 Low-value buyers, on the other hand, will now ask for a cheaper contract when the gains from moving to low precautions outweigh the costs. Medium-value buyers continue to remain silent because they expect to receive medium precautions by default.

98. See supra notes 74-77 and accompanying text.
99. Initially each non-null buyer has a random, 1% chance of deciding to opt out of the normal behavior algorithm. Those who do so incur transaction costs, but receive their optimal contract. Changes to this 1% assumption will be explored further. See infra notes 173-174 and accompanying text.
100. Each low-value and high-value buyer who decides not to opt out has a random, 1% chance of making this error. Like before, changes to this assumption are explored in the sensitivity analysis. See infra notes 173-174 and accompanying text. This experiment does not model the possibility of seller error or judicial error—although these would be fruitful areas for further analysis.
3. Step Three: Seller Behavior

In the third step of the experiment, sellers choose how to treat each buyer. Two decisions are easy: Null buyers are ignored and buyers choosing to incur transaction costs are given their requested level of precautions. Sellers in Universe 1 and Universe 2, however, may treat silent buyers differently—as the sellers react to the different incentives put in place by alternative default rules on consequential damages.

With a simple Hadley rule, sellers never worry about incurring extra damages for breach and have no reason to offer silent buyers high precautions. If many high-value buyers in a market do reveal their preferences, however, then the seller may conclude that the remaining buyers are low-value buyers and offer all silent buyers low-precaution contracts. Conversely, if just a few high-value buyers contract around the default, then the seller may continue to provide medium precautions to all silent buyers. A separation variable is used to model this split.

Sellers behave the same way in Universe 2 when their market is governed by a Hadley default rule. Yet when a full-damages default rule applies to the market, sellers now must decide whether to offer silent buyers high or medium precautions. As before, if the separation variable is exceeded, that is, many low-value buyers contract around the full-damages default, then silent buyers get high precautions. Otherwise, sellers give medium precautions in markets governed by a full-damages default.

4. Step Four: Default Rule Comparison

The last step in the experiment is to sum up the overall measure of social welfare for each universe and compare the totals to see which one is more efficient. How is this welfare calculated? First, null buyers do not participate in the economy and thus generate no welfare.

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102. See supra note 43 and sources cited therein.

103. The separation threshold is set at 20% for both Hadley and full-damage markets. Thus if 20% or more buyers contract around the default rule, the silent buyers in that market get low precautions (if a Hadley default applies) or high precautions (if a full-damages default applies). See Geis, supra note 43, at 909-17. Null buyers are excluded from the 20% figure.

104. This means that the complex default rule might theoretically deliver the benefits discussed. See supra Part II.C. In other words, fewer buyers may need to contract around the default rule in order for the population to separate, thus allowing everyone to receive their optimal contract. Whether this actually occurs will depend on the different buyer types in each population, along with many other factors at play in the experiment.
Every other buyer contributes the utility that he receives under his completed contract minus the transaction costs, if any, that he incurred to reach the deal.¹⁰⁵ I then add the numbers for all buyers to determine total social welfare in each universe. Finally, the net benefit (or loss) from a simple default rule can be calculated by subtracting the total welfare in Universe 2 from the total welfare in Universe 1. A positive result means that the simple default rule outperformed the complex one. A negative number means the opposite. Looking at this one number, then, is an easy way to summarize the results of one iteration of the experiment.

How does the model account for the fact that adjudication and promulgation costs are likely to be greater with a complex default rule?¹⁰⁶ Alas, I have no empirical data to estimate these costs, nor am I sure where to gather such data. So, for now, I assume that a complex rule costs a small share of the economy’s total social welfare to promulgate and adjudicate.¹⁰⁷ But this is a strong assumption, so I also report the difference between social welfare in each universe when promulgation and adjudication costs are presumed equal. If Universe 2 does, indeed, generate more social welfare, we can then see how much promulgation and adjudication costs would need to rise before the benefits of a complex default rule evaporate.

The real power of this simulation, however, comes from the ability to play out the efficiency effects of simple versus complex default rules thousands of times. I will use Monte Carlo simulation software to rerun the experiment many, many times and explore a wide range of market scenarios. In each trial, 500 new buyers and five new sellers are generated, and the net benefit (or cost) of a simple default is recalculated. Taken together, this analysis leads to a better understanding of whether one type of default is likely to prevail, and if so, by how much.

All that remains before running this experiment is to introduce the five markets that will comprise the economy and to describe the

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¹⁰⁵. To simplify the analysis, the model assumes that sellers behave in perfect competition, such that any economic surplus accrues to the buyers. Cf. Bebchuk & Shavell, supra note 26, at 305 (making similar assumptions). But cf. Johnston, supra note 26, at 625-26 (criticizing the perfect competition assumption in the Hadley economic models). Information costs are excluded from the utility calculation because they are merely transferred from buyer to seller. In other words, these costs play into the buyer’s decision, but are not a deadweight loss for social welfare.

¹⁰⁶. See supra notes 62-68 and accompanying text.

¹⁰⁷. Initially I set this number at 1% of the social welfare generated under a complex default rule.
empirical data forming the basis for the buyer valuation distributions in these markets.

