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Predictive Decisionmaking

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Predictive Decisionmaking

by Michael Abramowicz[*]

In this Article, Professor Abramowicz identifies a regulatory strategy that he calls "predictive decisionmaking" and provides a framework for assessing it. In a predictive decisionmaking regime, public or private decisionmakers make predictions, often of future legal decisions, rather than engage in normative analysis. Several scholars, particularly in recent years, have offered proposals that fit within the predictive decisionmaking paradigm, but have not noted the connection among these proposals. The Article highlights five different mechanisms on which predictive decisionmaking regimes may rely, including predictive standards, enterprise liability, accuracy incentives, partial insurance requirements, and information markets. After identifying several advantages that predictive decisionmaking strategies may have over nonpredictive alternatives, the Article identifies several potential problems with predictive decisionmaking, and develops a simple analytical framework for assessing predictive decisionmaking proposals. The Article concludes by illustrating variants on the mechanisms for accomplishing predictive decisionmaking in conjunction with new predictive decisionmaking proposals.

Legal decisions frequently depend in part on predictions about the future. Congress tries to anticipate future dangers to the United States's national security in choosing how to allocate defense research expenditures.[1] Highway designers project demographic trends and the effects of alternative spending choices on commute times.[2] Creators of sentencing guidelines and trial court judges take the risk of recidivism into account in setting prison terms.[3] And even though constitutional judicial review is based largely on analysis of whether a statute conforms with a 200-year-old document, Supreme Court Justices unapologetically debate the consequences of possible decisions.[4] Few legal decisions are wholly divorced from consideration of anticipated future developments that might make a course of action more or less wise, or from contemplation of the expected effects of the decisions themselves.

Predictions, in short, often serve explicitly or implicitly as inputs into normative legal decisions. What is less obvious is that predictions of future legal decisions and other events sometimes can substitute for normative decisionmaking. Instead of assigning a normative decisionmaking task to governmental decisionmakers, or crafting rules requiring decisionmakers

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[1] *See, e.g.*, GEN. ACCT. OFF., NO. 04-591, HOMELAND SECURITY: SELECTED RECOMMENDATIONS FROM CONGRESSIONALLY CHARTERED COMMISSIONS AND GAO (Mar. 2004) (advising Congress on how to prioritize against emerging threats).

[2] *See, e.g.*, Lathrop B. Nelson, Comment, *Unclogging Virginia's Roads: Aligning Commuter Incentives in Northern Virginia,* 28 TRANSP. L.J. 185, 186-87 (2000) (citing several studies assessing demographic and transportation trends over the next twenty years).

[3] *See, e.g.*, U.S. SENTENCING COMM'N, RECIDIVISM AND THE "FIRST OFFENDER" (May 2004), *available at* http://www.ussc.gov/publicat/Recidivism_FirstOffender.pdf (reporting research by the Sentencing Commission on offender recidivism).

[4] *See, e.g.*, Blakely v. Washington, 124 S. Ct. 2531, 2541 (2004) (assessing predictions of how state legislatures might respond to the Court's decision); *id.* at 2544 (2004) (O'Connor, J., dissenting) (arguing that the "practical consequences of today's decision may be disastrous").

to make factual assessments in service of a normative goal, the government can demand that governmental or private decisionmakers make explicit predictions. In this Article, I will use the label "predictive decisionmaking" to encompass any legal institution that uses predictions as the basis of decisionmaking.

The dividing line between nonpredictive and predictive institutions is not always sharp. Holmes long ago recognized that private predictions of how the law will be enforced in effect are the law,[5] and scholars since have noted that judges and other governmental officials may make decisions in part by anticipating the acts of later decisionmakers.[6] My focus, however, is on institutional arrangements that rely on predictions that substitute for normative decisionmaking. A relatively trivial example can illustrate what does not count as predictive decisionmaking under my definition. Consider a regulatory regime that exists in every state: driver licensing. Individual decisionmakers at motor vehicle departments sometimes might exercise discretion they have by implicitly making predictions about the likelihood that a driver will cause an accident. But because the regulatory regime does not make the licensing decision directly contingent on explicit predictions by such decisionmakers, this is not a predictive decisionmaking approach.

A predictive alternative might rely on another set of institutions that already makes explicit predictive judgments about drivers: automobile insurance companies. A state might provide, for example, that individuals may receive drivers' licenses only if they are able to purchase automobile insurance at a relatively low price that provides the government assurance that they are likely to be relatively safe drivers. Insurance companies would have an incentive to identify the best predictors of safe driving, because those companies would wish to minimize future tort liability. This would be a predictive decisionmaking regime, because it would rely on explicit predictions, in the form of insurance prices, rather than instructing DMV officials to follow some set of protocols in service of the normative goal of keeping bad drivers off the streets. As in many other predictive decisionmaking regimes, the prediction is of future legal decisions, in this example future decisions imposing tort liability.

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[5] Oliver Wendell Holmes, Jr., *The Path of the Law*, 10 HARV. L. REV. 457, 461 (1897) ("[T]he prophecies of what the courts will do in fact . . . are what I mean by the law.")

[6] *See, e.g.*, Joseph L. Smith & Emerson H. Tiller, *The Strategy of Judging: Evidence from Administrative Law*, 31 J. LEGAL STUD. 61, 63-67 (2002) (providing an overview of strategic instrument theory, which suggests that judges sometimes craft decisions in part to limit the ability of agency officials and Congress to overrule decisions).

The existing driver's licensing scheme works well enough, but in part this may be because the threshold for driver licensing is so low. The predictive decisionmaking approach might be better if a state wanted to license only the safest drivers among some group, for example fifteen-to-eighteen year olds. We might doubt that a state legislature or administrative agency will adopt an optimal set of requirements and administer these requirements effectively, because there are complex empirical questions about how to identify the safest drivers. Should decisions depend on high school grades? On an unusually challenging road test? On having taken driver's ed or some other course?[7] On a written exam? On the purchase of technology that would allow drivers to be monitored?[8] The predictive decisionmaking approach simplifies the government's decisionmaking task, and it may be superior to the traditional alternative where governmental officials face high information costs or other pressures that may prevent them from adopting an optimal set of rules.

Predictive decisionmaking thus sometimes may provide a previously unrecognized market alternative to command-and-control regulation.[9] Predictive decisionmaking, however, need not require privatization of government functions. Indeed, some public officials already engage in predictive decisionmaking.[10] For example, under *Erie*,[11] when a federal court faces a state law issue not yet definitively addressed by the highest court in the relevant state, the federal court will generally make a prediction about how the state court would decide the issue.[12] This counts as predictive decisionmaking, because, at least in theory, the judges under such a regime make predictions rather than rendering decisions based on their own normative assessments. Some commentators have advocated normative decisionmaking rather than predictive

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[7] *See generally* K. Ker et al. *Post-License Driver Education for the Prevention of Road Traffic Crashes*, COCHRANE DATABASE SYS. REVS. (2003) (reviewing studies on the effectiveness of driver's ed programs).

[8] *See* Elizabeth Williamson, *Parents Hand Out Keys, and a Monitoring Device*, WASH. POST, Mar. 2, 2005, at A1 (noting increased use of technology such as GPS by parents to monitor driving by their teenage children).

[9] *See infra* Part III.B (explaining how predictive decisionmaking allows a market approach to safety regulation, an area in which the choice previously has appeared to be between command-and-control regulation and no regulation at all).

[10] Commentators sometimes even use the phrase "predictive decisionmaking" in a manner consistent with the usage here. *See, e.g.*, Evan H. Caminker, *Precedent and Prediction: The Forward-Looking Aspects of Inferior Court Decisionmaking*, 73 TEX. L. REV. 1, 1 (1994) (arguing that inferior courts should engage in "predictive decisionmaking" by assessing what superior courts would likely decide on appeal, rather than by making their own normative assessments).

[11] Erie R.R. v. Tompkins, 304 U.S. 64, 69-90 (1938).

[12] *See, e.g.*, Travelers Ins. Co. v. 633 Third Assocs., 14 F.3d 114, 119 (2d Cir. 1994) ("Where the substantive law of the forum state is uncertain or ambiguous, the job of the federal courts is carefully to predict how the highest court of the forum state would resolve the uncertainty or ambiguity.").

decisionmaking in diversity cases,[13] and this Article will produce a framework that could be used to compare the merits of the two approaches.

The contrast between this form of predictive decisionmaking and the driver licensing hypothetical emphasizes that the predictive decisionmaking umbrella is large, because there are a variety of different possible prediction mechanisms. The prediction mechanism in the *Erie* example is nothing more than a decisionmaking standard that is predictive rather than normative, and someone who makes a bad prediction suffers at most some small reputational cost. In the driver licensing example, by contrast, the prediction mechanism relies on private parties and provides those private parties with economic incentives. It is possible to imagine mechanisms that are hybrids of these approaches. A state, for example, might ask that individual motor vehicle officials make explicit predictions about license applicants' expected safety and then compensate the officials in part based on how accurate their predictions turn out over time. What all the examples have in common is that the regime requires the relevant decisionmakers to think predictively rather than normatively. This Article seeks both to explain why encouraging predictive instead of normative decisionmaking might be useful and to describe and compare a range of prediction mechanisms.

There are many objections, some powerful, to predictive decisionmaking proposals. My objective, though, is not to endorse any particular predictive proposal, and I admit that the insurance approach to driver's licensing would invite serious objections.[14] Rather, my objective is to use this example and more importantly others offered by legal theorists to highlight predictive decisionmaking as an approach (certainly not always the best approach) to legal decisionmaking and regulation. What is striking is how rarely policymakers and commentators consider predictive approaches. At least so far as I have been able to determine, for example, no

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[13] *See, e.g.*, Arthur L. Corbin, *The Laws of the Several States*, 50 YALE L.J. 762 (1941) (arguing that federal courts should employ traditional legal argument when state law is not clear); Michael C. Dorf, *Prediction and the Rule of Law*, 42 UCLA L. REV. 651, 696-701 (1995) (summarizing such views). Courts also sometimes have the power to certify issues directly to state courts. *See, e.g.*, Bradford R. Clark, *Ascertaining the Laws of the Several States: Positivism and Judicial Federalism After* Erie, 145 U. PA. L. REV. 1459, 1544-64 (1995) (advocating increased use of certification).

[14] For example, some might worry that the state would set the price cap not simply to keep bad drivers off the road, but also inefficiently to limit insurance company profits. Others might complain that the insurance approach might unfairly result in girls being able to drive at a younger age than boys. Another worry is that regulatory interventions or cost pressures might prevent insurance companies from engaging in the kind of individualized insurance pricing that would be necessary for an insurance regime to be effective. And yet another is that insurance companies might seek to evade price caps by charging less for liability insurance and more for collision insurance. This list is by no means meant to be exhaustive, and while some of the problems potentially can be addressed through careful institutional design, others, if deemed to present sufficient normative concerns, may have no easy solutions.

one appears to have even suggested that relying on insurance prices might be a possibility. This lack of attention exists even though the necessary predictive decisionmaking institution more or less already exists, even though many states already require insurance as a prerequisite to obtaining a vehicle registration,[15] even though high insurance rates attributable to a poor driving record presumably keep some potentially dangerous drivers on mass transit, and even though there have been criticisms of driver licensing for being too tolerant of bad drivers.[16]

Perhaps the absence of a literature on this approach to driver licensing reflects simply that it would prove to be, once all relevant factors are considered, a bad idea. An additional possibility, though, is that the solution is nonobvious, because legal and other scholars do not routinely consider the possibility of predictive decisionmaking institutions. Indeed, none of the very small number of works that this Article identifies as presenting predictive solutions cites any of the others or presents itself as an example of a general regulatory strategy, and no previous commentator has discussed these proposals together or predictive decisionmaking in general. Because the predictive decisionmaking concept is alien, some of the proposals, including the automobile insurance proposal, will strike many readers, at least at first, as quirky. In this Article, I aim to make the predictive decisionmaking concept intuitive. Many individual predictive decisionmaking proposals may still be unjustified on the merits, but they should not be condemned simply because the concept of predictive decisionmaking is unfamiliar.

The Article will thus outline the virtues of predictive decisionmaking and potential problems with predictive decisionmaking institutions. The possibilities of predictive decisionmaking emerge clearly if there are contexts in which the relevant predictive mechanisms can be made relatively cheap and accurate, not providing paranormal views into the future, but reflecting available information and generating plausible probability estimates. Predictive decisionmaking has the potential to simplify the government's task in constructing some legal regimes. In addition, where normative decisionmakers might have highly variable approaches, predictive decisionmaking can average the expected decisions of multiple decisionmakers and make legal decisionmaking more consistent. Predictive decisionmaking sometimes may make it

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[15] *E.g.*, CONN. GEN. STAT. ANN. § 14-12b (West 2005).

[16] *See, e.g.*, Jennifer L. Klein, *Elderly Drivers: The Need for Tailored License Renewal Procedures*, 3 ELDER L.J. 309, 312 (1995) ("Many incompetent drivers continue to remain behind the wheel rather than being denied the renewal of their license or being issued a restricted license.").

more difficult for interest groups or corruption to influence decisionmaking, and for irrelevant factors or ideological bias to contaminate the decisionmaking process.

Perhaps the greatest danger of any predictive decisionmaking approach stems from the inevitability that no prediction mechanism will match a crystal ball, and a predictive decisionmaking system that makes bad predictions may result in worse decisions than the nonpredictive alternative. If predictions are sufficiently reliable, however, then a successful predictive decisionmaking regime takes advantage of the best of both the world of standards and the world of rules. A large legal literature compares standards and rules,[17] though never from the perspective of a predictive decisionmaking apparatus. Rules tend to be overinclusive and underinclusive,[18] allowing regulated entities to exploit loopholes. Because predictive decisionmaking can often rely on a simple standard that tracks a variable of interest, such as expected tort liability, predictive decisionmaking harnesses an advantage of standards, their theoretical congruence to legislative intent. Vague standards ordinarily open up possibilities of inconsistent, corrupt, and biased decisionmaking. Predictive decisionmaking potentially avoids these pitfalls, however. A prediction, meanwhile, conceivably may cost less than a normatively-based legal decision, particularly if the decision would require litigation.

The ultimate question is whether any predictive mechanisms can generate predictions that reflect regulatory goals more consistently than normative decisions purportedly guided by those goals. The predictive decisionmaking proposals that this Article will review and offer are motivated in part by concerns that the decisions generated by the nonpredictive alternatives may be unattractive, for example because they are inaccurate or susceptible to excessive variation among decisionmakers. The ultimate analysis of predictive institutions must be a comparative one, but this Article will highlight predictive institutions rather than existing nonpredictive alternatives. The Article's goal is to place predictive decisionmaking on the regulatory menu, but not to advocate that we order it for any given problem, and indeed the analysis here will identify some reasons that we should be cautious about both existing and hypothetical predictive decisionmaking proposals.

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[17] *See, e.g.*, FREDERICK SCHAUER, PLAYING BY THE RULES: A PHILOSOPHICAL EXAMINATION OF RULE-BASED DECISION-MAKING IN LAW AND IN LIFE (1991); Kathleen M. Sullivan, *The Justices of Rules and Standards*, 106 HARV. L. REV. 22, 70-76 (1992); Cass R. Sunstein, *Problems With Rules*, 83 CAL. L. REV. 953 (1995).

[18] Sunstein, *supra* note 17, at 992-93.

Part I describes five different prediction mechanisms that might underlie a predictive decisionmaking regime, each in the context of specific policy proposal previously offered by a legal scholar or economist. One of these is simply a mechanism that instructs decisionmakers to make a decision using a predictive standard, while the others all employ some form of financial incentive. Part II evaluates predictive decisionmaking generally, elaborating on the dangers and possibilities sketched above. Part III consolidates these observations into a simple analytical framework that can be used to assess predictive decisionmaking proposals, and it applies the framework to the proposals considered in Part I. It also introduces and preliminarily assesses the possibility of using predictive decisionmaking for safety regulation, considering alternative possible predictive mechanisms. Finally, Part IV offers some variants on the predictive mechanisms developed in Part I and illustrates them through new predictive decisionmaking proposals. The proposals are chosen not because they are the most sensible, let alone politically enactable, but rather to show a range of contexts in which predictive decisionmaking is potentially applicable, and to demonstrate different technical variations on the predictive decisionmaking theme.

I. THE MECHANISMS OF PREDICTIVE DECISIONMAKING

This Part identifies a range of approaches that can be used to structure predicting decisionmaking institutions, describing five predictive mechanisms that may be used to accomplish predictive decisionmaking. Each of the mechanisms is illustrated by identification of a proposal by a legal scholar or economist that invokes the mechanism. None of the authors of these proposals recognizes a connection between the proposal and predictive decisionmaking more generally, or considers whether the same proposal might be accomplished with a different predictive mechanism. This Part, however, explains how each of these papers fits the predictive decisionmaking paradigm. The proposals are ordered roughly in the order of the independence of the predictions from their legal implications; with the first mechanism, the prediction is the law, and the last mechanism produces a prediction that may have any or no legal consequence. This Part does not assess the proposals on the merits. We will revisit the proposals later, however, applying an analytical framework developed below.[19]

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[19] *See infra* Part III.A.

A. *Predictive Standards*

In *Preference-Estimating Statutory Default Rules*,[20] Einer Elhauge argues that courts should resolve ambiguities in statutes by determining, where possible, which interpretations of statutes would maximize political satisfaction. When there is some chance that the current legislature would be able to resolve an ambiguity if the issue were on its agenda,[21] and the court can identify a particular resolution of the ambiguity as more likely than not to be what the legislature would choose if it did act,[22] the court should interpret the statute in the way that the legislature would resolve the ambiguity. This approach, Elhauge argues, is not only normatively desirable, but also descriptively powerful, explaining a variety of canons of construction,[23] as well as judicial reliance on legislative history.[24]

This theory fits cleanly within the predictive decisionmaking paradigm, as long as predictive decisionmaking is understood to encompass not only regimes in which actual decisions are predicted, but also regimes demanding hypothetical predictions.[25] Elhauge contrasts his regime with alternatives demanding that, given statutory ambiguity, judges should exercise judicial judgment,[26] for example by doing what they construe to be "the 'right' thing."[27] The predictive decisionmaking alternative to having a decisionmaker make a normative decision is to generate a prediction and then give that prediction legal force. The predictive decisionmaking turn in Elhauge's proposal is thus his argument that in the absence of actual decisionmaking by the legislature, judge-made law should depend on predictions of what the current legislature might do rather than on judges' own normative lights.

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[20] *See* Einer Elhauge, *Preference-Estimating Statutory Default Rules*, 102 COLUM. L. REV. 2027 (2002) [hereinafter Elhauge, *Preference-Estimating*].

[21] Where the legislature would deadlock on a particular issue, for example because the two houses of a bicameral legislature would resolve the question in different ways, then courts would not be able to use a preference-estimating statutory default rule. *See id.* at 2106-07.

