PREDICTIVE DECISIONMAKING

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69

INTRODUCTION

PREDICTIONS often serve explicitly or implicitly as inputs into normative legal decisions. Few legal decisions are divorced from consideration of future developments that might make a course of action more or less wise, or from contemplation of the effects of the decisions themselves. Less obviously, predictions of future legal decisions and other events sometimes can substitute for normative decisionmaking. Instead of assigning a normative decisionmaking task to governmental officials, or crafting rules requiring officials to make factual assessments in service of a normative goal, the government can demand that governmental or private decisionmakers make explicit predictions. A legal institution whose decisions depend on such predictions engages in what I will call "predictive decisionmaking."

The dividing line between nonpredictive and predictive institutions is not always sharp. Holmes recognized long ago that private predictions of how the law will be enforced in effect are the law.[1] A relatively trivial example, however, can illustrate what does not count as predictive decisionmaking under my definition. Consider the regulatory regime of driver licensing. Individual decisionmakers at motor-vehicle departments sometimes might exercise discretion by implicitly making predictions about the likelihood that a driver will cause an accident. Because the regulatory regime does not make the licensing decision directly contingent on explicit pre-

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[1] O.W. Holmes, The Path of the Law, 10 Harv. L. Rev. 457, 461 (1897) ("The prophecies of what the courts will do in fact . . . are what I mean by the law.").

dictions by such decisionmakers, it is not a predictive decisionmaking approach.[2]

A predictive alternative might rely on another set of institutions that already make explicit predictive judgments about drivers: insurance companies. A state might provide that individuals may receive licenses only if they can purchase insurance at a low price that indicates insurers believe them to be relatively safe drivers. Insurance companies seeking to minimize future tort liability have an incentive to identify the best predictors of safe driving. A state legislature or administrative agency might not adopt an optimal set of requirements and administer these requirements effectively because there are complex empirical questions about how to identify the safest drivers. The predictive decisionmaking approach saves the government from having to consider these questions. The predictive decisionmaking approach might be particularly useful if a state wanted to license only the safest drivers among some group—for example, fifteen-to-eighteen year olds.

Predictive decisionmaking thus sometimes provides a previously unrecognized market alternative to command-and-control regulation.[3] Predictive decisionmaking, however, need not require privatization. Indeed, some public officials already engage in predictive decisionmaking.[4] For example, under *Erie*,[5] when a federal court faces a state

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[2] An example that comes much closer to predictive decisionmaking but still does not quite meet my definition is enterprise liability. See, e.g., Steven P. Croley & Jon D. Hanson, Rescuing the Revolution: The Revived Case for Enterprise Liability, 91 Mich. L. Rev. 683 (1993); Jon D. Hanson & Kyle D. Logue, The First-Party Insurance Externality: An Economic Justification for Enterprise Liability, 76 Cornell L. Rev. 129 (1990). Enterprise liability proposals rely on private predictions about future legal decisions as a substitute for normative legal decisionmaking. See, e.g., Jon D. Hanson & Kyle D. Logue, The Costs of Cigarettes: The Economic Case for Ex Post Incentive-Based Regulation, 107 Yale L.J. 1163, 1273–81 (1998) (arguing that a strict liability regime for cigarettes would be superior to ex ante regulation of tobacco, in part because it would better harness private information). Although the underlying justifications are similar, because the private predictions are not themselves the direct basis of a governmental decision, I would not count enterprise liability proposals as manifesting predictive decisionmaking.

[3] See infra Section III.B (explaining how predictive decisionmaking allows a market approach to safety regulation).

[4] 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, 5–6 (1994) (arguing that inferior courts should, and sometimes do, engage in "predictive decisionmaking" by assessing what superior courts would likely decide on appeal, rather than by making their own normative assessments).

[5] Erie R.R. Co. v. Tompkins, 304 U.S. 64, 69–90 (1938).