B. The Data

The fields of marketing and economics have developed sophisticated techniques for estimating buyer valuations—or, as they usually call it, "Willingness To Pay" (WTP)—in a wide variety of industries. Many scholars in this area have also generously agreed to share their raw data for use in this Article. This Subpart provides a brief overview of this data and how it was collected.

My overall goal for market selection has been diversity. I want to conduct the experiment with an economy built from a wide range of goods and services, because this is the reality that our legal rules face. A secondary goal has been to select data gathered with research techniques where participants have the best incentives to truthfully reveal their valuation. I am willing to relax this requirement in some cases, however, in order to build a more diverse economy. Ultimately, I selected data from five disparate markets: cake, coffee mugs, digital music players, NFL football, and a health care procedure involving blood donation and storage. Table 1 offers summary statistics for the data in these markets.

| TABLE 1 |
| DESCRIPTIVE STATISTICS FOR MARKET DATA |
| \begin{tabular}{|l|l|l|l|l|}
| \hline
| \textbf{N} & \textbf{VALUATION METHOD} & \textbf{MEDIAN ($)} & \textbf{MEAN ($)} & \textbf{DISTRIBUTION SELECTED} \\
| \hline
| \textbf{CAKE} & 100 & BDM & 1.12* & 1.20* & Logistic \\
| \textbf{MUGS} & 74 & BDM & 6.07 & 5.35 & Gamma \\
| \textbf{MP3} & 21 & Vickrey & 7.92 & 6.75 & Weibull \\
| \textbf{NFL} & 367 & CVM & 12.00 & 11.48 & Beta \\
| \textbf{BLOOD} & 384 & CVM & 809 & 754 & Beta \\
| \hline
\end{tabular} |

* value in DM (DM 1.00 is approximately U.S. $0.55)

1. Cake

In 2002, Klaus Wertebroch and Bernd Skiera published a series of experiments in the Journal of Marketing Research where they estimated a population's WTP for several simple consumer products. One of these experiments involves a piece of pound cake, and I have

108. I have argued elsewhere that empirical data from the field of marketing is especially suited to solving problems in contract law. See Geis, supra note 43, at 951-55.

chosen this data for the first market.\textsuperscript{110} A potential drawback of this choice is that cake is a simple, consumable food item—sold mostly via immediate spot transactions rather than through complex contracts spanning long periods of time. Thus, many transactions in this market may be less relevant to contract law.\textsuperscript{111} Nevertheless, contract default rules do still apply to spot transactions, and I think it is worth including a food product.\textsuperscript{112}

In their study, Wertenbroch and Skiera used an experimental method called the Becker, DeGroot, and Marschak procedure (BDM)\textsuperscript{113} to determine the maximum price that 100 random participants were willing to pay for a piece of cake.\textsuperscript{114} The BDM procedure is an incentive-compatible technique that uses random numbers to create a type of self-auction.\textsuperscript{115} This means that participants have every reason to state their true WTP for the product in the experiment.\textsuperscript{116} As illustrated in Figure 5, participants were willing to pay about 1.12 deutschmarks, on average, for the cake, and most people valued it somewhere between zero and 1.60 deutschmarks.\textsuperscript{117}

\textsuperscript{110} Id. at 231.
\textsuperscript{111} See, e.g., COOTER \& ULEN, supra note 49, at 195-200 (discussing the importance of contract law for deferred exchanges).
\textsuperscript{112} Food items like pound cake might also be sold via longer-term, wholesaling supply contracts where contract default rules may take on greater importance.
\textsuperscript{113} Wertenbroch \& Skiera, supra note 109, at 228-29; see also Gordon M. Becker, Morris H. DeGroot \& Jacob Marschak, Measuring Utility by a Single-Response Sequential Method, 9 BEHAV. SCI. 226, 226-32 (1964).
\textsuperscript{114} More information regarding sample selection, procedural details, and the face validity of this experiment can be found in Wertenbroch \& Skiera, supra note 109, at 231-34.
\textsuperscript{115} See id. at 231-34. In the BDM procedure, the participant is told about the product and then asked to state an offer price to purchase the product. \textit{Id.} A random price is then drawn and if the offer exceeds the random price, then the participant must buy the product at the random price. \textit{Id.} If the random price exceeds the offer, then there is no buying opportunity and the experiment is concluded. \textit{Id.} I have recently explored the strengths and limitations of this experimental method in some detail. See Geis, supra note 43, at 927-30; see also Wertenbroch \& Skiera, supra note 109, at 230-34 (comparing the BDM method to other techniques for eliciting WTP).
\textsuperscript{116} Wertenbroch \& Skiera, supra note 109, at 230-34.
\textsuperscript{117} Id. at 233 fig. 2.
FIGURE 5. Cake Valuation Distribution

Armed with the data from this experiment, I can use statistical software to estimate the overall valuation curve that best fits these results. It turns out that buyer valuation for pound cake is best represented by a logistic distribution, and Figure 5 portrays the exact shape of this distribution.

2. Mugs

I chose the second product, a plastic travel mug, to introduce a slightly more durable consumer goods into the economy. Also, mugs are often used in experimental economics, so there are many potential studies from which to choose.