[22] This is to be calculated according to the relative probabilities of different resolutions that the legislature might successfully reach. *See id.* at 2061 n.84. For example, if there is a 50% probability that the legislature would not act at all even if the issue were on its agenda, a 30% chance that the legislature would select option *A*, and a 20% chance that the legislature would select option *B*, then the relative probabilities are 60% for *A* and 40% for *B*. As a result, the court should resolve the statutory ambiguity by selecting option *A*. *Id.* Where there are more than two interpretive possibilities and none is more likely than the rest combined to be selected, the task of minimizing political dissatisfaction requires the court to take a moderate possibility. *Id.* at 2076-81.

[23] *Id.* at 2049-56.

[24] *Id.* at 2056-76.

[25] Later, I will suggest how predictive decisionmaking institutions might encourage predictions of later decisions that might or might not be made. *See infra* Part IV.B.

[26] Elhauge, *Preference-Estimating*, *supra* note 20, at 2040-44.

[27] *Id.* at 2041.

If predictive decisionmaking were commonplace, even in academic scholarship, Elhauge's inventive and original proposal would have been obvious. When an institution exists that we believe produces good decisions, but it is impractical for reasons of time or cost to have the institution resolve every issue of a particular type, a predictive decisionmaking institution can substitute by predicting what the ideal institution would do. Because the legislature is the embodiment of representative governance, its decisions are presumptively normatively sound and democratically legitimate. Legislators, however, have limited time and attention.[28] They thus cannot anticipate all statutory ambiguities, and they cannot be burdened with the resolution of all cases that might implicate such ambiguities.[29] We could have judges make their own normative decisions according to any number of theories, but the predictive decisionmaking insight is that prediction can substitute for decision.

B. Cost Internalization

In a series of articles,[30] Jon Hanson and his coauthors have built a systematic economic defense of "enterprise liability," a regime in which business entities are held strictly liable for injuries that they cause. Strict liability, of course, is not novel, but the Hanson articles have offered original arguments about the benefits of strict liability where the potential defendants are corporations or other business associations. Negligence liability in theory can lead corporations to engage in optimal levels of care,[31] but in practice, "courts are not able to ascertain and enforce optimal manufacturer care."[32] If corporations themselves expect to bear liability for all the costs

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[28] *See, e.g.*, Daniel J. Meltzer, *The Supreme Court's Judicial Passivity,* 2002 SUP. CT. REV. 343, 386 (2002) (elaborating "the enormous range of what Americans ask Congress to undertake").

[29] Even if it were practical for the legislature to vote on the resolution of every issue in every case filed in its jurisdiction, the legislature might not want to do so, preferring to delegate this task. *See, e.g.*, Eli M. Salzberger, *A Positive Analysis of the Doctrine of Separation of Powers, or: Why Do We Have an Independent Judiciary?*, 13 INT'L REV. L. & ECON. 349, 359 (1993) (arguing that the independent judiciary can be defended as a type of delegation from the legislature).

[30] *See, e.g.*, Steven P. Croley & Jon D. Hanson, *Rescuing the Revolution: The Revived Case for Enterprise Liability*, 91 MICH. L. REV. 683 (19993); Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: Some Evidence of Market Manipulation*, 112 HARV. L. REV. 1420 (1999); Jon D. Hanson & Kyle D. Logue, *The First-Party Insurance Externality: An Economic Justification for Enterprise Liability*, 76 CORNELL L. REV. 129 (1990) [hereinafter Hanson & Logue, *First-Party Insurance Externality*].

[31] *See, e.g.*, STEVEN SHAVELL, ECONOMIC ANALYSIS OF ACCIDENT LAW 8 (1987) ("If due care is chosen by courts [applying a negligence rule] to equal the socially optimal level of care, then injurers will be led to exercise due care and the outcome will be socially optimal.")

[32] Hanson & Logue, *First-Party Insurance Externality*, *supra* note 30, at 169. "As compared to a given manufacturer," Hanson and Logue explain, "courts are ill-suited to engage in the ex post cost-benefit analysis required to determine what precautionary measures a manufacturer should have taken ex ante with regard to a given product." *Id.* To perform the task adequately, courts would need to estimate demand and supply curves, and then calculate "which product design generates the largest consumer surplus." *Id.* at 170. Hanson and Logue argue that "[s]uch determinations seem beyond the limits of judicial competence."

of their actions and products, even in cases in which the corporations have taken appropriate care, then the corporations will have optimal incentives in product design. The argument is an elaborate extension of the common economic insight that forcing economic actors to internalize the costs of their actions tends to promote efficiency.[33]

That enterprise liability is a predictive decisionmaking system that can substitute for alternative regulatory approaches is perhaps seen most clearly in a specific proposal offered by Hanson and Kyle Logue for regulating cigarettes.[34] One approach to regulating cigarettes would be for the government to engage in command-and control regulation, for example by requiring manufacturers to conform their products to particular safety designs.[35] Such regulation, however, encounters numerous technical obstacles.[36]

The predictive decisionmaking insight is that instead of relying on regulatory agencies to make such assessments ex ante, or on courts applying a negligence regime to make such assessments ex post, we can insist that cigarette manufacturers predict the outcome of future legal decisions retroactively tallying product costs. Enterprise liability gives manufacturers an incentive to make such predictions and take them into account in product design. Enterprise liability provides incentives to manufacturers to make accurate predictions, because the enterprise's profits will suffer from inaccurate ones. A prediction of future liability that is too high would cause an increase in prices that might make the enterprise's products less competitive, and a prediction that is too low means that the enterprise will charge too little to cover the future costs of liability.

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[33] The point is generally associated with A.C. PIGOU, THE ECONOMICS OF WELFARE (1932).

[34] Jon D. Hanson & Kyle D. Logue, *The Costs of Cigarettes: The Economic Case for Ex Post Incentive-Based Regulation*, 107 YALE L.J. 1163 (1998) [hereinafter Hanson & Logue, *Costs of Cigarettes*].

[35] *Id.* at 1264.

[36] Hanson and Logue explain:
   With cigarettes, a command-and-control regulator would need to determine the exact safety-enhancing technologies (e.g., a reduced-carcinogen cigarette recipe) that the industry could use in making cigarettes as safe, and cost-justifiable, as possible. Such an analysis, however, would require the regulator to conduct complete marginal-cost-benefit analyses of every potential smoking technology at every level of cigarette production, taking into account, among other things, the overall effect of each technology on not only accident costs, including the costs of accident prevention, but also cigarette demand. Thus, command-and-control regulation, done properly, would require the regulator to evaluate both safety elements and aesthetic elements of cigarettes, such as taste.
Id. at 1265.

C. Accuracy Incentives

There may be contexts in which it is impractical or implausible to force a predictor to bear the full cost of its predictions, for example because there will be no way to measure those costs, or because transactions cost associated with full internalization may be too great. In such cases, it might nonetheless be possible to assess ex post the accuracy of predictions, and to provide for ex post financial penalties or rewards that will give an ex ante incentive to make good predictions.

Robert Cooter and Winand Emons, in a pair of articles,[37] have proposed an approach for penalizing untruthful trial witnesses consistent with this strategy. Perjury law, Cooter and Emons argue, does not provide appropriate incentives for witnesses to be honest, because the threshold for prosecution is high.[38] As a result, they claim, "slanted testimony is endemic in courts."[39] An alternative approach is to impose penalties on witnesses whose testimony turns out to be false. The penalty would vary with the incentive that the witness has to slant testimony in one direction or another, so perfectly neutral witnesses should not be subject to penalties at all.[40] The sanction might be imposed by a judge, but parties might voluntarily consent to such arrangements, if lawyers were permitted to ask witnesses whether they would be willing to "bond" their testimony by agreeing to pay a specified amount if the testimony later proved false.[41] A refusal to accept a bond would signal that a witness had little confidence in the proferred testimony.[42]

Cooter and Emons are particularly interested in reforming the incentives of expert witnesses, and it is this aspect of the proposal that fits most clearly within the predictive decisionmaking paradigm. Suppose, for example, that an economist is testifying in an antitrust case about whether the defendant's market share exceeded some threshold.[43] To make the testimony potentially disconfirmable, "the cross-examining attorney might ask the economist whether at least 50% of industrial economists at major universities, when confronted with the

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[37] *See* Robert Cooter & Winand Emons, *Truth-Bonding and Other Truth-Revealing Mechanisms for Courts*, 17 EUR. J.L. & ECON. 307 (2004) [hereinafter Cooter & Emons, *Truth-Bonding*]; Robert Cooter & Winand Emons, *Truth-Revealing Mechanisms for Courts*, 159 J. INST. & THEORETICAL ECON. 259 (2003) [hereinafter Cooter & Emons, *Truth-Revealing*].

[38] Cooter & Emons, *Truth-Revealing*, *supra* note 37, at 271-74.

[39] Cooter & Emons, *Truth-Bonding*, *supra* note 37, at 308.

[40] In this sense, the proposal produces a result similar to perjury law, since neutral witnesses have no incentive to lie, and "[i]n practice the probability of prosecuting a neutral witness for perjury is close to zero." *Id.* at 315.

[41] *Id.* at 316-19.

[42] *Id.* at 317-18 (noting that refusal would be allowed "in a free contract regime").

[43] *Id.* at 313.

same evidence that he relied upon," would agree with the conclusion.[44] After the trial, there would be some chance that a survey of one or more randomly selected economists would occur, and an appropriate penalty for a misprediction of the result of this survey may give the economist expert sufficient incentive to make an honest prediction about the proportion of economists who would agree with the economist's testimony.[45]

The proposal's predictive turn is the implication that such a prediction forms a more reliable basis for legal decisionmaking than a relatively undisciplined testimonial. Ordinarily, in making a normative decision about how to apply antitrust law, a court must rely on experts' conclusions, but because experts may have an incentive to slant testimony, courts must determine which experts to credit. Courts may consider witness demeanor, credentials, and reputation to help identify misleading testimony, but at least some commentators are skeptical of fact-finders' ability to identify dishonesty among experts.[46] Cooter and Emons suggest that courts rely on witnesses' bonded predictions instead of solely making normative assessments of experts' economic claims. The proposal is thus parallel to Elhauge's. Just as Elhauge would use predictions rather than potentially idiosyncratic normative frameworks for resolution of legal ambiguities, so too would Cooter and Emons rely on predictions rather than potentially idiosyncratic positive frameworks for resolution of factual ambiguities.

D. Partial Insurance Requirements

In the proposals assessed so far, the predictors have been either the decisionmakers themselves (in the Elhauge proposal), or entities (in Hanson and Logue's) or individuals (in Cooter and Emons's) whose behavior the government wishes to affect. It is also possible, however, for a predictive decisionmaking regime to rely on third party predictors, and as the example in the introduction implies,[47] there already exists a set of institutions with expertise in making predictions: insurance companies. A decision by an insurance company to issue insurance at a particular price reflects a prediction that the price will be large enough to cover the

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[44] *Id.*

[45] The economist could admit "that his opinion is unusual or eccentric" and yet "argue that he is right and other experts are wrong." *Id.* at 320. The Cooter and Emons proposal presumably is most forceful, however, where a fact-finder has insufficient expertise to assess arguments on the merits, and thus relies on predictions about consensus beliefs.

[46] Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535, 1590-634 (1998) (arguing that nonexperts will have difficulty assessing the testimony of experts).

[47] *See supra* text accompanying notes 6-8.

expected losses from such a policy plus the administrative costs of issuing the insurance. The more competitive the insurance market, the narrower will be the gap between the price and the expected loss.

A requirement that some entities obtain insurance for some eventuality provides one means of ensuring full internalization of the costs of the event.[48] This is a familiar point from the insurance law and regulation literature,[49] and a full insurance requirement acts as an enterprise liability regime applied to the combination of the regulated entity and its insurer. Insurance requirements sometimes might be useful, however, even where it is not desirable or feasible to require parties and their insurers fully to internalize certain costs. The reason is that insurance mandates lead to purchases of insurance at particular prices, and the government conceivably can interpret these prices as proxies for predictions, and then use the proxies for whatever regulatory purposes it desires. Generation of prices does not require full insurance. A requirement that certain entities obtain partial insurance against a contingency may be sufficient to generate price data.

The usefulness of partial insurance requirements in generating information animates a proposal in Kenneth E. Scott and Thomas Mayer's comprehensive treatment of federal deposit insurance reform.[50] Scott and Mayer devote much of their analysis to justifying the then- and still-existing regime in which the federal government provides deposit insurance to banks. They argue that the high information costs that consumers otherwise would bear in assessing bank safety means that some form of insurance is necessary,[51] and that federal subsidy of insurance is justified because a great deal of bank risk is attributable to the possibility of failures of national macroeconomic policy.[52] The private market cannot be relied on in any event to provide adequate

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[48] A possible addition to Hanson and Logue's cigarette proposal would thus require cigarette manufacturers to obtain full insurance protection against future liability. Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1311 (considering this possibility). There would be some additional cost to this because of the transactions costs associated with insurance transactions, but it might be justified in third parties are seen as better predictors than the manufacturers themselves.

[49] *See* KENNETH S. ABRAHAM, DISTRIBUTING RISK: INSURANCE, LEGAL THEORY, AND PUBLIC POLICY 48-49 (1986) (noting that accurate risk classification may allow internalization of risk, but that accurate risk classification may be difficult to achieve).

[50] *See* Kenneth E. Scott & Thomas Mayer, *Risk and Regulation in Banking: Some Proposals for Federal Deposit Insurance Reform*, 23 STAN. L. REV. 857 (1971).

[51] *Id.* at 859-60.

[52] *Id.* at 864-66. Scott and Mayer explain that this is relevant because it "is a general principle of both law and economics that an activity should bear the costs it creates and is in the best position to minimize or prevent." *Id.* at 865. On this theory, the federal government should pay for at least the portion of bank risk for which it is responsible.

insurance, because bank failures are likely to be highly correlated,[53] and the risks are sufficiently large that private firms will be unable to maintain sufficient reserves or reinsurance to cover all possible losses.[54]

Nonetheless, Scott and Mayer argue that the premiums that banks pay to the government should vary depending on their actual risk, rather than being uniform.[55] The challenge is determining how to set these premiums. Scott and Mayer suggest that no formula will be sufficient to set premiums efficiently,[56] and that there is a risk that the process of setting premia might become politicized.[57] Predictive decisionmaking seeks to replace a potentially flawed governmental decisionmaking process with a prediction, and Scott and Mayer, after considering other possibilities, offer a one paragraph proposal suggesting a predictive approach.[58] Banks might be required to obtain private insurance for some small portion of their deposits.[59] "The resulting demand would bring a new form of private insurance into existence and thereby create a large, independent set of risk judgments."[60] Scott and Mayer never explicitly say so, but presumably they would have the government rely at least in part on the prices at which private entities issued insurance in determining public insurance rates.

The approach, however, gives the government the flexibility to decide what, if anything, to do with the predictions. For example, the government might use a partial insurance requirement simply to generate information that would then be passed along in some form to bank consumers, so that they could make their own risk judgments. Or, the government could require that banks maintain their insurance rates below a certain tolerable risk threshold, for example using partial insurance requirements as an alternative to solvency regulation. These proposals could be assessed on their own terms, and an advantage of a partial insurance requirement is that it can be used in conjunction with different regulatory regimes.

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[53] Insurance markets in general are less likely to exist where losses are highly correlated. *See, e.g.*, Anne E. Kleffner & Neil A. Doherty, *Costly Risk Bearing and the Supply of Catastrophic Insurance*, 63 J. RISK & INS. 657, 657-58 (1996).

[54] Scott & Mayer, *supra* note 50, at 866-67.

[55] *Id.* at 886-92.

[56] *Id.* at 893 ("Even after an elaborate econometric study, the risk measures and premium categories adopted would contain a large judgmental element, especially at the outset.").

[57] *Id.*

[58] *Id.* at 895.

[59] This might be achieved, for example, by "requiring the insured bank or S&L to obtain some portion (for example, the first $X million) of its coverage from private sources." *Id.*

[60] *Id.*

E. Information Markets

Information markets complete the separation of a prediction mechanism from the decision about what the government should do with the prediction. Particularly in the past two years, a literature about information markets has emerged crossing a variety of fields, including business,[61] economics,[62] finance,[63] law,[64] and policy.[65] The literature remains relatively small, but the first paper proposing the use of information markets to generate predictions that might then be used for other purposes was published just over a decade ago.[66] In this proposal, Robin Hanson suggested that an information market, which he then called an "idea futures market,"[67] might be used to assess scientific claims. The information market concept is an extension of a long, though not formalized, tradition in which scientists place bets on the future to attest to their confidence in their views of the expected resolution of scientific questions.[68] Hanson suggests

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[61] *See, e.g.*, Thomas W. Malone, *Bringing the Market Inside*, HARV. BUS. REV., Apr. 2004, at 107 (discussing internal corporate use of information markets); Martin Spann & Bernd Skiera, *Internet-Based Virtual Stock Markets for Business Forecasting*, 49 MGMT. SCI. 1310 (2003) (explaining how information markets can predict future market conditions).

[62] *See, e.g.*, Paul W. Rhode & Koleman S. Strumpf, *Historical Presidential Betting Markets*, 18 J. ECON. PERSP. 127 (2004) (analyzing the accuracy of historical precursors to modern information markets); Justin Wolfers & Eric Zitzewitz, *Prediction Markets*, 18 J. ECON. PERSP. 107 (2004) [hereinafter Wolfers & Zitzewitz, *Prediction Markets*] (providing an overview of the theoretical and empirical economic literature on information markets).

[63] *See, e.g.*, Joyce Berg et al., Accuracy and Forecast Standard Error of Prediction Markets (2003) (unpublished manuscript, on file with author) (explaining how information markets can be used to estimate confidence intervals); Paul C. Tetlock, How Efficient Are Information Markets? Evidence from an Online Exchange (unpublished manuscript, on file with author) (Jan. 2004) (assessing the extent to which information markets replicate anomalies documented in sports betting markets); Justin Wolfers & Eric Zitzewitz, Using Markets to Inform Policy: The Case of the Iraq War (2005) (unpublished manuscript, on file with author) (illustrating the use of an information market to analyze equity prices in the S&P 500).

[64] *See, e.g.*, CASS R. SUNSTEIN, GROUP JUDGMENTS: DELIBERATIONS, STATISTICAL MEANS, AND INFORMATION MARKETS (John M. Olin Law & Econ. Working Paper No. 219, Oct. 2004) (arguing that information markets may help overcome flaws of deliberative processes); Michael Abramowicz, *Information Markets, Administrative Decisionmaking, and Predictive Cost-Benefit Analysis*, 71 U. CHI. L. REV. 933 (2004) (advocating use of information markets in administrative decisionmaking and cost-benefit analysis); Miriam A. Cherry & Robert L. Rogers, Tiresias and the Justices: Using Information Markets to Predict Supreme Court Decisions (2005) (unpublished manuscript, on file with author).