Virginia Law Review   [Vol. 92:69

law issue not yet definitively addressed by the state's highest court, the federal court will make a prediction about how the state court would decide the issue.[6] 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 decisionmaking in diversity cases,[7] and this Article's framework could be used to compare these 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. For instance, the prediction mechanism in the *Erie* example is nothing more than a decisionmaking standard that is predictive rather than normative. Someone who makes a bad prediction suffers at most some small reputational cost. In the driver licensing example, the prediction mechanism provides private parties with economic incentives. Hybrids of these approaches also are possible. For example, a state might ask individual motor vehicle officials to 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. Yet what all the examples have in common is that the regime requires the relevant decisionmakers to think predictively rather than normatively. Accordingly, this Article will seek both to explain why encouraging predictive instead of normative decisionmaking might be useful and to describe and compare a range of prediction mechanisms.

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[6] 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.").

[7] See, e.g., Arthur L. Corbin, The Laws of the Several States, 50 Yale L.J. 762, 771–72 (1941) (arguing that federal courts should employ traditional interpretive approaches 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 (1997) (advocating increased use of certification).

There are many objections, some powerful, to predictive decisionmaking proposals. My objective is not to endorse any particular predictive proposal. Rather, it is to highlight predictive decisionmaking as an approach to legal decisionmaking and regulation. What is striking is how rarely policymakers and commentators consider predictive approaches. For instance, as far as I have been able to determine, no one appears to have even suggested relying on insurance prices for driver licenses. This lack of attention exists even though the necessary predictive institution already exists, even though states already require insurance, and even though high insurance rates attributable to a poor driving record presumably keep some dangerous drivers on mass transit.

Perhaps the absence of a literature on this approach to driver licensing reflects simply that, all factors considered, it is a bad idea, or one that would raise constitutional problems. An alternative possibility is that the solution is nonobvious because lawmakers ignore the possibility of predictive decisionmaking institutions. Indeed, none of the works that this Article will identify as presenting predictive solutions cites any of the others or presents itself as an example of a general regulatory strategy. Because the predictive decisionmaking concept is alien, some of the proposals, including the automobile insurance proposal, will strike many readers as quirky. In this Article, I will aim to make the predictive decisionmaking concept intuitive. Many individual predictive decisionmaking proposals may still be unjustified, but they should not be condemned simply because the concept is unfamiliar.

The Article will outline the virtues of predictive decisionmaking and identify potential problems. The possibilities of predictive decisionmaking emerge clearly in contexts in which the relevant predictive mechanisms can work cheaply and accurately by reflecting available information and generating plausible probability estimates. Predictive decisionmaking could simplify the government's task in constructing some legal regimes. In addition, predictive decisionmaking can average the expected decisions of multiple decisionmakers and make legal decisionmaking more consistent. Predictive decisionmaking sometimes may make it more difficult for interest groups, corruption, irrelevant factors, or ideological bias to contaminate decisionmaking processes.

Perhaps the greatest danger of predictive decisionmaking stems from the inevitability that no prediction mechanism will match a crystal ball. 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. Rules tend to be overinclusive and underinclusive,[8] allowing regulated entities to exploit loopholes. Because predictive decisionmaking can often rely on a simple standard that tracks a variable of interest, predictive decisionmaking harnesses an advantage of standards in that they may be written in a way that makes them at least theoretically congruent to legislative intent. Vague standards ordinarily open up possibilities of inconsistent, corrupt, and biased decisionmaking. Predictive decisionmaking potentially avoids these pitfalls, however, and may conceivably cost less than normatively-based legal decisions.

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 proposals that this Article will review are motivated in part by concerns that the decisions generated by the nonpredictive alternatives may be unattractive. 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. The analysis here will identify some reasons for caution about both existing and hypothetical predictive decisionmaking proposals.

Part I will describe four different prediction mechanisms that might underlie a predictive decisionmaking regime, each in the context of a 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 employ some form of financial incentive. Part II will evaluate predictive decisionmaking generally, elaborating on the dangers and possibilities sketched above. Part III will consolidate these observations into a simple analytical framework

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[8] See, e.g., Cass R. Sunstein, Problems with Rules, 83 Cal. L. Rev. 953, 992–93 (1995).

that can be used to assess predictive decisionmaking proposals, and it will apply the framework to the proposals considered in Part I. It also will introduce and preliminarily assess the possibility of using predictive decisionmaking for safety regulation. Part IV will offer additional variations on the predictive decisionmaking theme.