Charles Plott and Kathryn Zeiler have recently completed one of the most carefully designed and executed studies involving mug valuation. Over a series of three experiments involving law students at the University of Southern California and undergraduate students at Pasadena City College, Plott and Zeiler collected seventy-four

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118. It should be noted, however, that these results may be limited to the population used in the experiment; the WTP estimates could be different for other countries or locations. See Epstein & King, supra note 25, at 29-34 (warning against the extension of inferences to populations outside of the experimental data).

119. Specifically, I will use a logistic curve with a mean of 1.14 and a scale of 0.32. The chi-square measure for the goodness-of-fit of this distribution to the data is 19.9—not statistically significant. The Anderson-Darling (A-D) and Kolmogorov-Smirnov (K-S) tests, alternative ways to measure the fit with less emphasis on the extreme values, do suggest that this curve offers a good match (A-D = 0.84; K-S = 0.08). I also trim this curve below zero (to eliminate negative valuation) and above 1.60 (to provide a more reasonable range of values), with the probability amounts outside these values distributed proportionately along the rest of the curve.

incentive-compatible responses on mug valuation. The data was again gathered with the BDM procedure, and the experiments were conducted with extensive subject training, practice rounds, and anonymity. The authors have graciously offered to share their data.

As Figure 6 illustrates, the participants place a wide range of values on the plastic travel mug, which retailed for about $8.50. The mean value is just over $6.00 and the median slightly lower at $5.35, but one generous soul would pay $23.00. I estimate that this data is best represented by a Gamma distribution described by several variables, and will use this curve to randomly select mug valuations for buyers assigned to this product in the sample economy.

FIGURE 6. Mug Valuation Distribution

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121. Id. at 536-39. The authors conducted the study to explore whether the widely discussed gap between WTP and “willingness to accept” (WTA) was actually linked to experimental procedures and not to an “endowment effect.” Id. The data on mug valuation is thus comprised of both WTP and WTA statistics. Id. But as Plott and Zeiler report no statistical difference between buyers and sellers, I combine their data into one pool of mug valuations and use these valuations to estimate an overall buyer distribution. Id.

122. Id. at 537-38.

123. The data is also available to the public at the American Economic Review; http://www.aer.org/data/june05_app_plott.pdf (last visited Mar. 14, 2006).

124. Plott & Zeiler, supra note 120, at 539. The participants were not told the retail price of the mug to avoid anchoring effects. Id.

125. Id.

126. Specifically, the data is best represented by a Gamma distribution with a location of -1.96, a scale of 1.85, and a shape of 4.33286. The Gamma distribution applies to a wide range of physical quantities and is very similar to a lognormal and exponential distribution. The chi-square measure for the goodness-of-fit of this distribution to the data is 6.8, the Anderson-Darling measure is 0.32, and the Kolmogorov-Smirnov measure is 0.07. As with the prior curve, I trim the distribution below zero values and allocate probabilities of negative values (a very small number) to the rest of the curve. See supra note 119 and accompanying text.
3. Digital Music Players

I have selected a digital music player (MP3 player) as the third product for several different reasons. First, this will bring a more complex electronic product into the analysis—one that might induce more mindful contracting behavior. Second, John C. Bernard and William Schulze have published an excellent WTP study for this product, using an incentive-compatible Vickrey auction to elicit buyer valuations. Third, the authors do not measure WTP for sale of the MP3 player; instead they auction off the right to rent the player for one week. This rental feature adds another type of diversification into the economy—and also takes the exchange directly into the intertemporal domain of contract law. Finally, the MP3 player experiments were conducted in 1999, at a time when digital music players had just been introduced to the market. The data thus reflects WTP for a novel good.

Figure 7 portrays the range of values that the buyers, twenty-one electrical engineering students at Cornell University, were willing to pay to rent a Rio MP3 player for one week. The mean and median values are $7.92 and $6.75, respectively (at the time, the MP3 player retailed for about $200.00). As before, the last step is to fit the data to a standard probability distribution. In this case, the Weibull

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128. In a Vickrey auction, buyers use sealed bids to make their offers. See William Vickrey, Counterspeculation, Auctions, and Competitive Sealed Tenders, 16 J. Fin. 8, 20-23 (1961). The highest bidder wins the auction but pays the price offered by the second-highest bidder. Id. For example, if A bids ten dollars, B bids fifteen dollars, C bids twenty dollars, and D bids twenty-five dollars, then D wins and must pay twenty dollars to purchase the item. Vickrey auctions are generally believed to be incentive compatible, giving buyers every reason to bid their true WTP. See John H. Kagel, Auctions: A Survey of Experimental Research, in The Handbook of Experimental Economics 501 (John H. Kagel & Alvin E. Roth eds., 1995).

129. See Bernard & Schulze, supra note 127, at 3.

130. Contract default rules matter more because the parties will need to interact one week later when the renter gives back the player. See, e.g., Cooter & Ulen, supra note 49, at 195-200 (discussing the uncertainties of deferred exchanges).