[65] *See, e.g.*, ROBERT HAHN, USING INFORMATION MARKETS TO IMPROVE POLICY (AEI-Brookings Joint Ctr. Working Paper No. 04-18) (Sept. 2004) (providing a variety of policy applications for information markets); Adam Meirowitz & Joshua A. Tucker, *Learning from Terrorism Markets*, 2 PERSP. ON POLITICS 331 (2004) (drawing lessons from a failed information markets initiative); Justin Wolfers, *Pricing Political Risks with Prediction Markets* (Stanford Inst. for Economic Pol'y Res. Pol'y Brief, June 2004), *available at* http://bpp.wharton.upenn.edu/jwolfers/Press/SIEPR%20policy%20brief.htm (last visited Mar. 16, 2005) (arguing that information markets can help assess the magnitude of political risks).

[66] *See* Robin Hanson, *Could Gambling Save Science? Encouraging an Honest Consensus*, 9 SOCIAL EPISTEMOLOGY 3 (1995) [hereinafter Hanson, *Could Gambling Save Science?*].

[67] A variety of terms have been used for the phrase "information market." *See* Robin Hanson, Foul Play in Information Markets 2 (2005) (unpublished manuscript, on file with author) [hereinafter Hanson, *Foul Play*] (noting that other phrases include "prediction markets," "virtual stock markets," and "artificial markets"). "Information market," however, appears at least tentatively to be emerging as the most popular phrase.

[68] Perhaps the most famous example of a scientific (perhaps more accurately, economic) bet concerned a debate about whether the prices of various metals would rise over a ten-year period, indicating the existence of commodity shortages. *See, e.g.*, Terry L. Anderson & Lea-Rachel Kosnik, *Sustainable Skepticism and Sustainable Development*, 53 CASE W. RES. L. REV. 439, 445-46 (2002) (detailing the bet between Paul Ehrlich and Julian Simon, who won by betting that prices would fall).

that an information market might be superior to traditionally structured peer review in rewarding scientific merit.

In Hanson's proposal, the market would work as follows. A scientific proposition about which there is some disagreement but that potentially someday might be proved true or false would be identified. Shares would then be distributed, which would be worth a set amount, say $1 each, should the proposition later turn out to be true, and $0 should the proposition later turn out to be false. Shares would then be exchanged, as in a conventional securities market, with a "bid-ask queue" joining together buyers and sellers.[69] The prices at which shares are exchanged could then be interpreted as market predictions of the probability that the proposition will turn out to be true. Some legal procedure eventually would be needed to resolve when a proposition in fact has been proven or disproven, though Hanson's proposal appears to envision relatively unambiguous claims. Although Hanson is not clear about exactly what the government should then do with the predictions generated, the implication is that the government (or nongovernmental organizations such as academic institutions) might use them to set scientific research priorities.

Hanson's proposal fits the predictive decisionmaking paradigm perfectly. Hanson opens his paper by arguing that peer review is "just another popularity contest," which provides "too few incentives to correct for cognitive and social biases, such as wishful thinking, overconfidence, anchoring, and preferring people with a background similar to your own."[70] Though one might argue about the flaws of peer review, it is dissatisfaction with a decisionmaking process that spurs predictive decisionmaking alternatives. Rather than rely on the normative decisions of scientists, Hanson would have us rely on the predictions of participants in these markets, many of whom would also presumably be scientists but who would have to put their money where there mouths are for their opinions to matter. Thus, as in the previous proposals, Hanson envisions substituting a mechanism for predicting a future legal decision (in this case, the eventual decision about whether a particular proposition has been proven true) for a normative decision that otherwise would be only implicitly predictive.

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[69] A bid-ask queue is simply a list of prices at which market participants have offered to buy or sell securities, respectively. When the best bid price is greater than or equal to the best ask price, a transaction occurs, and a spread between the bid and ask queues thus remains. *See, e.g.*, Elizabeth Hoffman & Matthew L. Spitzer, *Experimental Law and Economics: An Introduction*, 85 COLUM. L. REV. 991, 1000 (1985) (providing an accessible explanation).

[70] Hanson, *Foul Play*, *supra* note 66, at 4.

II. THE PROMISE AND PITFALLS OF PREDICTIVE DECISIONMAKING

This Part explains why predictive decisionmaking may have promise as a regulatory strategy, and identifies the potential pitfalls that might prevent predictive decisionmaking from realizing that promise. Some of the discussion will rely on the examples previously advanced, so some familiarity with the hypothetical predictive decisionmaking regimes discussed in the Introduction and Part I is assumed. In some cases, a promise and a pitfall are flip sides of the same coin. Predictive decisionmaking, for example, might provide a means of reducing undesired external influence on normative decisionmakers, but predictive decisions themselves may be subject to manipulation and bias by predictors. Parts II.A and II.B discuss the promise and pitfalls of predictive decisionmaking, respectively.

A. *Promise*

To consider the promise of predictive decisionmaking, let us for now assume away the pitfalls. Imagine that a predictive decisionmaking mechanism consistently and at low cost gives the best possible predictions given available information. Reliance on that mechanism in lieu of a traditional regulatory strategy might have several benefits.

1. *Regulatory Simplification*

Perhaps the most obvious benefit of predictive decisionmaking is that it can facilitate regulatory simplification. Enterprise liability would require fewer rules than a regime in which the government actively attempted to specify requirements for the manufacturing of cigarettes. Relying on insurance prices for bank regulation would save the government the trouble of crafting detailed regulations seeking to assess individual bank risk. Predictive decisionmaking is not inherently simpler; imposing strict liability on trial witnesses, for example, would likely increase the amount of regulation. But predictive decisionmaking can serve as a substitute for detailed rules. If the government wants to encourage an entity to behave in a way that will make some measurable outcome of that entity's actions more or less likely, then instead of controlling the entity's actions directly, the government can use a predictive mechanism that either will give the entity an incentive to take the effects of its actions into account or will produce an independent estimate of the probability of the relevant outcome.

With predictive decisionmaking, details fall to private parties, saving the government from having to consider them. This shift may focus the government and public debate on normative rather than on technical issues. Enterprise liability would still leave room for argument about the degree of responsibility that cigarette companies should bear, but it sidesteps the need to assess the danger of cigarettes. If cigarette manufacturers had anticipated enterprise liability, they would have had less of an incentive to hide research indicating such dangers.[71] Similarly, an information market assessing scientific propositions would still leave the government the decision of what to do with information market predictions. The information market, though, would segregate the predictive component of the decisionmaking task from the normative component. In the absence of such segregation, there is a risk that government officials may make normative decisions under the guise of predictive ones. Suppose that an official allocating scientific resources is concerned about the risks of nanotechnology. Systemic reliance on information market predictions about the technological viability might force the official to admit this concern rather than to engage in the possibly more attractive subterfuge of predicting that nanotechnology is unlikely to be technologically viable.

A happy consequence of regulatory simplification is a reduced danger that regulations will become obsolete. As long as a predictive mechanism occurs continuously, predictors will have incentives to update their predictions. If relevant changes in technology occur—a cure for some forms of cancer, perhaps, or development of safer chemicals for cigarettes—the cigarette manufacturers will have an incentive to respond to these changes without subsequent government intervention.[72] Similarly, insurance companies pricing bank risk would have an incentive to respond to relevant changes in the economic environment. Participants in an information market about scientific propositions could profit by trading on news affecting the validity of scientific propositions, so if suddenly cold fusion were conclusively proven impossible, a government relying on the information market without any analysis of its own could stop funding such research.

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[71] *See* Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1274 (noting that cigarette manufacturers would have an incentive to use information in their possession rather than conceal it).

[72] Although Hanson and Logue emphasize the reduced information demands on government of the enterprise liability approach, *see id.* at 1273-74, they do not note the dynamic benefits.

Regulatory simplification also makes it more difficult for private parties to exploit loopholes, situations in which the government's elaborate rules do not quite reflect the intuition underlying them. Let us imagine, for example, that one of the challenges of bank regulation is that banks develop clever accounting gimmicks that allow them to evade the spirit of the governments' rules.[73] The result is a familiar and inefficient game of spy-vs.-spy, in which the government refines rules and private parties seek weaknesses in the new regulatory regime. Because predictors regulate with predictions and prices rather than with justifications, there will be less of a danger that the time required to develop new regulations will provide a window for loophole-seekers. Sometimes, of course, private parties might fool predictors with tricky accounting, but at least when predictors are not fooled, they will not face the usual burdens associated with developing regulatory responses.

There are at least two significant caveats to the regulatory simplification story, however. First, some regulatory framework would be needed to supervise the relevant predictive mechanism. Development of satisfactory rules for imposing sanctions on trial witnesses, for example, may be cumbersome, and the regulatory burden of sponsoring an information market may not be a trivial task.[74] There may, however, be economies of scope. Once a prediction mechanism is used for one purpose, the same regulations might be deployed for another. If, for example, some governmental agency were charged with running government-sponsored information markets, that agency could coordinate information markets for all other agencies.

Second, to the extent that predictive decisionmaking relies on a future governmental decision, some regulatory apparatus may be needed to oversee that decision. Where that decision is the outcome of a litigation (or a settlement in the shadow of such litigation), the predictive decisionmaking apparatus is piggybacking on the judicial system. A silver lining is that a decision being predicted by predictive decisionmaking might be simpler than ex ante regulation. Enterprise liability, for example, requires measurement of damages, not normative assessments of fault.[75] Moreover, decisionmaking noise in the ultimate decision might be more tolerable in a

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[73] *Cf.* Avery Wiener Katz, *An Economic Analysis of the Guaranty Contract*, 66 U. CHI. L. REV. 47, 74 (1999) (noting that banks seek to exploit loopholes in federal banking regulation).

[74] Far less regulation, however, is likely to be needed than of a conventional securities market. For example, there is a strong argument that information markets should not be subject to insider trading rules, because the purpose of such markets is to encourage information production. *But cf.* Robert W. Hahn & Paul C. Tetlock, A New Approach for Regulating Information Markets 14-15 (2004) (unpublished manuscript, on file with author) (arguing that the usual insider trading rules should apply).

[75] *See* Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1283 ("[B]ecause enterprise liability would do away with the need

predictive decisionmaking regime.[76] The decision being predicted is needed ex post to discipline ex ante predictions, but by itself it has no direct regulatory consequence.[77] Perhaps we will care about fairness to predictors,[78] but there is little efficiency reason to add procedural or other protections that will regularize the eventual decision.

2. *Decisionmaking Consistency*

Predictive decisionmaking is not the only way to achieve regulatory simplification. The government could, for example, replace any detailed set of rules with a standard. The standard could then be elaborated through common law adjudication. The common law, after all, is also sometimes applauded for its ability to adjust to changed circumstances.[79] The limitations of this approach are the familiar problems of standards: unpredictability and inconsistency. While courts could be charged with determining whether a bank's portfolio is sufficiently "unsafe" that sanctions should be imposed, the vagueness of such a requirement means that banks will face litigation risk, and the outcome of a litigation might depend on the particular normative views of the randomly selected judge. Predictive decisionmaking encourages predictors to take into account unique aspects of particular issues in much the same way as common law judges do, but without the formal apparatus of written opinions and without subjecting individual regulated entities to the randomness inherent in a system of multiple decisionmakers working largely independently. Thus, while regulatory simplification proved a potential benefit of predictive decisionmaking relative to rule-based decisionmaking, consistency is a potential benefit of predictive decisionmaking relative to open-ended application of standards.

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for an expensive trial on the issue of fault, it might actually be cheaper to administer than, for example, a fault-based tort regime.").

[76] *See* Abramowicz, *supra* note 64, at 1003 ("Because the information market predicts what an average analyst would find, it is not quite so important here as in traditional regulatory contexts to ensure that the actual retrospective decision be highly accurate.").

[77] This assumes that the decision does not set a precedent. The irony is that to encourage common law-like decisionmaking by private predictors, it may be best to ensure that ex post decisions are made without precedential effect. Otherwise, the next set of predictors would be predicting under the shadow of the rules created by past decisions, rather than anticipating what future decisionmakers on average will decide.

[78] Hanson et al.'s proposal for smokers' compensation is responsive to this fairness concern. *See* Jon D. Hanson, Kyle D. Logue & Michael Zamore, *Smokers' Compensation: Toward a Blueprint for Federal Regulation of Cigarette Manufacturers*, 22 S. ILL. U. L.J. 519 (1998) [hereinafter Hanson et al., *Smokers' Compensation*] (describing a system that would systematize damages awards). But if the only goal were to ensure optimal deterrence, then consistency in individual ex post damages awards would not be a concern.

[79] *See, e.g.*, Russick v. Hicks, 85 F. Supp. 281, 285 (W.D. Mich. 1949) ("The genius of the common law is its flexibility and capacity for growth and adaptation.").

A predictive decisionmaking institution could be relatively consistent. Consistency follows from the assumptions of accuracy and unbiasedness, which we will reconsider below.[80] Implicit in Elhauge's case is his view that judicial prediction of legislative action is a more disciplined task than judicial exercise of normative discretion.[81] In general, accurate prediction mechanisms avoid the subjectivity associated with normative decisionmaking. If an insurance market is relatively efficient, for example, then prices of insurance will reflect relative risk, not potentially arbitrary discriminations by individual regulators who may have different views of appropriate bank conduct. Similarly, if information markets are relatively accurate, then we should not expect the identities of the information market traders to have much bearing on the information market outcome.[82]

Even if there is substantial randomness in the eventual decision that disciplines a predictive decisionmaking mechanism, the mechanism itself might produce relatively consistent results. Suppose, for example, that in a system of enterprise liability for cigarette manufacturers, damages assessments are expected to be accurate on average, but highly variable. Such inconsistency once again may be of concern from a fairness perspective, but it would not mean that the predictive decisionmaking mechanism itself is inconsistent. The question is whether there is randomness in a cigarette manufacturer's estimate of its *expected* future liability, not whether the actual liability turns out to be inconsistent with expectations. Similarly, insurance companies issuing partial deposit insurance policies to banks may end up disappointed if there is a wave of bank failures, but that would not imply that insurance company assessments were inconsistent ex ante. Indeed, the prices may well have reflected risk based on information available at the time. Predictive decisionmaking needs sound predictions, but sound predictions do not always turn out to be correct.

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[80] *See infra* Parts II.B.2-3.

[81] *See, e.g.*, Elhauge, *Preference-Estimating*, *supra* note 20, at 2107 (acknowledging that "an unstable legal regime would fail to induce the behavioral reliance that is necessary to make interpretations effective enough to advance any political preferences"). *But see* Amanda L. Tyler, *Continuity, Coherence, and the Canons*, 99 Nw. U. L. REV. (forthcoming 2005) (arguing that Elhauge's proposal pays insufficient attention to legal stability).

[82] Abramowicz, *supra* note 64, at 977-79 (assessing some experimental data indicating that ideology of information market traders does not affect results).

3. Aggregation of Diverse Preferences

The possibility of ex ante consistency despite ex post randomness means that predictive decisionmaking may provide a means of aggregating the preferences of a diverse group of decisionmakers. Suppose that a group of decisionmakers is likely to make good decisions on average but bad decisions in many individual cases, because some of the decisionmakers might deviate greatly from a moderate position in either direction. There may be contexts in which occasional deviation from moderation is useful,[83] but at least sometimes decisionmaking institutions seek to prevent idiosyncratic decisionmaking. One way of doing so is to ensure that a large number of decisionmakers address any particular question,[84] for example with a large commission or an en banc judicial panel. That can, however, be impractical in many circumstances, in part because of the large cost of hiring and convening multiple decisionmakers. Predictive decisionmaking provides an alternative, allowing for preference aggregation without summoning all of the individuals whose expected preferences are being aggregated.

Consider, for example, Robin Hanson's proposal for an information market to assess scientific propositions. Suppose that for some scientific propositions, many scientists would conclude that the propositions have a middling probability of being true, while a few scientists would anticipate a low probability and a few scientists would predict a high probability. There is always the possibility that those with views on the extremes are correct, but if researching funding is to be allocated based on these probability assessments, it probably makes sense for funding to reflect majority sentiment.

A nonpredictive institution allocating science funding cannot thus depend on a single peer reviewer, but must have enough reviewers (or reviewers of reviewers) to prevent idiosyncratic views from distorting research priorities. This may be expensive and cumbersome. A predictive decisionmaking approach, however, might use a prediction mechanism to anticipate a decision by a decisionmaker to be chosen later. That decisionmaker might evaluate whether a

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[83] *See, e.g.*, Heather K. Gerken, *Second-Order Diversity*, 118 HARV. L. REV. 1099 (2005) (arguing that there may be benefits to governance structures that may place the national majority sometimes in the minority). *But see* Michael Abramowicz, *En Banc Revisited*, 100 COLUM. L. REV. 1600, 1630-36 (2000) (arguing that courts should seek to avoid ideological variance in decisionmaking).

[84] The logic of the Condorcet Jury Theorem implies that as the number of decisionmakers rises, so too does the chance of a correct decision, if each independent decisionmaker has at least a 0.5 probability of arriving at the correct decision. *See, e.g.*, NICHOLAS R. MILLER, INFORMATION, ELECTORATES, AND DEMOCRACY: SOME EXTENSIONS AND INTERPRETATIONS OF THE CONDORCET JURY THEOREM, *in* INFORMATION POOLING AND GROUP DECISION MAKING 173, 175-77 (Bernard Grofman & Guillermo Owen eds., 1986) (discussing the Theorem).

particular scientific proposition is true, as Hanson suggests, or simply whether the initial project should have received funding. The provision of financial incentives can provide predictors an incentive not to convey their own opinions, but to report the average opinions of those who might be selected to make the legal decision that will discipline the predictive mechanism.

Predictive decisionmaking thus can serve as an alternative to institutions that aggregate preferences through voting. Many institutions, including legislatures, administrative agencies, courts, and corporate boards, rely on two forms of voting to aggregate preferences: first, voting to determine who will be the decisionmakers for the relevant institution, and second, voting among the decisionmakers. Both types of voting seek to ensure that the ultimate decisions represent the constituency on whose behalf the decisionmakers are acting. An alternative to a voting regime is to use a predictive decisionmaking mechanism to anticipate some later assessment by an individual randomly selected from that constituency or, at some point in the future, from a group selected through a voting regime to represent that constituency.

The predictive approach may be useful for two reasons. First, there may be cases in which the outcome of a vote is relatively clear, and the predictive mechanism may provide a cheaper means of generating that outcome. For example, a predictive mechanism might anticipate that there is a very high probability that a randomly selected later decisionmaker would conclude that a particular scientific funding proposal was without merit. This might be cheaper than gathering several decisionmakers together for a hearing and taking a majority vote, or even having a single decisionmaker make a decision that the proposal has no merit. To prevent arbitrary decisions, society often imposes procedural requirements on decisionmakers, such as the provision of written explanations, but these may be expensive. If predictive mechanisms are accurate, they may substitute for such procedural protections.

Second, representative institutions will rarely perfectly match the preferences of broader constituencies. Even if five or even one hundred scientists vote on each research proposal, at any given time the decisionmakers may have different views on average from the broader group of scientists from whom the board members are selected. A predictive mechanism that anticipates a retrospective decision that will be made by some future board whose composition is not yet known will assume an average board composition rather than one tilted in one direction or another. Particularly where it is important to avoid outlier decisions and where gathering together

large numbers of decisionmakers is expensive, predictive decisionmaking may be a useful means of aggregating anticipated preferences.