I. THE MECHANISMS OF PREDICTIVE DECISIONMAKING

This Part illustrates each of four predictive decisionmaking mechanisms by identification of a proposal by a legal scholar or economist invoking the mechanism.[9] The proposals are ordered roughly by the independence of the predictions from their legal implications. With the first mechanism, the prediction is the law, while the last mechanism produces a prediction that may have little or no legal consequence. This Part does not assess the proposals on their merits.[10]

A. Predictive Standards

In *Preference-Estimating Statutory Default Rules*,[11] Professor Einer Elhauge argues that courts should resolve ambiguities in statutes by determining which interpretations of statutes would maximize political satisfaction—that is, the interpretations most likely to be enacted into law by the current legislature. When the current legislature might be able to resolve an ambiguity if the issue were on its agenda,[12] and the court can identify a particular

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[9] This is not intended to be a comprehensive list of predictive decisionmaking mechanisms. At least two other mechanisms bear mentioning. First, an auction might be used to generate a prediction. A predictive decisionmaking proposal using auctions is illustrated in Michael Kremer, Patent Buyouts: A Mechanism for Encouraging Innovation, 113 Q.J. Econ. 1137 (1998). Through the auction mechanism, the government would obtain private estimates of the value of a patent and then, with some probability, buy out the patent at that price. Id. at 1146–47. Second, negotiations often serve as predictive decisionmaking mechanisms. By honoring settlement agreements that reflect predictions of what the courts would do, the courts save the trouble of adjudicating many cases themselves.

[10] But see infra Section III.A (revisiting the proposals).

[11] Einer Elhauge, Preference-Estimating Statutory Default Rules, 102 Colum. L. Rev. 2027, 2032–34 (2002) [hereinafter Elhauge, Preference-Estimating].

[12] 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.

resolution of the ambiguity as more likely than not to be what the legislature would choose if it did act,[13] the court should resolve the ambiguity as the legislature would. Elhauge defends the approach as normatively desirable and descriptively powerful, explaining various canons of construction[14] and judicial reliance on legislative history.[15]

This theory fits within the predictive decisionmaking paradigm, understood to encompass not only regimes in which actual decisions are predicted, but also regimes demanding hypothetical predictions.[16] Professor Elhauge contrasts his regime with alternatives demanding that, given statutory ambiguity, judges should exercise judgment[17]—for example, by doing what they construe to be "the 'right' thing."[18] The predictive decisionmaking alternative to a normative decision is to generate a prediction and then give that prediction legal force. The predictive decisionmaking turn in Elhauge's proposal is 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 positions.

If predictive decisionmaking theories were commonplace, Professor Elhauge's inventive proposal would have been obvious. When an ideal institution cannot resolve every issue of a particular type for reasons of time or cost, a predictive decisionmaking institution can substitute by predicting what the ideal institution would do. Because the legislature is the embodiment of representative

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[13] This interpretation is to be calculated according to the relative probabilities of different resolutions that the legislature might successfully reach. 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. at 2061 n.84. 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.

[14] Id. at 2049–56.

[15] Id. at 2056–76.

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

[17] Elhauge, Preference-Estimating, supra note 11, at 2040–44.

[18] Id. at 2041.

governance, its decisions are presumptively normatively sound and democratically legitimate. Legislators, however, have limited time and attention.[19] They thus cannot anticipate all statutory ambiguities or be burdened with the resolution of all cases that might implicate such ambiguities.[20] Judges could make their own normative decisions according to any number of theories, but the predictive decisionmaking insight is that prediction can substitute for normative analysis.