131. This novelty feature was, in fact, a motivating factor in the authors' choice of product: They test whether buyer valuation for novel products quickly recedes. Bernard & Schulze, supra note 127, at 1-8.

132. Id. at 2. The selection of participants makes it worth asking whether this valuation curve would be representative of the entire buying population; I might guess that electrical engineers would be more eager than most to rent a new digital music player.

133. Id.
distribution, a versatile, continuous probability distribution, offers a tight fit for the data.\textsuperscript{134}

FIGURE 7. Digital Music Player Rental Valuation Distribution

4. NFL Football Teams

The fourth product adds an entertainment dimension to the economy by examining how much consumers would pay to have an NFL football team located in their hometown. A recent economic study has gathered information from residents in Jacksonville, Florida, on their WTP for the presence of the Jacksonville Jaguars.\textsuperscript{135} It is worth clarifying that the study does not ask how much residents would pay for a game ticket; it focuses instead on how much residents value having the team in Jacksonville.\textsuperscript{136}

Using this data to study contract default rules presents two potential concerns. First, the topic of the study is not something that most people have the power to contract over; we might try to get an NFL team in our hometown by lobbying politicians to build a stadium, not by writing a contract with the Jaguars. Second, the WTP data is estimated using a research method called contingent valuation.\textsuperscript{137} This experimental method asks buyers how much they would be willing to

\textsuperscript{134} The best-fitting Weibull distribution is defined by a location of -1.91, a scale of 11.09, and a shape of 2.011263. The chi-square measure for the goodness-of-fit of this distribution to the data is 0.67, the Anderson-Darling measure is 0.14, and the Kolmogorov-Smirnov measure is 0.10. As before, the few negative values in this distribution are moved to positive areas under the curve.


\textsuperscript{136} \textit{Id.} Reported benefits from the presence of an NFL football team include greater community spirit, improved race relations, and economic stimulus. \textit{Id.} at 5-6.

\textsuperscript{137} \textit{Id.} at 3.
pay for the team, but it does not require them to put their money where their mouth is—by following through with a purchase at that price.\textsuperscript{138} In other words, contingent valuation is not incentive compatible.

On balance, though, I do think it is worth using this data. I suspect that the valuation numbers are closely correlated with a consumer’s WTP for football tickets—a frequent subject of contracting—and I am keen to add an entertainment product to the economy. While it would be nice to find an incentive-compatible study, this study’s sample size is large and the research methods are carefully documented.

Figure 8 illustrates the overall results of the Jaguars study: the values range from roughly four dollars to twenty-four dollars, with a median figure of twelve dollars. A Beta distribution will be used to model buyer valuations.\textsuperscript{139}


\textsuperscript{139} Specifically, a Beta distribution with a minimum parameter of 4.04 and maximum parameter of 25.64, an Alpha parameter of 1.684, and a Beta parameter of 2.8874 offers the best fit. The chi-square statistic for the goodness-of-fit is 12.02, but other goodness-of-fit statistics suggest that this Beta probability distribution portrays the empirical data more accurately: the Anderson-Darling measure is 0.63 and the Kolmogorov-Smirnov measure is 0.03.
5. Blood Donation and Storage

Several years ago, Stephanie Lee, a professor at Harvard Medical School, conducted a WTP study for a complex medical service involving autologous blood donation and storage. Autologous blood donation refers to a process where patients give their own blood for storage, often when they face a high possibility of transfusion following a planned operation. The procedure is usually similar to that used for volunteer blood donation, although additional identification and storage activities are also performed. By donating their own blood, patients can ensure a perfect blood match and also avoid the risk of contaminated blood. Insurance companies sometimes pay for this procedure, but hospitals are beginning to offer autologous blood donation services for a fee when it is not covered by insurance.

This product is a wonderful addition to the experiment's sample economy. It involves a complex service in the health care industry and represents a higher price point than the other four products. Autologous blood donation and storage also takes place over an extended period of time, placing this service in the typical domain of contract law.

140. Stephanie J. Lee et al., Patients' Willingness To Pay for Donation, 40 HEALTH POL'Y 1 (1997).
142. Recio, supra note 141, at 114.
143. Id.
144. Id.
Professor Lee collected the valuation data from nearly 400 patients undergoing an autologous blood donation procedure.\textsuperscript{145} Her surveys were completed, on a volunteer basis, in the mid-1990s in conjunction with the Brigham and Women's Blood Donor Center in Boston.\textsuperscript{146} The WTP information was estimated using contingent valuation, and the results were cross checked with several measures of face validity.\textsuperscript{147} The average value was just under $800.00.\textsuperscript{148} As Figure 9 illustrates, a Beta distribution is again used to model the data, but, importantly, the population curve contains more high-value buyers than low-value buyers.\textsuperscript{149}

Looking across all five data sets, three markets (Mugs, MP3, and NFL) have valuations that skew to the right and will always receive a \textit{Hadley} default rule. But the other two markets (Cake and Blood) skew to the left and will receive a full-damages default under a complex regime. Taken together, are these diverse markets better served with a simple default rule or a complex one? It is time to conduct the experiment.