Institutions that rely on voting perform functions that predictive decisionmaking approaches may have difficulty replicating, however. For example, predictive decisionmaking may not be useful when a primary function of a voting regime is to reveal preferences, unless predictors can identify some other means of ascertaining the preferences of the potential decisionmakers. Similarly, institutions relying on voting also typically rely on some form of deliberation, and at least as generally constructed, information markets and other predictive mechanisms do not foster deliberation.[85] If discussion of scientific proposals or other issues is critical for producing normatively sound decisions, then a predictive decisionmaking institution may need to be used as a complement rather than as a substitute for existing institutions.

4. *Insulation from External Influence*

Legislatures and other public institutions are designed to reflect the preferences of the population at large, but interest groups sometimes may have a disproportionate influence on decisionmaking.[86] Theorists of regulation, for example, worry about the possibility that interest groups may "capture" administrative agencies, leading to regulation to support private interests rather than public interest.[87] The most extreme form of external influence, relatively rare in the United States but endemic in some other countries,[88] is bribery. Some might argue that interest groups or even bribery can promote efficiency by creating a market in regulatory outcomes, but in many contexts we may wish to liberate decisionmakers from external influence. The Article III judiciary, for example, is an institutional design that is relatively effective in freeing judges to do what they think is right.[89]

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[85] *See* Michael Abramowicz, Deliberative Information Markets for Small Groups, *in* INFORMATION MARKETS: A NEW WAY OF MAKING DECISIONS IN THE PUBLIC AND PRIVATE SECTORS (Robert Hahn & Paul Tetlock eds., forthcoming 2005) (explaining that information markets do not foster deliberation, and suggesting some alternatives to the structure of information markets that might produce more information sharing as a weak substitute to deliberation). The issue of democratic deliberation is revisited *infra* Part II.B.5.

[86] *See* George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 137 (1971) (providing the seminal observation of this point).

[87] *See generally* Thomas W. Merrill, *Capture Theory and the Courts: 1967-1983*, 72 CHI.-KENT L. REV. 1039, 1050-52 (1997) (providing a historical overview of capture theory).

[88] For an overview with special attention to the problems of developing countries, see SUSAN ROSE-ACKERMAN, CORRUPTION AND GOVERNMENT: CAUSES, CONSEQUENCES, AND REFORM (1999).

[89] The key design aspect, of course, is judicial independence. *See, e.g.*, Alexander Tabarrok & Eric Helland, *Court Politics: The Political Economy of Tort Awards*, 42 J.L. & ECON. 157 (1999) (finding that jury verdicts against out-of-state businesses are

Predictive decisionmaking institutions also may help insulate decisions from outside influence, at least assuming that the predictive mechanisms themselves are not subject to manipulation.[90] If, for example, Congress wanted to encourage safer cigarettes but worried that a governmental agency might not be its faithful agent,[91] it might enact an enterprise liability regime. Congress would still, however, need to worry about the possibility that external influence might affect ex post liability assessments, and that the predictive mechanisms would anticipate such influence. It is plausible, however, that damages assessments might be easier to insulate from industry influence, for example through detailed rules,[92] or by delegating decisions to courts that also have many other responsibilities, such as the federal courts, and therefore would be harder to influence on any one issue by lobbying during the appointments process. There may be some cost to assigning decisions to less specialized bodies,[93] but high variance ex post decisions may not be troublesome for predictive decisionmaking institutions, since it is only the ex ante anticipation of those decisions that has direct legal consequence.[94]

Insulation from external influence will tend to be easier to accomplish, the less subjective the eventual legal decision (or other variable) being predicted. For example, Hanson's information market assessing scientific predictions is designed in part to escape what Hanson sees as orthodoxy about scientific consensus.[95] Hanson's market thus will work most effectively if the eventual evaluation of whether a proposition has been proven true will be made at such a time or in such a way that present scientific prejudices are not likely to have much influence. The partial insurance scheme for banks, meanwhile, seems likely to be successful in insulating individual bank evaluations from outside influence, because the legal criteria determining when an insolvency has occurred and thus deposit insurance is warranted are relatively objective.

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significantly greater than those against in-state businesses and that this association is stronger in states where judges are elected versus those where they are not).

[90] *See infra* Part II.B.3.

[91] A substantial empirical literature indicates that congressional oversight has some effect on administrative actions. *See, e.g.*, Elhauge, *Preference-Estimating*, *supra* note 20, at 2128-30.

[92] This is the approach that Hanson et al. recommend, using worker compensation schemes as a model, but they note that allowing smokers the choice of a traditional forum would reduce concerns of industry capture. *See* Hanson et al., *Smokers' Compensation*, *supra* note 78, at 586-87.

[93] *But see* Richard A. Posner, *Will the Federal Courts of Appeals Survive Until 1984? An Essay on Delegation and Specialization of the Judicial Function*, 56 S. CAL. L. REV. 761, 783-90 (1983) (noting concerns about specialized courts).

[94] *See supra* text following note 82.

[95] *See supra* note 70 and accompanying text.

Insulation from external influence will also tend to be easier when the parties that might seek to influence a normative decision in a nonpredictive institution or a prediction in a predictive decisionmaking institution will have less incentive to influence the eventual ex post decision. For example, potential recipients of scientific research funds might have an incentive to try to influence traditional entities providing grants by convincing them of the truth or falsity of certain scientific propositions. But with Hanson's predictive decisionmaking market, the eventual legal decision acknowledging the truth or falsity of a particular proposition matters only because it disciplines the predictors in the information market. By the time the proposition has been resolved, it will already have been determined, in part through the information market, whether particular researchers will have received funds, and so the researchers will have no ex post incentive to manipulate the market. Thus, even where ex post decisionmaking processes are as vulnerable to outside influence, predictive decisionmaking will immunize the process from that outside influence, unless parties can somehow credibly commit to exerting influence ex post.

B. Pitfalls

The Part identifies several possible pitfalls with predictive decisionmaking: miscalibration, inaccuracy, bias, cost, and displacement of democratic deliberation. This list is not intended to be comprehensive, and individual predictive decisionmaking proposals will present concerns that do not fit squarely under any of these headings. Of course, even a predictive decisionmaking proposal with problems in each of these areas might be normatively preferable to a nonpredictive alternative, if the problems with that alternative are sufficiently great.

1. Miscalibration

The miscalibration concern is that what is being predicted may not reflect what normatively matters for a particular decisionmaking institution. Should hypothetical decisions of the current legislature, assuming they can be reliably ascertained, resolve statutory ambiguities left by a previous legislature? Do expected future damages in a cigarette strict liability regime provide the appropriate measure for full cost internalization? Concerns about miscalibration will generally be specific to the particular proposal, rather than trans-substantive. Nonetheless, the miscalibration concern presents a general danger: While pure normative decisionmaking

generally may encompass the full range of relevant concerns, predictive decisionmaking will tend to aim only at proxies for these concerns.

Differently stated, predictive decisionmaking may place arguably legitimate considerations outside the decisionmaking calculus. For example, Elhauge's approach would make it irrelevant that legislative preferences will tend to reflect the input of concentrated interest groups more than those of diffuse interest groups.[96] Someone who believes that the judiciary should strive to mitigate the effects of powerful interest groups thus can accept Elhauge's proposal, if at all, only on second-best grounds.[97] Similarly, the Hanson and Logue proposal will not count any benefits to society from smokers dying early, such as reduced Social Security expenditures.[98] The predictions generated by the partial insurance requirement suggested by Scott and Mayer will take into account all potential causes of bank failure, including poor macroeconomic policy, the costs of which Scott and Mayer themselves conclude should not be borne by banks.[99]

2. *Inaccuracy*

Even if the object of prediction ensures that a predictive decisionmaking regime is not inherently miscalibrated, a predictive decisionmaking regime may be hobbled by a predictive mechanism that produces too much noise. Perfect accuracy cannot be expected—no predictive decisionmaking regime could anticipate the future with certainty—but predictive decisionmaking regimes must produce predictions that come close to reflecting expected values. Whether they can may depend on the predictive mechanism and the relevant context. Will judges be able to predict what the current legislature would most likely decide? Will agency costs prevent corporations from adequating factoring anticipated future costs into their own decisionmaking? Will sanctions derived from rational actor models lead to optimal behavior by witnesses in the real world? Will insurance companies be able to tailor their prices sufficiently to account for the

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[96] *See* Elhauge, *Preference-Estimating*, *supra* note 20, at 2083-84.

[97] Elhauge himself attacks this view. *See* Einer Elhauge, *Does Interest Group Theory Justify More Intrusive Judicial Review*, 101 YALE L.J. 31 (1991).

[98] Hanson and Logue argue that cost savings from premature death should not count to mitigate the social costs of premature death, while others have taken a contrary position. *See, e.g.*, Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1247-54 (critiquing the literature). It would not be trivial to change the enterprise liability mechanism to take into account such cost savings if they were deemed relevant.

[99] Scott & Mayer, *supra* note 50, at 864-66.

differential risk of different policyholders? Will information markets be sufficiently efficient that their prices can be relied on for legal purposes?

These are large questions, too large for comprehensive treatment here, and for most of these questions, answers likely will not come soon. Consider, for example, whether corporations in an enterprise liability regime will sufficiently respond to their anticipated long-term liabilities. Some commentators have argued that capital markets are inefficient in the sense that they focus excessively on short-term and insufficiently on long-term outcomes.[100] This would imply that corporate managers will systematically respond too little to prevent liabilities that may be imposed far in the future. When a legal regime offers relatively clear rules barring corporate malfeasance, the deficiencies of enterprise liability sometimes may be overcome by imposing direct liability on managers,[101] or on third-party gatekeepers.[102] But managers are relatively undiversified bearers of risk, and so this strategy will not be efficient for predictive decisionmaking proposals involving substantial uncertainty about expected costs.[103]

Realistically, corporate theorists will not conclusively resolve uncertainty about the degree to which corporations respond to long-term costs anytime soon, and so any enterprise liability predictive decisionmaking proposal will reflect an appreciation that enterprise liability will affect corporate behavior but some uncertainty over how close it will come to producing optimal incentives. The same will hold for most other predictive mechanisms. We know, for example, that insurance companies risk-classify to some extent, but it is not easy to anticipate the extent of risk classification that insurance companies would provide for a hypothetical mandatory insurance that does not exist.[104] Similarly, we cannot know how powerful accuracy incentives will be without experiment, but laboratory experiments may be unreliable, and it will usually not be feasible to create real world natural experiments of specific proposals. Normative

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[100] *See, e.g.*, Aleta G. Estreicher, *Beyond Agency Costs: Managing the Corporation for the Long Term*, 45 RUTGERS L. REV. 513, 533-49 (1997); Lawrence E Mitchell, *A Critical Look at Corporate Governance*, 45 VAND. L. REV. 1263, 1283-300 (1992) (arguing that they do).

[101] *See, e.g.*, Reiner H. Kraakman, *Corporate Liability Strategies and the Costs of Legal Controls*, 93 YALE L.J. 857, 867 (1984) ("[E]nterprise liability is the normal form of corporate liability in the prescriptive as well as the descriptive sense, and … managerial liability should be viewed as an ancillary form—as a kind of backstop for occasions when enterprise liability is likely to fail.").

[102] *Id.* at 890 (listing "outside directors, lawyers, accountants and investment bankers" as possible gatekeepers).

[103] *Id.* at 865 (noting that indemnification agreements generally arise because managers have low tolerance for risk).

[104] *See* ABRAHAM, *supra* note 49, at 76-83 (discussing risk classification in insurance and why it may be limited).

evaluations of predictive decisionmaking proposals thus will necessarily depend on our intuitions about the anticipated accuracy of predictive decisionmaking mechanisms.

Predictive decisionmaking thus encounters a Catch-22: We need actual experience with predictive decisionmaking institutions before we can have sufficient confidence in them to create predictive decisionmaking institutions. Perhaps the predictive mechanism that stands the best chance of escaping this dilemma is the information market. Because the predictions produced by information markets need not have any legal consequence, purely experimental information markets can be created, and their accuracy can be assessed. Indeed, there already exists a literature suggesting that information markets are relatively accurate, and that literature should provide more concrete assessments of accuracy over time.[105] This, however, may introduce another paradox. Because information markets present the predictive decisionmaking concept most starkly, we may be hesitant to adopt information market proposals until other forms of predictive decisionmaking have proven worthwhile. Concerns about accuracy alone should thus make us hesitant to anticipate the near-term public policy embrace of predictive decisionmaking.

3. Bias

The above analysis of inaccuracy encompassed both concerns that a predictive decisionmaking mechanism might be subject to random noise, and that it might be systematically inaccurate, for example if corporations excessively discount future costs. The analysis, however, did not consider the possibility that the source of inaccuracy might be the desire of one or more individuals to affect public policy. Judges might make wrong predictions of what the current legislature would do because they prefer the consequences of the wrong prediction. A corporate manager might underpredict future liability costs because the manager believes that lower prices will help his short-term job security. Expert witnesses might lie about how many others would agree with them because they want a particular party to win the litigation. An insurance company official might arrange to give a break to a friend. A participant in an information market used for science funding might manipulate that market because of normative preferences for particular scientific projects.

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[105] *See generally* Wolfers & Zitzewitz, *Prediction Markets*, *supra* note 62 (providing an overview of prediction market accuracy).

In each of these cases, an individual is willing to take a loss, reputational or monetary, under the incentive endogenously provided by the prediction market because the individual cares about some extrinsic consequences of the prediction. Such willingness is relevant in part because its existence suggests that we cannot assess the degree of accuracy of a predictive mechanism by blithely assuming that all predictors may be acting in good faith. The greater the bias of predictors, the less accurate the prediction mechanism. Bias also may be relevant, however, if the reason for inaccuracy normatively matters in assessing a predictive decisionmaking institution. Perhaps inaccuracy in predictive decisionmaking is less tolerable when the inaccuracy stems from conscious decisions by decisionmakers than when it reflects inadvertent misprediction.

Inaccuracy from bias sometimes may be less tolerable than inaccuracy from incomplete competence for reasons related to equality. If connections with VIPs helped bad drivers obtain licenses in a predictive licensing institution, that would provide not merely an efficiency, but also a fairness, objection to that institution. Similarly, if certain groups were able successfully to manipulate information markets, that would be a concern not merely because erroneous predictions might produce bad policy, but also because those groups might receive ill-gotten gains. Equality, of course, may not be the only reason to be concerned about bias. For example, we might be concerned about the potential for biased judicial predictions about legislative actions because we value judicial candor and would prefer decisions that admit normative preference from those that seek to conceal it.

The susceptibility of the predictive decisionmaking mechanisms to bias is, like the concern about accuracy, an empirical question largely beyond the scope of both this paper and of current knowledge. An economic literature assesses whether banks discriminate on the basis of race in lending,[106] and reliance on insurance companies or third parties to make predictions affecting individual rights might produce similar questions. Again, however, questions about the manipulability of information markets may be the easiest to resolve, because controlled experiments with no legal consequences are possible. Preliminary analysis suggests that attempts to manipulate information markets are unlikely to have sustained effects on prices,[107] and

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[106] *See, e.g.*, ALICIA MUNNELL ET AL., MORTGAGE LENDING IN BOSTON 43-44 (Fed. Reserve Bank of Boston Working Paper No. 92-7, 1992).

[107] *See* Abramowicz, *supra* note 64, at 972-76 (assessing the dangers of manipulation).

counterintuitively that such attempts may improve accuracy by increasing market liquidity.[108] But further experiments are needed to confirm the robustness of the results.

4. Cost

Prediction requires resources and thus always entails some cost. Time that judges devote to prediction, for example, will come at the expense of time that could be spent engaging in other forms of normative decisionmaking. Corporations subject to enterprise liability and stock analysts will devote some effort to anticipating future damages, and the cost of this calculation may be borne in part by shareholders and in part by consumers. Witnesses subject to sanctions for inaccuracy may devote additional effort to ascertaining the truth, and they may thus demand greater compensation for testifying than they otherwise would. Insurance companies will pass along the cost of their actuaries in insurance prices. And for information markets to be effective, they will likely need to be subsidized, presumably for most legal applications by the government. Some of these costs may be modest, but the size of the costs depends on the design of the predictive decisionmaking regime.

In addition to direct financial outlays, predictive decisionmaking mechanisms may impose a cost in the form of risk. Cigarette manufacturers, for example, cannot be sure of the size of the financial outlays that someday will be required, and this will make their stock more expensive. Parties subject to accuracy incentives, insurance companies, and information market participants will also face risk and effectively demand compensation for it. Insurance prices will rise, for example, to the extent that an insurance company cannot diversify away the costs of risk.[109] Information market participants will participate only if they anticipate that their expected gains from participation, for example from the portion of a government subsidy that they expect to capture, will be enough to compensate them for both the time and risk that they are undertaking. The greater the risk that a predictive decisionmaking mechanism imposes, moreover, the more analysis that participants will want to undertake before accepting the risk.

The institutional designer will thus often face a tradeoff between accuracy and cost, as devoting more resources to prediction will increase both. The ability of the designer of some

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[108] *See* Robin Hanson et al., *Information Aggregation and Manipulation in an Experimental Market*, J. ECON. BEHAV. & ORG. (forthcoming 2005) (manuscript at 67) (showing that manipulation attempts increased market liquidity and thus market accuracy).

[109] *See* ABRAHAM, *supra* note 49, at 2 (discussing the benefits of risk pooling).

predictive decisionmaking institutions to choose a particular tradeoff is a significant virtue of those institutions relative to nonpredictive alternatives. With nonpredictive alternatives, it may also be possible to make institutions more or less effective with greater or fewer resources, but the means of doing so are relatively clumsy. The government, for example, might develop more or less detailed bank examination guidelines, or more or less cumbersome scientific review procedures, but these are complex transformations. With a partial insurance requirement or information market, by contrast, the government need only change the degree of insurance required or the degree of market subsidization. Moreover, this may sometimes permit the government to obtain certain predictions at very low cost. Nonpredictive institutions may entail a degree of formality, for example in the form of a right to a hearing or a written explanation of a decision, that will impose at least some minimum fixed cost for making each decision. Formal procedural requirements may be critical to constraining the discretion of normative decisionmakers, but financial incentives may provide a substitute form of constraint that can be scaled down more easily.

5. *Displacement of Democratic Deliberation*

Much distrust of predictive decisionmaking reflects skepticism about the predictive mechanisms, but many would condemn predictive decisionmaking even if the predictive mechanisms were perfectly calibrated, accurate, and unbiased, and even if the predictions cost nothing. There might be any number of reasons for such condemnation, but some may reflect what is lost in predictive decisionmaking, democratic deliberation. We may value deliberation intrinsically or because we believe that deliberation will wind up improving decisions other than those immediately being considered. Judicial decisionmaking in the course of filling statutory gaps might stimulate public discourse more than mere judicial prediction. With command-and-control regulation of cigarettes comes a continuing conversation about tobacco and society, and enterprise liability would end or at least postpone this conversation. The participation of trial witnesses may itself reflect a kind of democratic engagement whose character provision of financial incentives would inevitably change. And government allocation of science funds provides an opportunity for assessing the role of science in society.