\begin{footnotesize}
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\begin{itemize}
\item \textsuperscript{145} There were 412 participants, but twenty-eight surveys have been excluded because they were only partially completed. Lee et al., supra note 140, at 5.
\item \textsuperscript{146} \textit{Id.} at 2.
\item \textsuperscript{147} \textit{Id.} The use of contingent valuation presents the same potential concerns as the NFL study. See supra note 138 and accompanying text. But, on balance, I believe the benefits of including such a complicated product are substantial.
\item \textsuperscript{148} Lee et al., supra note 140, at 5.
\item \textsuperscript{149} The best-fitting Beta distribution is defined by a minimum parameter of -1.89.8 and a maximum parameter of 14.010, an Alpha parameter of 1.546, and a Beta parameter of 1.06. The chi-square measure for the goodness-of-fit of this distribution to the data is 45.9, the Anderson-Darling measure is 12.74, and the Kolmogorov-Smirnov measure is 0.04. As before, the few negative values in this distribution are moved to positive areas under the curve.
\end{itemize}
\end{footnotesize}
C. Results and Discussion

I think it is helpful to first examine the results for one sample economy in order to see how the model works. After that, I will rerun the simulation thousands of times and discuss the broader patterns that emerge. This work will ultimately show that, as modeled, the simple default rule outperforms the complex one about 80% of the time. I then examine why this occurs and also study the circumstances that sometime cause the complex default rule to be more efficient.
Table 2 summarizes the results for a single, randomly chosen run of the experiment. The bottom line in this economy: A simple default rule generates about 177.6 more in social welfare than a complex default. Why is this true? It is helpful to look at each market separately.

Start with the 108 buyers in the Cake market, the only part of the economy where a complex default rule outperforms a simple one. Most cake buyers are low-value buyers in this iteration because low precautions happen to be particularly cost-effective. Under a simple Hadley default rule, however, these low-value buyers do not contract

150. Specifically, in this iteration, low precautions succeed 58% of the time, which is much higher than the expected 50% rate of success. Medium and high precautions, by contrast, are less effective than usual: they succeed just 68% and 86% of the time, respectively. This, combined with the random determination of buyer values, causes all non-null buyers to prefer low precautions.
for tailored precautions, and they receive less-efficient medium precautions.\textsuperscript{151} But under the complex regime, these buyers face a full-damages default and will bargain to their optimal contract. Thus, the complex rule is a success because this particular buyer pool happens to have many low-value buyers.\textsuperscript{152}

Turning to the ninety-nine mug buyers, if we put aside the assumption for promulgation and adjudication costs, this market derives exactly the same social welfare with a simple rule and a complex one. This should not be too surprising because both scenarios are governed by a Hadley default rule. No one happens to opt out or make a mistake in the complex regime, and the predominantly medium-value buyers simply remain silent and receive their optimal contract.\textsuperscript{153} There are five high-value buyers, but none find it worthwhile to incur the transaction costs required to get high precautions.\textsuperscript{154} The greater efficiency of a simple default rule in this market, then, is entirely dependent on the assumption for promulgation and adjudication costs.

The next two markets, MP3 and NFL, experience similar results and can be analyzed together. Like the Mug market, participants face a Hadley default under both simple and complex regimes. But unlike the Mug market, there is a slight efficiency gain from the simple regime—even ignoring promulgation and adjudication costs. This difference is not explained by more parties reaching an optimal contract: buyer groups in both the MP3 and NFL markets fail to separate. Rather, the complex regime is less efficient because a few buyers opt out of the analysis or are mistaken about the governing default rule. For example, in the MP3 market, 1 of the 34 high-value buyers gains an incremental 0.25 by moving from medium to high precautions. Since this is outweighed by the transaction costs of making the change, he simply accepts medium precautions under a

\textsuperscript{151} See supra notes 95-97 and accompanying text.

\textsuperscript{152} The results might have been different if the seller had a better success rate for high precautions. This could have resulted in a significant population of high-value buyers contracting around a Hadley default, which would enable the population to separate and the remaining low-value buyers to receive their optimal contract. More generally, this point starts to illustrate the complex mix of factors that causes one rule to be more efficient in a given sample economy.

\textsuperscript{153} With medium-value buyers, it does not matter whether they are mistaken about the governing default rule in a complex regime, because they will not choose to incur transaction costs with either a Hadley or a full-damages default.

\textsuperscript{154} This is true because medium precautions are particularly effective in this iteration (75% success rate) and high precautions are not (87% success rate).
simple Hadley regime. But in the complex regime, this buyer does not want to bother with deciphering the applicable default and decides to opt out by negotiating for his preferred, high precaution contract. There is a net social loss because the transaction costs of 1.05 exceed his marginal gain of 0.25. A few other buyers in these two markets make the same decision, leading to a situation where the simple default rule does better. The increased promulgation and adjudication costs also reduce the efficiency of a complex regime.