Such claims are difficult to evaluate, because the intrinsic value of deliberation is subjective, and because any educative benefits of deliberation are virtually impossible to

measure. At least three caveats to these claims are in order. First, there are surely some contexts in which democratic deliberation seems to be of value only to the extent that it improves the decision that the deliberation targets. Evaluation of individual bank solvency may be vital in setting deposit insurance, but any argument that regulators' discussions in assessing individual banks will meaningfully improve public discourse in other areas would be strained. Second, deliberative institutions suffer from their own pathologies. Cass Sunstein, for example, has chronicled these and argued that information markets sometimes may help counter them.[110] Third, predictive decisionmaking itself may stimulate deliberation, discourse and analysis. For example, the creation of an insurance-based driving regime might stimulate research into the most effective approaches to road testing, and an information market assessing scientific propositions might promote rethinking of the conventional wisdom.

A counterargument to this last point might be that democratic deliberation may be particularly useful in its uncommodified form. Margaret Radin, for example, has argued that sometimes market transactions may make it impossible for certain goods, perhaps including "love, friendship, and sexuality," in noncommodified form, because the commodification may contaminate all transactions.[111] Once private institutions offer analyses of particular issues for private gain, public-spirited individuals might no longer be interested in offering their input. When a municipality privatizes its garbage collection system, citizens might complain, but they may be less likely to offer thoughtful suggestions on how to improve the system, and so too might predictive decisionmaking make public-spirited citizens less likely to contribute. On the other hand, one might argue that normative decisionmaking processes generally are often already so infiltrated by financial concerns that privatizing the decisionmaking process itself may cause little disillusionment.[112]

Even so, democratic deliberation and normative decisionmaking allow for political accountability and responsiveness. When the government regulates cigarettes, for example, the public can respond if it finds the regulations too intrusive or too tolerant of smoking, for example by voting for those who favor an alternative approach. Yet if we rely on the cigarette companies

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[110] SUNSTEIN, *supra* note 64.

[111] *See* Margaret Jane Radin, *Market-Inalienability*, 100 HARV. L. REV. 1849, 1913 (1987). Radin labels this a "domino theory" of commodification.

[112] For a related argument that the legal system is already so thoroughly commodified that sale of legal claims seems unlikely to make things much worse, see Michael Abramowicz, *On the Alienability of Legal Claims*, 114 YALE L.J. 697, 710 (2005).

to anticipate the future costs of cigarettes in setting product features and prices, we will have no politicians to blame if we do not like the results. The only recourse would be to change the predictive decisionmaking regime itself. Once a form of normative decisionmaking is eliminated, the public can expect their normative views to matter only if the normative decisionmaking regime is restored. The same argument, of course, can be used against any governmental program that relies on incentives rather than on control. If we decide to control pollution by taxing it or through an emissions trading program, for example, the government no longer has the opportunity to decide precisely what pollution will be permitted. If accountability is necessary to generate a sense of participation in political community, however, then predictive decisionmaking might inappropriately truncate public space.

III. AN ANALYTICAL FRAMEWORK FOR PREDICTIVE DECISIONMAKING

The above analysis of the promise and especially the pitfalls of predictive decisionmaking suggests that assessments of individual proposals may be placed in three broad groupings. First, one must assess whether what is being predicted will provide a sound basis for decision. Second, one must consider whether the predictive mechanism will be sufficiently accurate and unbiased. And third, one must consider whether the mechanism of translating predictions into policy is legitimate or normatively desirable in a particular context. Part III.A uses this framework to evaluate past proposals. Part III.B proposes a new application of predictive decisionmaking to safety regulation, and it applies the framework to compare different approaches to implementing this new application.

A. *Evaluation of Past Proposals*

This Part will apply this analytical structure to provide assessments of the specific predictive decisionmaking proposals that other scholars have offered, addressing each of the three issues with respect to each of the five papers introduced in Part I. The purpose is not to reach conclusions about the merits of the proposals, a task that would require more detailed analysis and consideration of the benefits and costs of nonpredictive alternatives. Rather, the purpose is to develop general points about predictive decisionmaking and about particular predictive decisionmaking mechanisms. The discussion will also illustrate how this analytical

framework highlights central issues concerning the suitability of particular proposals, some of which the authors of those proposals failed to identify.

1. The Object of Prediction

Elhauge. Each of the three issues is best examined by assuming away the other problems. Thus, in considering Elhauge's proposal, we will first assume that judges will always predict perfectly and that predictions can provide a normatively appealing basis for decisionmaking, depending on what is being predicted. The affirmative argument is clear,[113] but potential objections arise: Perhaps judges should not be seen as mere handmaidens to legislators, but as active partners in the lawmaking process, uniquely situated to ensure that the law reflects principle and not just expedience.[114] Relatedly, one might insist that while legislators' enactments may be entitled to a presumption of democratic legitimacy,[115] we should not be so enamored of legislators that we elevate even their hypothetical decisions to the status of law. And if courts are to be in the business of making hypothetical predictions, perhaps they should predict what the people as a whole would decide, if the people were able to resolve an issue without intermediaries.[116] These arguments illustrate that predictive decisionmaking proposals will sometimes demand analysis that a predictive decisionmaking theory cannot itself provide.

J. Hanson & Logue. At the center of Hanson and Logue's argument lies an implicit contention that enterprise liability reflects the appropriate object of prediction. The object is just what regulators should care about, the health and other costs that cigarette smoking imposes on smokers. The goal, however, is not to eliminate these costs altogether by eliminating cigarettes, but to ensure that manufacturers fully take the costs into account, balancing them against the

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[113] *See supra* text preceding note 28.

[114] Elhauge confronts an argument along this line, by offering a brief rebuttal to Ronald Dworkin's theory of judging. *See* Elhauge, *Preference-Estimating*, *supra* note 20, at 2044-47.

[115] JEREMY WALDRON, THE DIGNITY OF LEGISLATION 92-123 (1999) (offering an Aristotelian defense of the legitimacy of legislation).

[116] Elhauge anticipates an argument along this last line, but he responds to it largely by comparing prediction mechanisms rather than the object of predictions, pointing out that because construction of an ideal decisionmaking body itself would necessarily involve decisions of value, judges' predictions about the decisions of such a body are likely to reflect their own values. *See* Elhauge, *Preference-Estimating*, *supra* note 20, at 2082 (considering various other arguments that also maintain that statutory interpretation should respond to political developments but do not insist on prediction, and arguing that "these scholars would make statutory interpretation turn on a judicial view about which public opinions or majority preferences would be enactable but for certain political realities that these scholars deem normatively undesirable"). Elhauge's argument would have been more complete if he had explicitly argued that although a hypothetical decisionmaking body in theory might serve as a superior object of prediction to a legislature, the sacrifice is worthwhile because judges' predictions of actual legislative preferences would be more consistent.

benefits. Thus, for example, manufacturers would have incentives to improve the safety of cigarettes,[117] but only to the extent that the benefits of such safety improvements exceeded the costs, including both direct design and manufacturing costs, as well as decreased satisfaction by consumers. Hanson and Logue thus take seriously the arguments of economists who insist that regulation credit the pleasures of smoking for those who enjoy the habit.[118]

Concerns about the object of prediction, however, can also be used to levy criticisms against the proposal. Cigarette companies presumably would care only about the expected cost of smoking borne by those who might in fact bring suit. Some smokers and smokers' survivors might not claim compensation to which they were due,[119] and victims of second-hand smoke might be too diffuse to organize themselves effectively and bring claims.[120] Both of these considerations suggest that the object of prediction may understate what ideally we would like the cigarette manufacturers to predict, the total costs of smoking.[121] On the other hand, cigarette companies will be predicting not smoking costs, but courts' ex post assessments of smoking costs. If courts systematically inflate damage assessments or attribute some health effects independent of smoking to cigarettes,[122] then cigarette manufacturers will be overdeterred. Hanson and Logue argue that concerns about "exorbitant damages … are often vastly exaggerated,"[123] but in the absence of empirical evidence, this provides at least a potential basis for argument and dispute.

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[117] *Id.* at 1296-98.

[118] *See, e.g.*, ROBERT D. TOLLISON & RICHARD E. WAGNER, THE ECONOMICS OF SMOKING (1992); W. KIP VISCUSI, SMOKING: MAKING THE RISKY DECISION (1992).

[119] Hanson and Logue argue that a benefit of enterprise liability over state-initiated ex post incentive-based regulation is that victims are more likely to come forward in the enterprise liability regime that they describe. *See* Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1279. It may well be, however, that a government estimate of smoking damages might be more accurate than the estimate of smoking damages considering only those smokers who file claims. A possible solution to this problem of underdeterrence would be imposition of punitive damages based on the probability that some victims will not bring suits. *See generally* A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARV. L. REV. 869 (1998) (advocating this approach to calculating punitive damages).

[120] Hanson and Logue acknowledge that class-action suits might be an ineffective antidote. *See* Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1312 & n.602. They thus suggest that ex ante regulation might be a useful regulatory supplement. *Id.* at 1312-13. The predictive decisionmaking model, however, suggests an alternative. Even if relying on first-party suits (or suits by subrogation to insurers) is the best way of forcing cigarette manufacturers to internalize the costs of cigarettes borne by smokers, it may be that creating a right of action in the government for damages borne by third parties would be the best way of forcing internalization of the costs of cigarettes borne by smokers. There is no inherent reason that a single predictive decisionmaking regime must be used for all aspects of a complex problem.

[121] An additional consideration pointing in the same direction is that manufacturers will recognize some probability that they might be judgment-proof in the future and will discount damages that they may never need to pay. *See id.* at 1307-12.

[122] *See, e.g.*, David E. Bernstein, *The Breast Implant Fiasco*, 87 CAL. L. REV. 457, 461 (1999) (review essay) (arguing that juries often nullify causation requirements because of sympathy to litigants).

[123] Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1282.

Cooter and Emons. The object of prediction in the proposal is the potential subsequent event that will establish either with certainty or with some lower confidence whether the statement was accurate. In some contexts, the possibility of a confirming or disconfirming event might be zero. One possibility, Cooter and Emons note, is that a prediction might be confirmed or disconfirmed simply based on whether the court ends up agreeing with the testimony, but this could provide a witness with perverse incentives to agree with another witness, regardless of the truth of that witness's testimony.[124] The random selection of an expert from a pool of experts at least provides a mechanism for confirming or disconfirming an expert's prediction about the proportion of other experts who would agree, but the usefulness of predictions will depend on the quality of the potential pool of experts. If the pool of experts as a whole is biased, then predictions will still provide a poor basis for fact-finding. In general, if predictive decisionmaking is to protect against bias, it is critical to ensure that there will not be systematic bias in the ex post decision, though ex post bias is a problem only if it can be predicted ex ante.

Scott and Mayer. The object of prediction in Scott and Mayer's proposal is straightforward, as insurers would seek to predict the probability and expected cost of bank failures. This object of prediction would be objectionable only to the extent that federal deposit insurance premia should vary based on some other criteria. One virtue of the insurance approach to predictive decisionmaking is that the object of prediction can be adjusted relatively easily. If, for example, one determined that premia charged should reflect only bank failures potentially within the control of the bank, then, as long as it is possible ex post to distinguish these bank failures from others, only insurance for these bank failures could be required.

R. Hanson. Assessing the object of prediction in Robin Hanson's proposal is difficult in part because the proposal for what the government should do with the predictions is only vaguely defined. Assuming that government channels research funds based on information markets, moreover, it might not be optimal for the government to fund only those research projects geared toward proving or developing propositions that are true. For example, even if it is extremely unlikely that "cold fusion" research will ever prove to be a commercially viable means of producing energy,[125] some research effort might still be justified because of the large payoff if

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[124] Cooter & Emons, *Truth-Bonding*, *supra* note 37, at 320.

[125] *See generally* Kenneth Chang, *Evidence on Cold Fusion Remains Inconclusive, New Review Finds*, N.Y. Times, Dec. 2, 2004, at A31 (noting a Department of Energy study indicating that further research into cold fusion is needed before it can be

the visions of cold fusion proponents turn out to be accurate. The predictions of Hanson's market could be just one input into a social cost-benefit calculus. In general, because information markets themselves have no legal consequences, they may leave more questions than other predictive mechanisms about what the government should do with the predictions.

2. *The Prediction Mechanism*

Elhauge. Would judges' predictions of hypothetical legislative decisions be sufficiently accurate and unbiased? Elhauge recognizes that his statutory interpretation proposal can be only as good as judges' predictions of enactable preferences, and he responds by cabining his proposal to contexts in which he believes that judges can make sufficiently accurate assessments.[126] Elhauge also confronts the possibility of bias, acknowledging that "open-ended interpretive power" creates the danger not only of "error costs (good faith errors in guessing about changing legislative preferences)," but also of "agency costs (furthering judges' personal preferences in the guise of current legislative views)."[127] Elhauge answers that actual judicial practice demands relatively objective evidence of current legislative preferences.[128]

Elhauge's reasoning, though, allows for the possibility that judges sometimes may make difficult predictive assessments,[129] and one might argue that this may reintroduce judicial preferences in disguised form.[130] Perhaps more troublingly, Elhauge does not directly confront the objection that judges' personal preferences might affect not only which policy resolution they

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determined whether it has a scientific basis).

[126] For example, Elhauge recognizes that judges sometimes might rely on the preferences of the enacting legislature rather than the preferences of the current legislature where the former is more easily ascertainable. Elhauge, *Preference-Estimating*, *supra* note 20, at 2095-96. Similarly, Elhauge insists that judges not rely on every "changed reading of the political tea leaves," assessing current preferences instead only by considering official political actions. *Id.* at 2107. Where current preferences are not readily ascertainable, Elhauge argues in a companion piece, judges should consider selecting an interpretation that is most likely to spur the current legislature to announce its preferences. *See* Einer Elhauge, *Preference-Eliciting Statutory Default Rules*, 102 Colum. L. Rev. 2162 (2002).

[127] Elhauge, *Preference-Estimating*, *supra* note 20, at 2107.

[128] *See id.* at 2108-59 (surveying the types of evidence that courts will tend to consider).

[129] A hypothetical offered by Elhauge imagines that there is a 60% chance that a legislature would adopt one approach and a 40% chance that the legislature would enact the alternative. *Id.* at 2061. As Elhauge recognizes, though, such numbers will rarely be clear. *See, e.g.*, *id.* at 2081 (recognizing that "courts will rarely have these sorts of precise percentages in mind"). Because numbers are inherently uncertain, if the percentages really are 60% to 40%, it will often be possible to argue with a straight face that the percentages are 40% to 60%. In general, when percentages are relatively close to 50%, it seems plausible that judicial political preferences may affect predictions.

[130] Allowing judicial preferences to affect decisionmaking in disguised form may be worse than allowing judges to make more straightforward normative decisions. Preference-estimating statutory default rules thus may introduce some of the same problems as other approaches to statutory interpretation. *See, e.g.*, Richard J. Pierce, Jr., Chevron *And Its Aftermath: Judicial Review of Agency Interpretations of Statutory Provisions*, 41 Vand. L. Rev. 301, 306 (1988) (decrying "'creative' interpretation," in which judges pretend to be interpreting a statute that does not speak to an issue).

anticipate the legislature would select when there is relatively little evidence of current legislative preferences,[131] but also whether they conclude that there is sufficient evidence in the first place.[132] The preference-estimating approach leaves considerable room for debate about whether it should apply in any given case,[133] and the preferences of the decisionmakers might affect such determinations.

These objections are not fatal. What approach to statutory interpretation does not risk the influence of judges' policy preferences? The analysis, however, suggests a general point about predictive decisionmaking proposals that do not provide strong financial incentives. A predictive decisionmaking regime must consider not only the innate ability of predictors, but also how they will make predictions when they realize that these predictions will have policy effects. Predictive decisionmaking proposals sometimes will thus be limited to situations in which the predictive task is relatively easy, to ensure predictor objectivity. But there will often be no objective guideposts for determining whether a predictive task indeed is easy, and decisionmaking regimes demanding predictive decisionmaking only where a task is easy introduces the possibility for bias in that determination.

J. Hanson & Logue. Hanson and Logue have a strong claim that this mechanism will be more effective than either of the two other plausible sets of predictors.[134] The government could implicitly make predictions in the course of drafting command-and-control regulations, but

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[131] There is a large literature suggesting that judges' ideological preferences affect their decisioons. *See, e.g.*, Frank B. Cross & Emerson Tiller, *Judicial Partisanship and Obedience to Legal Doctrine: Whistleblowing on the Federal Courts of Appeals*, 107 YALE L.J. 2155 (1998) (finding the political party of the President who appointed a judge predictive of resolutions of administrative law cases); Daniel R. Pinello, *Linking Party to Judicial Ideology in American Courts: A Meta-Analysis*, 20 JUSTICE SYS. J. 219 (1999) (providing an overview of the literature); Cass Sunstein et al., *Ideological Voting on Federal Courts of Appeal: A Preliminary Investigation*, 90 VA. L. REV. 301 (2004) (showing that an opinion author's own ideology and the ideology of other panel members may affect judicial voting).

[132] Elhauge's analysis is thus analogous to the following claim: Deference under *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 842-44 (1984), eliminates judicial bias, because *Chevron* instructs judges to defer to agencies when statutes are ambiguous. The empirical evidence, however, suggests that judges' political preferences may affect whether they determine that statutes are ambiguous in the first place. *See, e.g.*, Cross & Tiller, *supra* note 131, at 2168-70 (finding the political affiliation of D.C. Circuit judges to predict decisionmaking in *Chevron* cases); Richard L. Revesz, *Congressional Influence on Judicial Behavior? An Empirical Examination of Challenges to Agency Action in the D.C. Circuit*, 76 N.Y.U. L. REV. 1100 (2001).

[133] A particularly tricky issue arises in distinguishing between cases in which the legislature certainly would be deadlocked and cases in which there is a small probability that the legislature might be able to resolve a particular issue. *See supra* notes 21-22. Elhauge's analysis implies that even if there is a very small probability of action, as long as the relative probabilities are clear, then preferences can be estimated.

[134] I would not classify either of these two alternative approaches as "predictive decisionmaking," however. Command-and-control regulation is just the opposite, implicitly taking into account assessments of the future, but not demanding that regulators make explicit predictions. In deregulation, meanwhile, predictions would not be a vehicle by which regulation is accomplished. In addition, consumers in a deregulated regime would be anticipating future events, but not future legal decisions.

Hanson and Logue doubt the government's ability to do this effectively.[135] Similarly, in a deregulated regime, consumers could act as predictors, assessing the benefits of smoking against future health costs. Hanson and Logue offer a detail argument, however, that consumers are "undeterrable," because consumers have imperfect information and inaccurate risk perceptions.[136] The quality of a predictive decisionmaking mechanism will depend in part on the access to information of those expected to make predictions, and enterprise liability alone assigns the predictive task to those in the best position to make such predictions.