Finally, we get to autologous blood donation. As will become apparent, this part of the economy is massive and often sways the results. In this case, a simple default is more efficient, but only because of the promulgation and adjudication cost assumption. Putting these costs aside, a complex default rule would actually generate 38.0 more in social welfare than a simple default rule. The explanation is counterintuitive: Under a simple Hadley rule, three high-value buyers choose to contract for high precautions even when the transaction costs outweigh the incremental benefits that they receive. They do this because they also have a very low probability of incurring consequential damages and thus receive a lower price by revealing their type. This information cost savings does not increase the overall social welfare, however, and there is a net loss. More simply, these high-value buyers inefficiently incur high transaction costs. With a complex rule, the Autologous Blood market receives a full-damages default and these high-value buyers refuse to identify their type.

So, in summary, a simple default rule does better in this randomly chosen example, but only because of the assumption for promulgation and adjudication costs. Otherwise, a complex default rule would have led to the more efficient outcome. The results of a single

155. By revealing his type, this buyer would incur transaction costs of 1.05 and information costs of 0.33 because his chances of suffering consequential damages is a high 84%, for a net personal loss of 1.14.

156. Recall that the model gives each buyer a 1% chance of "opting out" under a complex default rule. See supra note 99, and accompanying text. This particular buyer happened to draw a random number below that 1% threshold.

157. I control for this effect in the sensitivity analysis by linking the mix of buyers to the average size of a given transaction—in effect, allocating fewer buyers to expensive markets. See infra notes 164-166 and accompanying text.

158. See supra note 94 and accompanying text.

159. See supra note 105 and sources cited therein.

160. And I do consider this a strong assumption. Lawmakers might indeed expect complex default rules to cost more than simple ones. See Ayres, supra note 1, at 1-17; Kaplow, supra note 27. But the 1% figure used here lacks empirical support, which is why I report all results separately.
iteration, however, while helpful in understanding the dynamics at work, are not very meaningful. The best rule will depend on the complex interplay of numerous factors, making it important to study many sample economies. After saving this data, then, the next step is to rerun the analysis thousands of times with a different set of buyers and sellers in each iteration.

FIGURE 10. Net Benefit of Simple Default over Complex Default (n = 5000 trials)
With Promulgation/Adjudication Costs
(79.5% of results > 0)

Without Promulgation/Adjudication Costs
(52.4% of results > 0)

Figure 10 displays the results for a run of 5000 trials, both with and without promulgation and adjudication costs. This figure graphs
the net efficiency benefit of a simple default rule: A number greater than zero means that the simple default outperformed the complex one. And a negative number indicates that a complex default was better. In this simulation, almost 80% of the results are positive, suggesting that a simple default rule is often more efficient. But the results are much closer when promulgation and adjudication costs are ignored; a simple default rule does better than complex default rule just 52.4% of the time. This suggests that more research into promulgation and adjudication cost estimates could be quite important. It is worth noting, however, that even if both default rules cost the same, a simple rule might still be marginally better.

These results are the product of many complex interactions, and it is hard to pinpoint exactly why the simple rule is more efficient. However, after carefully studying some patterns, I want to draw out four insights that may help lawmakers weigh the trade-offs between simple and complex default rules in contract law.

First, in situations where a subgroup receives the same default rule under both simple and complex regimes, any efficiency difference is driven by opt-out behavior, error costs, and promulgation/adjudication costs. In other words, these parties do not derive gains from a default rule that is tailored to their subgroup because they continue to receive the same default rule as before. But if the greater complexity introduces even a small degree of promulgation cost, buyer error, or opt-out behavior, then a complex rule will usually be worse. In these circumstances, parties may inefficiently incur transaction costs to negotiate for their preferred contract when the incremental benefit is not worth it.\textsuperscript{161} And even slight distortions can create a meaningful difference. If, however, a complex default rule never leads to mistakes—and is not more expensive to set up and administer—then the default rule regime does not matter for these subgroups.

Second, markets that do receive a different default rule under a complex regime sometimes do much better with these tailored default rules. In other words, the theory behind complex default rules can work: more parties receive their optimal contract with minimal transaction costs. For example, in this experiment, social welfare is sometimes higher in the Cake and Autologous Blood markets under the complex default rule. If the population separates under both defaults, a complex default rule can do better in these markets when

\textsuperscript{161} Buyer behavior in the earlier analysis of the MP3 and NFL markets is a good example of this. \textit{See supra} notes 155-156 and accompanying text.
fewer low-value buyers must incur transaction costs to generate the split. Under a simple default, by contrast, more high-value buyers may need to incur transaction costs to cause the split. And the benefits of a complex default can be even greater if the population only separates under a full-damages rule and more parties receive their best contract.\footnote{162. This is true because high-value buyers who fail to identify their type under a pooling Hadley default (because the benefits that many high-value buyers receive from moving to high precautions is often outweighed by the transaction or information cost that would have to be incurred) will receive inefficient medium precautions. But if many low-value buyers contract around a full-damages default, then the population may separate, and the high-value buyers get their best contract without incurring any transaction costs.}

But it does not always work as planned. The third insight is that a complex rule sometimes backfires in markets receiving the new, tailored default. This usually happens when some silent buyers are misidentified and receive a bad contract. For example, in one Blood market pattern, medium precautions are especially effective and there are very few high-value buyers. With a Hadley default, the population does not separate and the many medium-buyers receive their best contract. But with a full-damages default, enough low-value buyers elect to contract for their preferred default, splitting the population, and the vast group of medium buyers receives inefficiently high precautions. In short, even when a default works as expected, there may be other, unintended effects that generate new distortions.