Yet here too one might express doubts about whether cigarette manufacturers will indeed make sufficiently accurate predictions. Perhaps cigarette manufacturers will suffer from the common cognitive trap of being unduly optimistic.[137] Just because cigarette manufacturers will be in the best position to make predictions does not mean that they will in fact make sufficiently good predictions. Executives at cigarette manufacturers might have incentives to minimize concerns about potential liability, much as other corporate officials have exaggerated short-term financial performance and hidden long-term vulnerabilities.[138] Hanson and Logue anticipate that cigarette manufacturers would raise prices,[139] but if corporations sometimes pursue short-term profits at the expense of long-term gain,[140] then they might not raise prices to the level at which consumers would be forced fully to internalize the health costs of cigarettes.[141] Hanson and Logue's proposal, and proposals for enterprise liability in general, depend on the ability of capital markets to discipline corporate decisionmaking, but Hanson and Logue never address market efficiency directly.

Cooter and Emons. The heart of Cooter and Emons's articles is their provision of mathematical models showing that their predictive mechanism has various desirable properties,

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[135] *See supra* notes 35-36 and accompanying text.

[136] Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1181-223.

[137] *But see* Cass R. Sunstein, *Hazardous Heuristics*, 70 U. CHI. L. REV. 751, 775-76 (2003) (reviewing HEURISTICS AND BIASES: THE PSYCHOLOGY OF INTUITIVE JUDGEMENT (Thomas Gilovich et al. eds., 2002)) (arguing that because optimistic bias will be attenuated in many contexts, such as "when people are in a predecisional state of deliberation," it may not provide a strong basis for "paternalistic interventions").

[138] *See, e.g.*, *The Enron Collapse: Implications to Investors and the Capital Markets: Hearing Before the Subcomm. on Capital Mkts., Ins., and Gov't Sponsored Enters. of the House Comm. on Fin. Servs.*, 107th Cong. 211 (2002) (testimony of William C. Powers, Chairman, Special Investigative Committee of the Board of Directors of Enron Corp.) (detailing a notorious case).

[139] Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1221.

[140] *See, e.g.*, sources cited *supra* note 140.

[141] *Cf.* Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1221 ("[T]hrough consumers prices consumers would internalize the costs of smoking.").

including optimizing each witness's incentive to be honest, assuming the mechanism is properly calibrated and the witness is a rational risk-neutral economic actor.[142] These assumptions, though, are potentially subject to attack. A mechanism might not be properly calibrated, for example leaving some residual incentive to shade testimony if the individual setting the sanction underestimates the exogenous incentive to shade in a particular direction.[143] Or witnesses might not respond rationally to requests that they bond their testimony. Even if such truth bonds were allowed, some witnesses might refuse to offer them, either because of risk averseness or simply because they find the bonds distasteful, and the court might misread the implications of such a refusal. Or a witness who does agree to a bond might be bad at estimating how many other experts would come to the same conclusion, regardless of the accuracy of the underlying testimony. Of course, even with some degree of deviation from the article's assumptions, the predictions generated might still be more reliable than unconstrained testimony. In general, though, thorough assessment of the effectiveness of accuracy incentives will require more than the development of rational choice models.

Scott and Mayer. Insurance companies are experts at making actuarial predictions, and the need to be competitive without undue risk disciplines insurance company predictions. The ability of insurance companies to make sound predictions, however, may vary from context to context. While insurance companies risk-classify insurance premiums to some extent, there are many variables along which insurance traditionally is not risk classified, despite the competitive advantages that arise from charging higher premiums to riskier consumers.[144] The problem is the informational cost of obtaining reliable information that will enable risk classification. The greater the amount of insurance obtained, the greater the incentive of the insurance companies to engage in due diligence before issuing policies, and thus the proportion of the risk that banks are required to insure might determine the accuracy of insurance prices. If insurance companies will not risk-classify effectively, then a predictive decisionmaking regime that imposes enterprise liability by requiring banks to maintain adequate reserves to cover losses might be preferable, at

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[142] Cooter and Emons implicitly assume risk neutrality by setting the witness's expected payoff to "her wage minus the expected sanction." Cooter & Emons, *Truth-Revealing*, *supra* note 37, at 267.

[143] The derived formula for imposing sanctions depends on the wage that the witness will receive and the extent to which that wage is contingent on the witness's testimony. *Id.* at 269. In practice, lawyers do not enter into explicit contracts with witnesses that vary compensation by the testimony produced. Thus, the party applying the truth-revealing mechanism must estimate the extent to which the lawyer implicitly is providing an incentive for the witness to shade testimony.

[144] *See supra* note 104 and accompanying text.

least if the banks themselves have better information about their prospects than the insurance companies have.

R. Hanson. The effectiveness of the mechanism of prediction is the central question for evaluating information markets. Are information markets sufficiently accurate and unbiased for practical applications? Preliminary research suggests that information markets are effective predictive tools.[145] Information markets have been used to predict the results of presidential elections, for example, and the results over a number of such markets suggest that they are generally more precise than opinion polls.[146] Hanson's proposal has inspired the creation of real world information markets, including at least one that trades scientific claims,[147] though only for "play money."[148] The predictions produced seem at least facially plausible,[149] though in contrast to the elections markets, it is difficult to develop a metric for assessing relative accuracy on scientific claims.

The question of whether information markets are sufficiently accurate is not likely to have a simple answer, in part because the literature on information markets has produced numerous proposals for how to structure information markets. Although Hanson in his original article downplayed concerns that there might be too little trading in information markets to generate reliable predictions, in subsequent work, he has offered an information market design specifically designed to overcome the possibility that information markets might be thin.[150] Central to this proposal, as well as some others,[151] is the recognition that information market accuracy might be improved if the information market is subsidized in some way. Like a partial insurance requirement, an information market presumably can be made more or less accurate depending on the resources that the government is willing to devote to prediction, and so

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[145] *See, e.g.*, Wolfers & Zitzewitz, *Prediction Markets*, *supra* note 62 (providing an overview of the research).

[146] Joyce Berg et al., Results from a Dozen Years of Election Futures Markets Research (unpublished manuscript Nov. 2000), online at http://www.biz.uiowa.edu/iem/archive/BFNR_2000.pdf (visited Mar. 16, 2005) (providing an assessment of the accuracy of the Iowa Electronic Markets).

[147] *See* http://www.ideosphere.com (last visited Mar. 3, 2005).

[148] Some real money information markets have involved trading in claims that might hinge on resolution of scientific uncertainties. *See, e.g.*, http://www.marteksys.com/markets/SARS_2004_home.html (visited Mar. 16, 2005) (providing materials on a market used to predict the severity of the SARS epidemic).

[149] For example, the market as of March 3, 2005, assigned approximately an 18% probability to the claim that by January 1, 2015, "[c]old fusion of deuterium in palladium can produce over 10 watts/cc. net power at STP (standard temperature and pressure)." *See* http://www.ideosphere.com/fx-bin/Claim?claim=CFsn (visited Mar. 3, 2005).

[150] Robin D. Hanson, *Combinatorial Information Market Design*, 5 INFO. SYS. FRONTIERS 107 (2003).

[151] *See, e.g.*, Abramowicz, *supra* note 64, at 960-62 (providing an approach to subsidizing an information market).

assessments of information markets will necessarily need to be context-specific. Concerns about the danger that information markets might be manipulated will also need to depend on context, including the incentives that individuals might have to manipulate the market and the ability of others to detect and correct for such manipulation.[152]

3. *The Legitimacy of Prediction*

Elhauge. Is there something inherently inappropriate about relying on predictions rather than normative decisions, assuming that legislative decisions are normatively desirable objects of prediction and predictions are sufficiently accurate and unbiased? Elhauge comes closest to examining this issue in addressing why he believes that his proposal should apply only where there are statutory ambiguities, not when a statute is clear but no longer reflects the current legislature's preferences. Once an enacting government goes through a process to make an authoritative decision, Elhauge declares, then a judge cannot overturn this decision by making a prediction of what the current legislature would prefer.[153] This conclusion is odd, though, because Elhauge's general argument for preferring the preferences of the current to those of the enacting legislature should apply here.[154]

Though Elhauge supplements this argument with concerns about the accuracy of the prediction mechanism,[155] Elhauge appears to assume that using predictive decisionmaking to trump statutory meaning would be inappropriate in all circumstances. Presumably this reflects an assertion of constitutional principle, though Elhauge never addresses the question whether, if he were designing a constitution, he would insert a provision requiring preference estimation even where a legislature has spoken. One argument against such a provision might be that even if predictive decisionmaking produces more normatively attractive decisionmaking than nonpredictive decisionmaking, we might still prefer nonpredictive decisionmaking because we

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[152] *See supra* notes 107-108 and accompanying text.

[153] Elhauge, *Preference-Estimating*, *supra* note 20, at 2103 ("Action by the enacting legislature that completed the constitutionally required process cannot be reversed simply because a judge believes the current government would probably be able to complete that same process with a different result.").

[154] Elhauge argues that a legislature would prefer that its preferences for interpretation of ambiguities control current courts as to all legislation rather than to have its preferences control future courts as to only the legislation that it in fact enacts. *See, e.g.*, *id.* at 2039. Yet, if that is so, why wouldn't a legislature prefer that its preferences generally control all current issues, rather than only issues on which it enacts legislation?

[155] *Id.* at 2104 (noting that the "enactable preferences of the current legislature . . . are necessarily less susceptible of reliable estimation than those of the enacting legislature that actually enacted a statutory meaning to govern the issue").

value democratic participation. Elhauge's approach thus reminds us both that predictive decisionmaking may at times face constitutional obstacles and that the generation of a decision through a prediction rather than an exercise of judgment may itself count as a cost, independent of the merits of the prediction as policy, in assessing a predictive decisionmaking regime.

J. Hanson & Logue. There are at least two possible reasons to worry about the normative desirability of enterprise liability. First, every prediction mechanism must provide some means of disciplining predictions, and that mechanism itself might impose some costs. Litigation disciplines predictions in an enterprise liability regime, and litigation by individual smokers can be expensive, perhaps more expensive than alternatives such as ex ante regulation or ex post lawsuits brought by government agencies. Hanson and Logue are sensitive to this concern, and thus suggest that a regime of "smokers' compensation," analogous to existing worker's compensation schemes, might be enacted.[156]

Second, enterprise liability will affect not only product design, but also consumer decisions, as cigarette prices rise with the anticipation of liability. Forcing consumers who may underestimate the risks of smoking to internalize the costs is a central goal of Hanson and Logue,[157] but Hanson and Logue's proposal also has an effect on any consumers who have full information and make rational decisions to smoke. The proposal in effect forces such consumers to purchase smoking insurance. Hanson and Logue suggest that this may be a benefit,[158] if market failures prevent the emergence of insurance markets that would meet consumer demand.[159] Many consumers, however, might well not want such insurance, which would not be tailored to consumers' individual demand for coverage.[160] A comprehensive analysis of the Hanson and Logue proposal or of any enterprise liability regime would thus need to include an assessment of the desirability of creating this mandatory insurance market.

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[156] Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1283-96 (summarizing the proposal); *see also* Hanson et al., *Smokers' Compensation*, *supra* note 78 (further elaborating the proposal). Hanson and Logue cast this as an alternative to enterprise liability, though one might also define "enterprise liability" to include regimes in which the relevant assessments are made by administrative agencies.

[157] Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1221-22.

[158] *Id.* at 1275-78 (arguing that enterprise liability prevents overdeterrence of rational consumers).

[159] Hanson argues in a separate article coathored with Steven Croley that consumers demand insurance for nonpecuniary accident costs, such as pain and suffering, and are unable to purchase it in the market, a problem that enterprise liability solves. *See* Steven P. Croley & Jon D. Hanson, *The Nonpecuniary Costs of Accidents: Pain-and-Suffering Damages in Tort Law*, 108 HARV. L. REV. 1785 (1995).

[160] For example, some smokers might not want life insurance, because they anticipate having no survivors, or no survivors whom they care about. *Cf.* Hanson & Logue, *Costs of Cigarettes*, *supra* note 34, at 1277 (recognizing the possibility of overdeterrence where smokers anticipate dying before they might collect their rewards).

Cooter and Emons. Cooter and Emons acknowledge "many practical obstacles" to their proposal that will need to be overcome, but even if these obstacles could be overcome and everyone agreed that the object and mechanism of prediction could be defined perfectly, some would be uncomfortable with witnesses accepting variable compensation and bets. Perhaps the prediction mechanism might undermine public confidence in the courts,[161] or make those who ordinarily would be inclined to volunteer to testify truthfully unwilling to participate for fear of appearing too mercenary.[162] Opposition may reflect the traditional discomfort of bringing purported mathematical precision into the courtroom.[163] Or maybe those who are uncomfortable with prediction are just stodgy, and it is the unfamiliarity of predictive decisionmaking that makes its implementation seem objectionable.

Scott and Mayer. Scott and Mayer's proposal, in contrast, presents only limited problems concerning the normative desirability of prediction. The insurance apparatus imposes some cost, with greater insurance requirements achieving greater accuracy only at the risk of increased cost. The insurance apparatus also means that banks would have to obtain some private insurance that it may or may not be socially optimal to require them to purchase, much as Hanson and Logue's cigarette enterprise liability proposal would in effect require smokers to buy smoking insurance. A requirement of obtaining partial insurance, however, may be considerably less onerous than a full insurance requirement. Thus, if it is possible to obtain sufficiently accurate predictions with a relatively modest insurance requirement, then the system will not be a costless way of determining the premia for the insurance that it provides on banks,[164] but it may be a relatively cost-efficient way for the government to determine risk premia. At least in contexts in which insurance is familiar, insurance requirements are unlikely to provoke moral objections, and

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[161] Charles Nesson, *The Evidence or the Event? On Judicial Proof and the Acceptability of Verdicts*, 98 HARV. L. REV. 1357 (1985), offers a positive theory that the justice system is structured so that the public will believe that verdicts reflect events, rather than merely evidence. A mechanism that highlights uncertainty might undermine public confidence according to Nesson's view. *But see* Ronald J. Allen, *Rationality, Mythology, and the 'Acceptability of Verdicts' Thesis*, 66 B.U. L. REV. 541 (1986) (offering a powerful rebuttal to Nesson's thesis).

[162] Similar arguments have been used to critique proposals to allow sale of organs. *See* Emanuel D. Thorne, *When Private Parts Are Made Public Goods: The Economics of Market-Inalienability*, 15 YALE J. ON REG. 149 (1998) (arguing that a ban on sales of organs might reduce organ supply by limiting the ability of health officials to induce altruistic donations).

[163] This discomfort may result in part from concern that mathematical precision may sometimes be incomplete and lead courts to make bad decisions. Laurence H. Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 HARV. L. REV. 1329 (1971) (developing this argument).

[164] The government could pay for the insurance itself, by purchasing insurance from the solvent insurance company offering the lowest rates.

partial insurance requirements may alleviate concerns about the feasibility of obtaining insurance.

R. Hanson. Even if we concluded that information markets were the most accurate way of predicting scientific developments and assessing purported scientific truths, we might be uncomfortable with science policy depending on capital markets. Hanson's initial paper's title— "Could Gambling Save Science?"[165]—recognizes this implicitly. Yet Hanson himself may have underestimated popular discomfort, as Hanson helped plan[166] an information market that the Defense Department planned to institute that would have predicted, among other things, the likelihood of terrorism.[167] The plan was scrapped after criticisms that the plan amounted to a betting parlor on terrorism.[168] Life insurance companies bet on death,[169] but life insurance may prompt less concern in part because the predictions made by such companies are necessary incidents to an institution widely thought of as necessary.

Information markets' greatest strength from the perspective of predictive decisionmaking, the independence of their predictions from decisions about what government should do with their predictions, may prove their greatest obstacle to implementation. The creation of any governmental plan that relies directly or indirectly on the result of an information market is more obviously a predictive decisionmaking regime than any proposal invoking one of the predictive mechanisms discussed earlier, because the predictive decision is isolated from the remainder of the proposal. An aim of this Article, of course, is to make predictive decisionmaking in general more familiar, and thus to focus analysis on the merits or demerits of specific proposals and predictive mechanisms. Concerns that prediction is not an appropriate substitute for various forms of democratic deliberation may be relevant to these merits, however, and such concerns may be at their apex when the predictive mechanism is an information market.

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[165] Hanson, *Could Gambling Save Science?*, *supra* note 66.

[166] *See* http://hanson.gmu.edu/policyanalysismarket.html (last visited Mar. 12, 2005) (discussing the genesis of the Policy Analysis Market and Hanson's role).

[167] Carl Hulse, *Threats and Responses: Plans and Criticisms; Pentagon Prepares a Futures Market on Terror Attacks*, N.Y. TIMES, July 29, 2003, at A1 (describing the Pentagon's plan).

[168] Peter Coy, *Betting on Terror: PR Disaster, Intriguing Idea*, BUS. WK., Aug. 25, 2003, at 41 (reporting on the decision to terminate the program after congressional criticism).

[169] At one time, life insurers were criticized for this. *See* Roy Kreitner, *Speculations of Contract, or How Contract Law Stopped Worrying and Learned to Love Risk*, 100 COLUM. L. REV. 1096, 1100 n.15 (2000) (recounting the history).

B. *Predictive Approaches to Safety Regulation*

A variety of federal agencies, such as the Federal Aviation Administration, the Mine Safety and Health Administration, the Nuclear Regulatory Commission, the Occupational Safety and Health Administration, and the Transportation Security Administration, regulate specific entities largely with command-and-control approaches. Although the command-and-control approach has received much criticism in the environmental field,[170] it has received much less in the safety context, and critics of the approach have generally suggested less regulation rather than an alternative approach to regulation.[171] In environmental law, reliance on the market may mean either an absence of regulation or regulation with the use of market mechanisms, but in safety law, only the former has appeared to be an option. Existing market approaches to regulation do not translate easily to the safety context. It is hard, for example, to imagine a workplace injury trading system analogous to emissions trading programs,[172] because entities subject to safety regulation cannot anticipate the number of workplace accidents that will occur in advance.

The purpose of this section is to describe how predictive decisionmaking presents a set of simple alternatives to command-and-control regulation not previously addressed in the literature, and to apply the framework above to develop and compare the alternatives. Safety regulation is a strong candidate for predictive decisionmaking because identification of an object of prediction is relatively straightforward. Safety regulation seeks to avoid accidents, property damage, injuries and deaths, so a predictive decisionmaking regime should seek to induce predictors to anticipate the likelihood and magnitude of these for any particular regulated entity. These predictions can then be used to prevent activities that are expected to produce excessive dangers. Commentators, however, have not generally considered predictive approaches to safety regulation, presumably because of the nonobviousness of the predictive decisionmaking approach.[173]

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[170] *See, e.g.*, Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1334-40 (1985) (criticizing the command-and-control approach).

[171] *See, e.g.*, Thomas A. Lambert, *Avoiding Regulatory Mismatch in the Workplace: An Informational Approach to Workplace Safety Regulation*, 82 NEB. L. REV. 1006 (2004).

[172] For an overview of emissions trading programs, see THOMAS H. TIETENBERG, EMISSIONS TRADING (1985).