What determines whether a complex default rule works as planned or backfires? The fourth insight is that the split between buyer types is quite important. When there are very few high-value buyers, for example, a Hadley default rule almost never leads to a separating equilibrium—there are not enough high-value buyers to signal their type—and the complex default rule might do better. Or when there are many medium buyers, a separating outcome might actually be worse because these medium buyers receive inefficient contracts. Again, this underscores the fact that many different factors will determine whether a simple or complex default is better—and it will be exceptionally hard for lawmakers to understand all of the permutations.\footnote{163. To some extent, this is an artifact of my model: I have only allowed sellers to write three discrete contracts. An extension to this model might use continuous functions for the possible array of seller contracts.}

In summary, then, a simple default rule appears just as good as a complex one in this experiment if promulgation and adjudication costs are assumed equal. And if the complex default rule costs more to
establish, then the simple default rule is more efficient 80% of the time. But this model makes many assumptions, and it is fair to ask whether this conclusion holds across a broader set of market conditions.

D. Sensitivity Analysis

While the previous Subpart suggests that a simple default rule often generates more social welfare than a complex one, the findings are limited by the multiple assumptions underlying the analysis. This Subpart seeks to extend the results by relaxing the assumptions for the most sensitive variables and rerunning the simulations. I will briefly reconsider five issues: the assignment of buyers to markets, the split between general damages and consequential damages, the transaction costs incurred to contract around a default, the probability that buyers will opt out of a complex default regime, and the probability that they will incorrectly identify the applicable default rule in a complex regime.

The first potential concern is that the large autologous blood market contracts will dominate the results, drowning out the other products.164 And to some extent this is true—although real life is also composed of disparate markets, so I am not sure that this is a problem. Nevertheless, to control for this effect, I decided to rerun the experiment by adjusting the mix of buyers according to the average value of each product. In other words, products with low valuations will have many of the 500 buyers, and the autologous blood market will have just a few.165 As might be expected, the results are less extreme with this revised mix of buyers because lower dollar amounts are traded. The net benefit of a simple default rule ranges from about minus 180 to 400. But a simple default rule does even better under this scenario, outperforming a complex rule nearly 90% of the time with extra promulgation and adjudication costs, and over 80% of the time without these costs.166 Upon reflection, this should not be too surprising—the Blood market often benefited from a complex default regime, and with very few buyers assigned to that market, a simple default rule will function even better.

164. See supra note 157 and accompanying text.
165. Specifically, I weighted the random probability of a buyer's assignment to a market to give each market an equal expected dollar size. When I shuffled the market in this way, 350 buyers were assigned to cake, 69 to mugs, 47 to MP3, 32 to NFL, and 2 to blood.
166. The exact results are 89.23% and 81.84%, respectively. The data and charts from all of these sensitivity tests are available upon request from the author.
The second variable to test is the split between general damages and consequential damages.\textsuperscript{167} Recall that this assumption is important because it impacts the incentives to negotiate for optimal precautions. A low liability cap, for instance, will increase consequential damages and give high-value buyers more reason to seek greater precautions in a \textit{Hadley} regime. To test the importance of this variable, I reran the experiment under low-cap and high-cap scenarios.\textsuperscript{168} As expected, lowering the liability cap made the \textit{Hadley} rule more likely to encourage optimal bargaining, and a simple default rule was better approximately 84\% of the time. It also continued to generate more social welfare in the high-cap scenario. Seventy-seven percent of the results were positive—but the social welfare was roughly equal when no extra amount was added for adjudication and promulgation costs.\textsuperscript{169} As the liability cap grows very large, the difference between simple and complex default rules disappears, and the \textit{Hadley} rule is effectively converted into a full-damages rule for all markets.

The third sensitivity test involves the transaction cost assumption. It is hard to predict the impact of very low transaction costs: they will make it easier for buyers to change the underlying default in a simple regime, but full-damage markets in a complex regime might also do better. To test these offsetting effects, I again set up two scenarios—low and high transaction costs—and repeated the experiment.\textsuperscript{170} How did each default rule regime fare? When transaction costs are set very low, complex defaults narrowed the gap: A simple regime still did better 72\% of the time, but a complex system was more efficient 59\% of the time when adjudication and promulgation costs were equal.\textsuperscript{171}

\textsuperscript{167} It would also be possible to hold the other variables constant and solve for the optimal split between general and consequential damages, or, in other words, the optimal liability cap. I thank Oren Bar-Gill for this insight. See Oren Bar-Gill, \textit{Quantifying Foreseeability} (N.Y.U. Sch. Law & N.Y.U. Ctr. Law & Econ., Working Paper No. 06-01, 2006), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=731344 (exploring optimal liability caps in the \textit{Hadley} context).

\textsuperscript{168} The low liability cap scenario set the general damages assumption at just the tenth percentile value for each of the markets; the high-cap scenario set this number at the fortieth percentile.

\textsuperscript{169} Specifically, a run of 5000 trials under the low-cap assumptions resulted in a mean benefit of 212. The simple default generated more welfare 83.66\% of the time (67.13\% of the time excluding promulgation and adjudication costs). A run of 5000 trials under the high-cap assumptions resulted in a mean benefit of 199. The results were positive 78\% of the time (51\% of the time excluding promulgation and adjudication costs).

\textsuperscript{170} Low transaction costs were set to 1\% of the mean valuation in each market; high transaction costs were set to 50\% of the mean valuation.

\textsuperscript{171} A run of 5000 trials under the low transaction costs assumption resulted in a mean benefit of 189. The simple default generated more welfare 71.94\% of the time, but it did better in just 40.67\% of the trials when I excluded promulgation and adjudication costs.
This happened, in part, because of the disproportionate impact of the Blood market: Low transaction costs made it easier for low-value buyers to separate the buyer population under a full-damages default. And buyers who decided to opt out of the analysis in the complex regime also did better because they received their best contract for less. By contrast, under the high transaction cost scenario, the simple default regime always did better. No one bothered to separate under this scenario and the few buyers who opted out or made a mistake in the complex regime wasted a great deal of money incurring these high transaction costs.\textsuperscript{172}

The last sensitivity test looks at two assumptions of the complex default regime: a buyer's refusal to determine which default rule applies to his contract and a buyer's chance of incorrectly identifying which default rule governs his deal. In this experiment, I have modeled these possibilities using an opt-out variable and an error variable. But what happens if buyers have perfect information and never exhibit any of these tendencies? Or what happens if many buyers make these mistakes? To answer these questions, I ran two final scenarios: one where buyers never opt out or make a mistake and one where buyers take either action 5\% of the time. The results should not be too surprising. Under the first adjustment, a complex rule does become more efficient than a simple one, leading to greater social welfare in 60\% of the trials, but only when extra adjudication and promulgation costs are ignored.\textsuperscript{173} Under the second adjustment, a complex default rule does worse, outperforming the simple regime just 31\% of the time.\textsuperscript{174}

In summary, the results appear robust across a wide range of sensitivity tests. While there are circumstances where the use of complex default rules could conceivably lead to more efficient law,

\textsuperscript{172} A run of 5000 trials under the high transaction cost assumption resulted in a mean benefit of 522. The simple rule did better 100\% of the time, even excluding promulgation and adjudication costs.

\textsuperscript{173} A run of 5000 trials with the opt out and error variables set to 0\% resulted in a mean benefit of 145. The simple default generated more welfare 78.89\% of the time, but it did better in just 40.42\% of the trials when promulgation and adjudication costs are excluded.

\textsuperscript{174} Under this scenario, the biggest change is that a simple default usually does better even when there are no extra promulgation and adjudication costs. Five thousand trials with the opt out and error variables set to 5\% resulted in a mean benefit of 305. The simple default generated more welfare 80.63\% of the time and 68.64\% of the time, when promulgation and adjudication costs are excluded.
this occurs only under extreme scenarios and does not increase efficiency by much.\textsuperscript{175}

\section{Conclusion}

The default rule approach to contract law has enjoyed widespread acceptance in recent years. Much of the literature now wrestles with the choice of one particular default rule over another, often using economic analysis to explore which rule will best serve the interests of the contracting parties.\textsuperscript{176}

However, there is another dimension to the default rule puzzle that has been largely overlooked. Lawmakers might conceivably segment contracting parties into groups and give each group a different starting point for a given issue in contract law. If successful, this approach would reduce the transaction costs of contracting—and possibly lead to more efficient contracts. On the other hand, complex default rules might also backfire, leading to greater legal costs and introducing new errors. Should there be just one rule for everyone? Two rules? Ten? Little analytical or empirical work has explored this problem of contract default rule precision.

This Article has examined the trade-offs between simple and complex default rules through an empirical experiment drawing upon data from the field of marketing. By creating a sample economy of five diverse products—and then copying this economy into two parallel universes—it is possible to test the contracting behavior of the same buyers and sellers under both simple and complex default rule regimes. Ultimately, the work suggests that complex default rules may not be worth the trouble: the simple default rule does better about 80\% of the time.

However, I would caution against over-generalizing from this experiment. It relies on numerous assumptions, and although the results appear robust across a variety of market scenarios, new empirical data or analysis of a different contract default rule could lead to different results. More empirical work is needed on the optimal precision question—and analytical methods may only go so far toward

\textsuperscript{175} For example, if transaction costs are very low and there is no promulgation or adjudication surcharge, then a complex default regime will generate more efficiency about 59\% of the time. Or a complex default rule does better if buyers never opt out of a complex regime, buyers never make an error, and no extra adjudication/promulgation costs arise. But I view these assumptions as extreme and unlikely to reflect reality. At the same time, I caution against over-generalizing from this experiment; extensions to this model or additional empirical data might lead to different results.

\textsuperscript{176} See Posner, supra note 6, at 829-32.
resolving this amorphous problem. However, I think that some data is better than nothing, and I am optimistic that additional research from other disciplines can be brought to bear on these questions. I also hope that this Article will reintroduce the complexity question into the default rule debate and spark some ideas for further empirical assessment of contract theory.