[173] Aside from ubiquitous proposals for strict liability, I have found only one safety regulation proposal that comes close to meeting the definition of predictive decisionmaking. *See* Paul H. Rubin & Mark A. Cohen, *Private Enforcement of Public Policy*, 3 YALE J. ON REG. 167 (1985). Rubin and Cohen imagine that we might partly privatize governmental functions, such as

The key question for a predictive approach to safety regulation is selection of an appropriate prediction mechanism. In this context, a predictive standard seems unlikely to be effective. One might imagine a regime in which a governmental official is asked to predict, for example, the number of injuries that will occur in a particular workplace, or the probability that a particular airline flight will result in a crash. The prediction might then determine whether the workplace or airline could operate, or it could be used as a basis for setting a fee that the regulated entity must pay. Simply asking governmental officials to think predictively, however, does not seem likely to represent an improvement in policy, as different governmental officials would be likely to generate wildly different predictions. Providing accuracy incentives to governmental officials might help in some contexts. For example, airport screeners might be rewarded for identifying contraband and penalized for false positives. But in many contexts, accidents and incidents will be sufficiently exceptional that any individual governmental official's predictive performance is likely to depend substantially on chance, so accuracy incentives would make compensation relatively uncertain without providing much impetus for improved decisionmaking by individual employees.

The most straightforward approach to predictive decisionmaking would be either an enterprise liability approach or a requirement that each regulated entity purchase adequate liability insurance. There are, however, drawbacks of these approaches. Enterprise liability might engender industry opposition, because it would place the entire burden of accidents on industry, even where those accidents were not the result of fault. Full insurance requirements, by contrast, might underprotect safety, assuming that liability would be based only on fault. Considering only these two options thus may make it appear that if the government wishes to rely on private predictions, it will either have to impose a heavy future liability on regulated entities, or give up on improving unsafe conditions that do not rise to the level that would be expected to generate negligence liability.

Forcing regulated entities to internalize the full costs of their actions by imposing enterprise liability or a full insurance requirement may in any event be infeasible, for example because the relevant entities might be judgment-proof in the event of a sufficiently large accident

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regulation of the nation's highways, and provide explicit incentives to the privatized entities to reduce the number of deaths. They argue, however, that current safety standards should remain in force, with the private party allowed to offer to pay automobile manufacturers to improve safety. *Id.* at 178-79. The private party's predictions thus do not substitute for normative decisionmaking, and the proposal does not count as predictive under my definition.

and the cost of insurance may be too high. Congress cited the difficulty of obtaining adequate insurance in justifying the controversial Price Anderson Act,[174] which limits the liability of nuclear power plant operators.[175] Because of the massive potential consequences of a nuclear accident, there might not exist enough insurance reserves to cover a major accident. An unfortunate consequence of the Price Anderson Act, however, is that moral hazard may lead nuclear facilities to invest too little in safety.[176] The government's regulatory response is a command-and-control approach to combating moral hazard.

A predictive alternative might be a partial insurance requirement, but with the insurance based on strict liability rather than on negligence. The advantage of this approach is that it allows governmental regulation to be based on the full costs that an activity is expected to generate, but without forcing the regulated entities to buy insurance to cover those costs. Insurance companies would have an incentive to monitor insureds to assess their risk levels and to price insurance accordingly. An insurer of an airline, for example, might consider the amount of money that the airline spends on maintenance, perhaps in addition to the specific safety practices the airline has adopted. An insurer of a specific line of business might itself issue guidelines for the business to follow, with random inspections to ensure that the business is following through on its commitments.

The partial insurance approach to nuclear safety would require the owners of each plant to obtain insurance to cover, say, one percent of damages caused, and allow the government to sue the insurance companies to recover this amount in the event of an accident. From this relatively modest requirement, the government could estimate the expected costs for each nuclear plant. The expected risk cost would be based on the amount paid for the partial insurance, with some deduction reflecting the insurance company's expected profits and costs, to the extent such costs are impounded into prices. A simple formula might be used (for example, 75% of insurance cost), or the government might try to develop a more ambitious formula, seeking to calculate the portion of the price not attributable to insurance company's

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[174] Atomic Energy Damages (Price-Anderson) Act, 42 U.S.C. §§ 2039, 2210 (2000).

[175] *See generally* Duke Power Co. v. Carolina Envtl. Study Group, Inc., 438 U.S. 59 (1978) (finding the statute constitutional); Harold P. Green, *Nuclear Power*, 71 MICH. L. REV. 479, 481-87 (1972-1973) (providing a historical overview of the enactment of the Act).

[176] Anthony Heyes, *Determining the Price of Price-Anderson*, REGULATION, Winter 2002-2003, at 1, 5 (making this point).

administrative costs and expected profits. Even if the formula is imperfect, this would allow for an approximate, and relatively objective, analysis of the risk of each plant.

This individualized estimate of risk might have different consequences depending on the design of the regime. First, the government might simply establish some maximum risk threshold, above which the plant would not be permitted to operate. If insurance policies were issued and priced annually, then this presumably would reflect some experience rating based on plant incidents short of catastrophes, and nuclear facility management would have to convince insurers that they had adequately addressed safety vulnerabilities. Second, a partial insurance requirement could allow for full cost internalization even if full insurance is unavailable. The government could charge the facilities ninety-nine times the expected risk cost for the remaining ninety-nine percent of potential damages.[177] This approach avoids immunizing nuclear energy from most liability, which critics have argued represents an economically distortionary subsidy to that industry. Third, some combination of these approaches could be used, for example requiring full payment of expected damages to the extent risk exceeds some threshold.

The purpose of the liability insurance here is not the typical purpose of reducing the regulated entity's risk, though a partial insurance requirement will advance such a goal to some degree. Rather, it is to obtain information, and the government can thus specify any formula that it wants as the trigger for insurance coverage. Indeed, it is not even essential to rely on suits brought by victims against the regulated entity. The government, for example, could require regulated entities to purchase partial insurance but allow those entities to sell to third parties, perhaps by auction, the right to sue the insurance companies should the relevant event occur. The net economic effect is that the regulated entities would be paying two third parties, the beneficiary on the one hand and the insurer on the other, to make a bet with each other about some event that the government specifies, such as the occurrence of deaths or injuries at a particular workplace.

Moreover, the insurance payout might be based on anything, not necessarily just on damages as they ordinarily would be paid in tort cases. The government, for example, might

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[177] The government in this plan might be issuing insurance, which then would be paid to victims, or simply charge the fees without formally issuing insurance. The latter approach reflects that in the event of a catastrophe, the government is likely to step in to provide disaster aid. *See* Peter Siegelman, *A New Old Look at Terrorism Insurance: Jack Hirshleifer's* War Damage Insurance *After Fifty Years*, 9 CONN. INS. L.J. 19, 24-25 (2002) (noting that the government may be unable to precommit to a policy of not paying disaster aid).

provide for insurance payments based on the number of deaths caused by accidents at a workplace without regard to the particular economic circumstances of the victims.[178] Instead of requiring a full estimate of damages, the insurance policy might require a payment of $100,000 per death, with some other liquidated damages payment schedule for injuries, in proportion to their seriousness. The government could then extrapolate from insurance prices the dangerousness of a particular workplace. The $100,000 value would not inherently reflect a low valuation of life, because this is a partial insurance scheme whose only purpose is for the government to generate price data.

How good a job will insurance companies do at risk assessment? An advantage of relying on insurance companies is that insurance companies have experience in risk classification, and such risk classification might serve as a guide to how accurate the predictive mechanism would be. The context, however, differs in important ways from traditional insurance contracts. Because of the large collateral consequences to the insurance rating, for example, regulated entities would want to provide as much information as possible to insurance companies to justify a low insurance premium.[179] Regulated entities might voluntarily submit to random third-party inspections, or to adhere to regulations provided by the insurance companies, even if the price of partial insurance alone would make such actions inadvisable. It is thus difficult in the absence of experience to gauge how accurate insurance rating will be, and accuracy will depend in part on the degree of partial insurance that regulated entities are required to obtain. Perhaps one percent insurance would be too little, and a greater degree of insurance would be required.

Even if insurance companies have the potential to serve as accurate predictors, a detailed partial insurance proposal would need to explain how to avoid the prospect of manipulation, specifically preventing side payments from regulated entities to insurers. Regulated entities and

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[178] One might argue that cost-benefit analysis should place the same value on the lives of the rich and the poor, even though the wealthy will generally have higher willingness to pay to avoid risk. *But see* ERIC A. POSNER & CASS R. SUNSTEIN, DOLLARS AND DEATH 46-47 (John M. Olin Law & Econ. Working Paper No. 222, 2004) (presenting the case for regulatory programs to value the lives of the wealthy more than those of the poor). An enterprise liability regime will generally place less value on the lives of the poor, because the survivors of poor decedents will obtain lower damages levels. If this is an inappropriate regulatory outcome, then a suitably designed partial insurance scheme may be a useful fix, treating all lives equally, though of course not by itself promising compensation to any victims.

[179] Some regulated entities might want to provide little information, because those entities are high-risk. An unraveling effect, however, will tend to lead to a great deal of information disclosure. Once the lowest risk entities credibly convey their low risk to insurance companies, the next lowest risk group will have an incentive to do so, and so on. *See* Paul Milgrom & John Roberts, *Relying on the Information of Interested Parties*, 17 RAND. J. ECON. 18, 22-24 (1986) (providing a model of how adverse selection may force information release).

insurers might have an incentive to collude to reach a low price for the type of liability insurance whose price the government would match and a higher price for some other type of insurance coverage. One possibility is to prevent the insurers from issuing other types of insurance to regulated entities, but this still leaves the danger that regulated entities might make cash side payments to insurance companies.

In theory, this problem might be mitigated by switching prediction mechanisms, and using information markets instead of partial insurance. A different information market might be used to assess risk for each regulated entity. An advantage of information markets is that they provide incentives for third parties to identify sweetheart deals and in effect bet against them, forcing market prices back to equilibrium levels. Thus, a formal anti-corruption regime may be less necessary. We have less experience with information markets, however, and while widespread deployment of information markets might lead to development of specialized firms that would combine expertise of many individuals to make predictions, those firms do not exist yet. The existing institutional structures of insurance companies thus might provide a stronger foundation for a predictive approach to safety regulation than reliance on decentralized prediction through information markets.

As a practical matter, concerns about the normative desirability of predictive decisionmaking for safety is the greatest barrier to implementation. Whatever our concerns about the effectiveness of government, we may simply be more comfortable when government rather than private entities set safety standards. A critical point, however, is that as with emissions trading programs in the environmental context, the partial insurance approach to safety regulation is potentially consistent with any particular level of regulation. Especially if governmental regulation pays too little attention to some risks,[180] the market approach could increase safety. Conceivably, the partial insurance approach could be less controversial than some alternatives, in part because it does not require the government to engage in the politically controversial task of valuing lives.[181] Predictive decisionmaking does require prediction of

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[180] Critics, for example, have charged the Nuclear Regulatory Commission has paid too little attention to the danger that terrorists might attack nuclear plants. *See* Cat Lazaroff, *Nuclear Plants Called Vulnerable to Terrorist Attack*, at http://www.commondreams.org/headlines01/0926-01.htm (visited Mar. 21, 2005).

[181] *See, e.g.*, Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENVTL. L. REV. 189 (2000) (noting difficulties with valuation of life).

deaths, which some critics of the proposed information market on terrorism found offensive,[182] but the use of insurance companies would tend to make such predictions less prominent and might thus mute such criticisms.

IV. MORE PREDICTIVE DECISIONMAKING MECHANISMS AND APPLICATIONS

This Part constructs potential predictive solutions to a range of regulatory problems. As in Part I, the primary purpose of this analysis is not to recommend adoption of particular proposals. Analysis of any of these proposals would require far more detailed treatment than is provided here. Rather, the purpose is to illustrate new variations on the predictive decisionmaking mechanisms illustrated in Part I. The proposals may help demonstrate that predictive decisionmaking provides a new approach to certain classes of problems, but a full comparison of the proposals to nonpredictive alternatives is beyond the Article's scope.

Part IV.A introduces a new predictive mechanism called "investment matching" and suggests that it might be used to discipline government spending. Part IV.B explains how the government might discipline arbitration decisions and attorney opinion letters using a probabilistic enforcement mechanism, i.e. one in which there is only some probability that a later legal decision will discipline the initial prediction. Finally, Part IV.C describes predictive decisionmaking approaches to interest rate policy, by explaining how information markets might predict variables conditional on different policy choices. This analysis also shows how predictive decisionmaking may help overcome the time inconsistency problem and thus provide an alternative to other precommitment strategies.

A. Government Spending and Investment Matching

Partial insurance requirements are designed to generate insurance company predictions of the probability and magnitude of undesirable outcomes such as accidents, though as the analysis above indicates, in theory partial insurance requirements might demand that insurance companies predict just about anything. In theory, insurance companies might even be used to anticipate desirable outcomes, but a predictive mechanism requiring insurance companies to do so would be relying on insurance company adaptability, not on any experience in making such predictions.

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[182] *See, e.g.*, *Bets Off on Terror Futures Market*, AP News Wire (July 29, 2003), online at http://www.wired.com/news/politics/0,1283,59813,00.html (visited Mar. 15, 2005) (noting Sen. Clinton's criticism of the program for creating a "futures market in death").

Other institutions, however, are in the business of making predictions when a range of outcomes are possible. For example, venture capitalists and the capital markets generally invest in businesses, recognizing that there is some chance of success and some chance of failure. An analogue to a partial insurance requirement might be a partial investment requirement. Specifically, where the government wishes to invest in spending projects, it might base its investments on those of private investors, who would be given incentives to predict whether those spending projects would produce the results the government desired.

Before considering such a mechanism, let us examine an alternative predictive decisionmaking approach to government spending. Robert Hahn and Paul Tetlock have proposed combining information markets and pay-for-performance contracting auctions.[183] In the particular example they offer, they suppose that the government wishes to improve education, and is considering sponsoring an auction in which the high bidder would implement some educational intervention.[184] The high bidder eventually would be compensated based on improvement in student test scores, at a rate set by the government in advance, such as $1 million per point. The government would not conduct this pay-for-performance auction, however, until it first sponsored an information market that would predict the eventual increase in test scores attributable to the program,[185] and unless the information market predicted that the program would be successful.

The proposal is interesting for several reasons. First, it highlights that an existing common practice, government contracting auctions, represents a form of predictive decisionmaking. The competition among potential contractors for a contract forces each contractor to predict how much it will cost to perform a particular job, and the amount that the government pays depends on these predictions. Second, it shows that this general approach sometimes might be improved with the insights of predictive decisionmaking. The pay-for-

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[183] *See* Robert Hahn & Paul Tetlock, *Big Ideas: The Market's Last Frontier*, MILKEN INST. REV., First Quarter 2005, at 83, 86. [hereinafter Hahn & Tetlock, *Big Ideas*]. Hahn and Tetlock also raise this idea in a fuller treatment of information markets. *See* ROBERT W. HAHN & PAUL C. TETLOCK, HARNESSING THE POWER OF INFORMATION: A NEW APPROACH TO ECONOMIC DEVELOPMENT (AEI-Brookings Joint Ctr. Working Paper No. 04-21, Oct. 2004).

[184] The auction could have a reserve price set, so that the government would not go forward with the project if the expected cost turned out to be too high. *See* Hahn & Tetlock, *Big Ideas*, *supra* note 183, at 86. For example, the government might set the reserve price at 0 (thus not allowing negative bids), so that it would go forward with the project if and only if it has to pay no more than $1 million per point increase in test scores.

[185] *Id.* For discussion of how information markets might be used to make conditional predictions, such as the increase in test scores if a program is and if a program is not enacted, see *infra* Part IV.C.

performance auction forces contractors to consider not only how much it will cost to undertake a project, but also how much such expenditures are likely to provide social improvements, as measured by the proxy variable, in this case test scores. Third, the proposal highlights that it sometimes might be useful to combine predictive decisionmaking techniques. In theory, the pay-for-performance auction should allow for optimal contracting, with the contractors fully taking into account the costs and benefits of their projects. But providing an information market allows for an additional check, helping to avoid the danger of a single overoptimistic contractor leading to a poor social investment. The information market prediction might help provide information to contractors, and thus potentially reduce to some extent contractors' research costs, thus leading to greater participation.

The use of a proxy for performance, however, raises several significant problems. First, sometimes it might be difficult to develop a proxy. Hahn and Tetlock suggest that this may be a reason to conclude that the program is of little social value, but it is conceivable that some programs might produce benefits that are difficult to evaluate in an objective way. Second, contractors might focus performance on the proxy rather than on the underlying social benefit. Schools, for example, might focus on test scores at the expense of real learning.[186] Third, and most importantly for our purposes, to the extent that the proxy is subject to random variation, the contractors face a great deal of risk. If, for example, test scores are highly variable for unpredictable reasons, such as economic conditions or immigration to a particular school district, contractors will bear considerable risk unrelated to their particular projects, and this risk will be passed along to the government in the form of lower auction revenues. This risk is attributable to measurement error, and is in addition to any risk from uncertainty about the benefits of the project.

An investment matching mechanism would require potential government contractors to obtain prospective funding from third-party investors. The government would then select a particular contractor, if any, based on which contractor received the highest investment from a third-party investor. For the project selected, the third-party investor would be compensated solely based on the performance of the associated government contractors, as indicated either by a proxy variable or by a subjective valuation to be performed by a government official at a later

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[186] *See, e.g.*, M. Gail Jones et al., *The Impact of High-Stakes Testing on Teachers and Students in North Carolina*, 81 Phi Delta Kappan 199 (1999) (reporting a study on the effect of "teaching to the test" on curricula).

time. The contractor, meanwhile, would receive project funding at some multiple of the amount provided by third-party investors.

For example, suppose that the benefit to the government of increasing test scores in a particular district is $1 million per point. The government might announce that it will compensate third-party investors at $50,000 per point increase (with the investors required to pay money to the government in the event of a decrease), and pay to the contractor with the highest third-party investment an amount equal to 19 times that investment. If the highest third-party investment offered were $100,000, then that would indicate a projection by the third-party investor of approximately a two-point increase in test scores. The government would provide the project $1.9 million in funding, on top of the $100,000 provided by the third party. If the project in fact provided a three-point increase, the third-party investor would receive $150,000.

The obvious benefit to this approach is that it minimizes the risk of random variation in a proxy variable or in a subjective valuation. The third-party investors will bear some risk associated with measurement error or the unpredictability of individual subjective valuations, but the total risk will only be about a twentieth of the risk if payment were based wholly on performance. Moreover, to the extent that there is some inherent risk in the project, stemming from uncertainty about whether the investment will achieve its goals, that risk is imposed on the government, rather than on the contractor (and indirectly on the government in the form of bids). Presumably, government contracting does not rely entirely on pay-for-performance in part because the government is a relatively risk-neutral actor, and it thus is efficient for the government to take on much of the risk of project success or failure.

A more subtle virtue of this approach relative to pure pay-for-performance contracting is that it makes it more feasible to rely on a subjective evaluation of contractor performance rather than on objective evaluation. The principal concern about subjective evaluation is that the government agency sponsoring the project will have an incentive to give a mediocre performance evaluation so that it has to pay less. Assigning the subjective evaluation task to an independent decisisionmaker might help, but even an independent decisionmaker might prefer to save the government money. The decisionmaker, however, will be much less concerned when the performance evaluation affects only the relatively small amount received by the third-party investor, rather than the entire amount to be received by the government contractor. The

decisionmaker presumably will also care about encouraging participation from contractors in the future, and with the lesser budgetary consequence for the government, more honest assessments can be expected.[187]

Many of the same concerns about partial insurance requirements may be levied at partial matching requirements. Once again, we need to be concerned about the danger of side payments. Government contractors might promise to pay third-party investors in exchange for inducing extra investment, recognizing that this extra investment will increase the chances of selection and the amount of the government match. The plausibility of the regime thus depends on the government's ability to stop such practices, for example with criminal sanctions.[188] In addition, just as the success of partial insurance matching depended on the ability of insurance companies to engage in accurate risk classification, so too does the success of this approach depend on the ability of third-party investors to predict investment results. If, for example, the winner's curse means that third-party investment provides an unreliable guide to project success,[189] then the government might be better off relying on its own assessments of project success, even if these assessments are subject to interest group influence.

B. *Opinion Letters, Arbitration, and Probabilistic Discipline*

In the above examples, the event being predicted, such as the measurement of the improvement in test scores, always occurs. Yet it sometimes may be desirable to create predictive decisionmaking regimes anticipating events that may or may not occur. Consider, for

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[187] If the government were still seen as having an incentive to lowball contractors, it might conduct a separate auction at the beginning of the contracting process to find an additional third party that will be responsible for paying the original third-party investor in accordance with the government's subjective evaluation of the success of the project. The winning bidder would be the third party willing to accept the least from the government to take on the obligation to pay the original third-party investor. The government's evaluation would then affect two independent third parties and presumably would be objective. A drawback of this approach is that it doubles the risk that private parties face from the government's subjective evaluation. This drawback would likely make it unsuitable for a full pay-for-performance scheme that did not rely on investment matching.

[188] An alternative to or complement for criminal sanctions would be to modify the predictive mechanism so that additional third parties would have an incentive to discipline the initial third party's investment. A simple approach here would be to allow other third parties to require the initial third party to double its bet (or increase its bet by some other proportion). For example, if *A* thought that *B* was providing a suspiciously high investment to a particular project, then *A* could promise to give to *B* the same amount of money that the government eventually provides in exchange for the same amount of money from *B*. *See generally* Michael Abramowicz, *The Law-and-Markets Movement*, 49 AM. U. L. REV. 327, 390-93 (1999) (discussing a similar mechanism).

[189] *See generally* RICHARD H. THALER, *The Winner's Curse*, *in* THE WINNER'S CURSE: PARADOXES AND ANOMALIES OF ECONOMIC LIFE 50 (1992) (providing an overview of the winner's curse). In theory, third parties would have an incentive to compensate for the winner's curse, by shaving their investment in recognition of the fact that offering the greatest investment might reflect undue optimism in the project. Even if this is so, however, the uncertainty over how much to shave a bid may add considerable variance to third-party investment decisions.

example, the issuance by lawyers of opinion letters. In a number of contexts, from tax[190] to intellectual property,[191] lawyers will provide formal opinion letters to their clients, informing them of whether activity may be permissible. Such letters may have some legal effect, for example in making it less likely that enhanced damages will be imposed for willful infringement,[192] yet the legal analysis of many such letters will never be reviewed by a court.

Lawyers eager to please their clients may thus have an incentive to shade their evaluations in their clients' favor.[193] A predictive decisionmaking regime might alter lawyers' incentives by giving the lawyers incentives to predict what courts would in fact decide. The problem is that the issues in opinion letters will eventually be litigated only some percentage of the time. It is relatively straightforward, however, to create a predictive decisionmaking mechanism that will nonetheless provide countervailing incentives. A very simple regulatory strategy would be to provide that fees must be refunded when a court later determines that the conclusion of an opinion letter was wrong. Combined with a requirement that lawyers providing opinions do not receive other work from the same clients,[194] this would give writers of opinions of counsel some incentive not to reach wrong conclusions.

If adjudication is sufficiently rare, however, such a sanction will make little difference. The problem is that the sanction would not be tailored to the probability that an erroneous opinion of counsel is discovered. A more sophisticated approach would require a lawyer providing an opinion to pay as a fine a multiple of the legal fees equal to the inverse of the probability that a particular letter ultimately would be adjudicated, plus interest, if a court eventually found this advice to be erroneous.[195] Under this regime, a lawyer's expected fee would

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[190] *See* Noöl B. Cunningham & James R. Repetti, *Textualism and Tax Shelters*, 24 VA. TAX REV. 1, 55-62 (2004) (discussing concerns about abuse of opinion letters).

[191] *See* Shashank Upadhye, *Understanding Willfulness in Patent Infringement: An Analysis of the "Advice of Counsel" Defense*, 8 TEX. INTELL. PROP. L.J. 39, 45-50 (1999) (providing an introduction to noninfringement opinions).

[192] *See, e.g.*, SRI Int'l, Inc. v. Advanced Tech. Labs., Inc., 127 F.3d 1462, 1465 (Fed. Cir. 1997) (noting that a legal opinion may prevent issuance of enhanced damages, but that the court will consider factors such as the objectivity of the advice presented).

[193] *See* Lynnley Browning, *U.S. is Denied Denied Most Papers Sought From Auditing Firm*, N.Y. TIMES, July 7, 2004, at C5 (discussing a recent controversy concerning tax shelters endorsed by several law firms).

[194] In the absence of such a requirement, attorneys might cross-subsidize opinions of counsel by charging more for other work, and the consequences of a finding of error would not be great.

[195] This approach borrows from the economic approach to punitive damages that recommends that punitive damages be used to compensate for situations in which bad conduct might not be detected. *See* Polinsky & Shavell, *supra* note 119 (suggesting this approach). In this context, the probability would need to reflect the advice that the lawyer gave. Adjudication might be less likely when a lawyer advises a client *not* to engage in certain activity, because adjudication then presumably will occur only if the client ignores the advice.

be equal to the fee multiplied by the probability that the court agrees with the lawyer. Even this regime might not produce optimal incentives, because lawyers might wish to take positions that are more likely to generate business in the future, even if the position taken in any given opinion letter does not maximize profits from that letter. At least if those who seek to immunize their conduct on the basis of opinions of counsel waive attorney-client privilege in advance,[196] however, courts would be able to rely to a greater extent than currently possible on such opinions in determining the clients' good faith.

A difficulty of this approach is that it would require some ex post assessment of the ex ante probability that an opinion letter would be adjudicated, and hindsight bias makes such ex post assessments difficult.[197] An alternative predictive decisionmaking approach would discipline the ex ante decisions by selecting a set percentage of those decisions for reconsideration. Suppose, for example, that a legislature wished to increase the incentives that arbitrators have to follow the law. Arbitrators may already practice fidelity to law in an effort to obtain clients, but if some parties (for example, securities firms or employers) have more control over the selection of arbitrators than their opponents (customers or employees), then arbitrators might have some incentive to favor the more powerful parties.[198] The legislature thus might in some context want to implement a mechanism that disciplined arbitrators decisions through random selection of a small percentage of cases for hearing in the district courts.

Such a mechanism might work like this: A governmental agency would use a computer random number generator to determine whether a particular case resolved by arbitration should be selected for traditional adjudication. Let us suppose that there is a one-in-ten chance that any given case is selected. If a particular case were selected, the traditional adjudicator would determine whether the arbitrator reached the correct or incorrect result.[199] If the result is

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[196] In the absence of such a requirement, clients might have an incentive to shop for favorable opinions. Concern about preserving the attorney-client privilege was central to a decision by the Federal Circuit to relax its prior rule providing for willful infringement damages when a patent infringer refused to release the contents of legal advice previously obtained. *See* Knorr-Bremse Systeme Fuer Nutzfahrzeuge Gmbh v. Dana Corp., 344 F.3d 1336 (Fed. Cir. 2003) (en banc). Courts, however, should be hesitant to place any weight on opinions of counsel if parties are willing to waive confidentiality only after those opinions prove favorable.

[197] *See* Jeffrey J. Rachlinski, *A Positive Psychological Theory of Judging in Hindsight*, 65 U. Chi. L. Rev. 571, 608-23 (1998) (discussing some approaches that the legal system might take to reduce hindsight bias).

[198] *See, e.g.*, Christopher R. Drahozal, *A Behavioral Analysis of Private Judging*, 67 Law & Contemp. Probs. 105, 127 && nn.128-29 (2004) (noting that a "repeat player" bias is a theoretical danger, but that studies so far are inconclusive).

[199] This assumes, admittedly unrealistically, that results are binary. A slightly more complicated mechanism would allow the traditional adjudicator to rate the arbitrator on a scale from 0 (completely incorrect) to 1 (completely correct).

incorrect, then the arbitrator would have to pay ten times the fee from the government; if the result is correct, then the arbitrator would receive ten times the fee to the government.[200] With this mechanism, an arbitrator would always have an incentive to resolve a case as it believes the court is most likely to resolve it.

As with other predictive decisionmaking designs in this paper, this approach to disciplining arbitrators may or may not be desirable. Perhaps arbitrators already seek to act as judges would, for example because of the existence of judicial review,[201] in which case the mechanism is redundant. Because one-tenth of cases would be subject to traditional adjudication, the mechanism may be more costly than traditional arbitration. The risk imposed on arbitrators would be so high that only a relatively small number of arbitration firms able to diversify the risk would likely exist, and such industry consolidation might lead to increased fees. The point, however, is simply that predictive decisionmaking can be used to provide incentives to one set of decisionmakers to act like a second set, by random selection of a few cases for resolution by the second set. The prior literature has failed to recognize even the possibility of such a strategy, and thus has not embarked on the task of considering whether there are any legal contexts in which it might be useful.

C. *Interest Rates and Conditional Prediction*

The opinion letter and arbitration proposals provide incentives to make predictions of an event that will occur only with some probability. It also is possible to induce pairs of predictions, anticipating some variable conditional both on an event's occurrence and on an event's nonoccurrence. The literature on information markets has suggested that conditional information markets might be used to gauge the expected effect of a policy decision on some variable of interest.[202] If policymakers are interested in knowing the effect of policy x on variable y (which

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[200] The program should roughly break even, but this is not guaranteed. An alternative approach would require that arbitrator payments to the government be placed into an annual fund. Correct results would result in the award of shares in the fund with a face value proportional to the fee being paid to the arbitrator. With this approach, payments by arbitrators necessarily would equal payments to arbitrators. For a similar proposal that would award shares in a fund to ensure equity among present and future claimants in mass tort cases, see Thomas A. Smith, *A Capital Markets Approach to Mass Tort Bankruptcy*, 104 YALE L.J. 367 (1994).

[201] Judicial review of arbitral decisions, however, is generally deferential. *See, e.g.*, First Options of Chicago, Inc. v. Kaplan, 514 U.S. 938, 948 (1995) ("[C]ourts grant arbitrators considerable leeway when reviewing most arbitration decisions . . . ."). Such deference is essential in a system that seeks to save parties from litigating their cases in the courts, but also may give arbitrators some freedom from constraint. The predictive decisionmaking insight is that decisionmakers can be disciplined not merely by a regime that affirms or reverses their decisions, but also by a regime that provides financial incentives.

[202] *See, e.g.*, Joyce A. Berg & Thomas A. Rietz, *Prediction Markets as Decision Support Systems*, 5 INFO. SYS. FRONTIERS 79

might be GNP, crime rates, test scores, or anything else that policy ideally will affect), the policymakers would create information markets that would predict both y given x and y given not x. The difference between the two predictions of y would be attributable to the decision to enact policy x.

As an example, let us consider interest rate policy. In considering a possible change in rates, a central banker cares about the effect that such a change would have on inflation and on unemployment. Conditional information markets might be used to predict the effects of the proposed change on these variables over some set time frame. For example, one information market might predict the inflation rate one year hence conditional on the change being made; securities in this information market would be worth the inflation rate times some constant announced in advance if the change were made, or zero if the change were not. An additional information market would predict the inflation rate one year hence conditional on the change not being made; securities in this information market would be worth the inflation rate times some constant announced in advance if the change were not made, or zero if the change were made. Finally, another information market would be used to predict the probability that the change will be made. From these three numbers can be extrapolated a market estimate of the effect of the possible change on inflation in one year, and similar information markets could produce estimates over alternative time frames or for variables such as unemployment.

Such conditional information markets might simply be used as an input into the central banker's interest rate decision. Given the extensive experience of capital markets anticipating the effect of interest rate decisions, information markets should produce relatively accurate predictions that would save the central banker the trouble of conducting independent analysis. Conceivably, though, it may be possible to replace a central banker with a rule that makes some preannounced tradeoff between inflation and unemployment. Some economists have considered replacing central bankers with some form of a rule that takes into account a number of variables concerning past economic performance,[203] but critics have argued that no rule could anticipate all of the economic conditions that might be relevant to an interest rate decision.[204] The conditional

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(2003) (providing an account of an information market used to assess conditional probabilities); *see also* Abramowicz, *supra* note 64, at 952-57 (providing an overview of conditional markets).

[203] *See, e.g.*, MILTON FRIEDMAN, A PROGRAM FOR MONETARY STABILITY (1959) (advocating constant growth of the monetary stock).

[204] *See, e.g.*, Patrick Minford, *Time-Inconsistency, Democracy, and Optimal Contingent Rules*, 47 OXFORD ECON. PAPERS 195,

information market approach overcomes this problem, because it predicts the outcomes of decisionmaking rather than inputs into decisionmaking. Information market participants would have an incentive to consider how novel economic circumstances might affect the relationship between interest rate decisions and variables such as unemployment and inflation, but the tradepff between these variables might be resolved in advance.

More generally, predictive decisionmaking can allow a partial escape from a common critique of rules, that they are necessarily overinclusive and underinclusive.[205] Rules that are based on conditional predictions of the consequences of a policy might be more congruent to the purposes underlying the rule than rules based on decisionmaking inputs. At the same time, rules remove the dangers associated with decisionmaker discretion. One reason that a rule-based approach to interest rates might be useful in some countries is that the monetary policy literature suggests that countries should seek to tie their hands to pursuing lower inflation than they would choose if given discretion at each point in time.[206] Inflation is caused in part by expectations of inflation, and so expectations of loose monetary policy are harmful even if looseness reflects the ideal tradeoff ex post. Countries thus seek to precommit to low inflation by appointing relatively conservative central bankers[207] and giving central bankers broad independence.[208] But some countries have had difficulty precommitting, and in these countries, a rule might further precommitment.

Interest rate policy is the classic example of the "time-consistency problem," as Finn Kydland and Edward Prescott noted in an article[209] that formed a central basis for their award of the 2004 Nobel Memorial Prize in Economics.[210] In some contexts, optimal policy ex ante differs

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195 (1995) (noting that rules may be inappropriate in monetary policy because of the need for a "flexible response" to economic shocks).

[205] *See supra* text accompanying note 18.

[206] *See* Robert Barro & David Gordon, *Rules, Discretion and Reputation in a Model of Monetary Policy*, 12 J. MONETARY ECON. 101 (1983) (recognizing the benefit of hand-tying).

[207] *See* David Currie et al., *The Choice of 'Conservative' Bankers in Open Economies: Monetary Regime Options for Europe*, 106 ECON. J. 345, 345 (1996) ("A growing and influential literature suggests that elected governments should delegate the operation of monetary policy to independent central bankers who are more 'conservative' in the sense that they assign a higher priority to low inflation than that of the representative government.").

[208] *See generally* ALEX CUKIERMAN, CENTRAL BANK STRATEGY, CREDIBILITY, AND INDEPENDENCE (1992) (reviewing and extending the theoretical and empirical literature on central bank independence).

[209] Finn E. Kydland & Edward C. Prescott, *Rules Rather than Discretion: The Inconsistency of Optimal Plans*, 85 J. POL. ECON. 473 (1977).

[210] *See* http://nobelprize.org/economics/laureates/2004/press.html (visited Mar. 18, 2005) (explaining the basis for awarding Kydland and Prescott the Prize).

from the optimal policy ex post; in such cases, the optimal policy is "time inconsistent," and precommitment, for example through reliance on rules rather than standards, may be needed to achieve it.[211] Predictive decisionmaking, however, can potentially allow for achievement of time inconsistent policy even without rules. A decisionmaker might be asked to make a retrospective assessment under a standard at some point in the future, and a predictive mechanism could be used to predict that decision and to determine policy. For example, an information market might predict in 2006 what a central banker in 2016 will say would have been the interest rate that a hypothetical optimal rule would have dictated for 2006. Although that central banker would be basing a decision on a standard, the central banker would not have the usual incentive to engineer a surprise inflation,[212] because the central banker's decision would be relevant only to discipline the information market, and would not itself set future interest rate policy. A predictive decision in 2006 can thus substitute for a normative decision and eliminate the temptation that a normative decisionmaker ordinarily would have to generate more inflation than the decisionmaker would have wished to precommit to in advance.

V. CONCLUSION

The literature on predictive decisionmaking is small, and predictive decisionmaking will not emerge overnight. Nor should it. Our institutions mostly work tolerably well, and adopting unfamiliar institutions that present unfamiliar sets of problems, both anticipable and unanticipable, is inherently risky. If predictive decisionmaking were used to evaluate predictive decisionmaking, the result might well not be favorable, because some predictive decisionmaking institutions might turn out to be flops.[213] The near-term prospects for adoption of predictive decisionmaking proposals are thus slight. Incremental change, such as increasing use of

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[211] Time inconsistency has proven important to understanding a wide range of legal and economic problems. *See, e.g.*, Michael Waldman, *Eliminating the Market for Secondhand Goods: An Alternative Explanation for Leasing*, 40 J.L. & ECON. 61, 62 (1997) (offering a positive explanation for the existence of leasing contracts that depends on time inconsistency).

[212] *See, e.g.*, Katharine S. Neiss, *Discretionary Inflation in a General Equilibrium Model*, 3 J. MONEY, CREDIT, & BANKING 357, 359 (1999) (offering a model describing the benefits to central bankers of engineering surprise inflations).

[213] That predictive decisionmaking might condemn itself is perhaps most clear with respect to Elhauge's proposal. Would the current Congress, if it considered the issue, choose a current preferences default rule? Anticipating this objection, Elhauge seeks out evidence that legislatures prefer a current preferences default rule. Elhauge, *Preference-Estimating*, *supra* note 20, at 2125-26. He concedes that there is "[n]ot much." *Id.* at 2125. My own hunch is that legislators and lawyers are generally conventionalists, hostile to innovative theories, even where those theories accurately purport to improve on older theories in describing contemporary practice. Thus, I would suspect that most legislators, if presented with the issue, would choose to require judges to seek to ascertain the intentions of enacting legislatures, even if logically it would be in their interest to support Elhauge's proposal. If I am right, then Elhauge's proposal can be justified only once his theory becomes sufficiently understood and accepted that legislators would support it.

prediction mechanisms to inform policymakers, is possible, however, and will allow for more complete academic evaluations of predictive decisionmaking.