B. Accuracy Incentives

Sometimes, a legal regime that requires parties to internalize the future costs of their decisions will similarly save the government from a regulatory task.[21] When internalization is not possible, 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. Professors Robert Cooter and Winand Emons, in a pair of articles,[22] 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.[23] As a result, they claim, "slanted testimony is endemic in courts."[24] An alternative approach is to impose penalties on witnesses whose testimony turns out to be false. The penalty would vary with the in-

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[19] See, e.g., Daniel J. Meltzer, The Supreme Court's Judicial Passivity, 2002 Sup. Ct. Rev. 343, 386 (elaborating on "the enormous range of what Americans ask Congress to undertake").

[20] 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, 359–60 (1993) (arguing that the independent judiciary can be defended as a type of delegation from the legislature).

[21] This is the logic of enterprise liability. See supra note 2.

[22] 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. Institutional & Theoretical Econ. 259 (2003) [hereinafter Cooter & Emons, Truth-Revealing].

[23] Cooter & Emons, Truth-Revealing, supra note 22, at 260.

[24] Cooter & Emons, Truth-Bonding, supra note 22, at 308.

centive that the witness had to slant testimony in one direction or another, so perfectly neutral witnesses should not be subject to penalties at all.[25] The sanction might be imposed by a judge. Alternatively, parties might voluntarily consent to such arrangements by permitting lawyers 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.[26] A refusal to accept a bond would signal that a witness had little confidence in the proffered testimony.[27]

Professors 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.[28] To make the testimony potentially falsifiable, "the cross-examining attorney might ask the economist whether at least 50% of industrial economists at major universities, when confronted with the same evidence that he relied upon," would agree with the conclusion.[29] After the trial, there would be some chance that a survey of one or more randomly selected economists would occur. If the testifying economist incorrectly predicted the result of this survey, an appropriate penalty would apply that would be sufficient to lead him to make an honest prediction about the proportion of economists who would agree with the economist's testimony.[30]

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 norma-

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[25] Cooter & Emons, Truth-Revealing, supra note 22, at 269. 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." Cooter & Emons, Truth-Bonding, supra note 22 , at 315.

[26] Cooter & Emons, Truth-Bonding, supra note 22, at 316–19.

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

[28] Id. at 313.

[29] Id.

[30] 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.

tive 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.[31] Professors Cooter and Emons suggest that courts rely on witnesses' bonded predictions instead of making solely normative assessments of experts' economic claims. The proposal thus runs parallel to Professor Elhauge's. Just as Elhauge would use predictions rather than potentially idiosyncratic normative frameworks to resolve legal ambiguities, so too would Cooter and Emons rely on predictions rather than potentially idiosyncratic positive frameworks to resolve factual ambiguities.

C. Partial Insurance Requirements

In the proposals assessed so far, the predictors have been either the decisionmakers themselves (in the Elhauge proposal) or individuals whose behavior the government wishes to affect (in the Cooter and Emons proposal). It is also possible, however, for a predictive decisionmaking regime to rely on third-party predictors, and as the example in the introduction implies, there already exists a set of institutions with expertise in making probabilistic 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 expected losses from such a policy plus the administrative costs of issuing the insurance. The more competitive the insurance market, the narrower 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. This is a familiar point from the insurance

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[31] Scott Brewer, Scientific Expert Testimony and Intellectual Due Process, 107 Yale L.J. 1535, 1590–1634 (1998) (arguing that nonexperts will have difficulty assessing the testimony of experts).

law and regulation literature,[32] and a full insurance requirement acts as an enterprise liability regime applied to the combination of the regulated entity and its insurer. Insurance requirements can be useful, however, even where it is not desirable or feasible to require parties and their insurers to internalize fully certain costs. The reason is that insurance mandates lead to purchases of insurance at particular prices—prices that the government conceivably can interpret as proxies for predictions, which the government can then use 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 Professors Kenneth E. Scott and Thomas Mayer's comprehensive treatment of federal deposit insurance reform.[33] Scott and Mayer devote much of their analysis to justifying the 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.[34] They argue further 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.[35] The private market cannot be relied on, in any event, to provide adequate insurance because bank failures are likely to be highly correlated,[36] and the risks are suffi-

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[32] 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).

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

[34] Id. at 859–60.

[35] Id. at 864–66. Professors 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.

[36] 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).

ciently large that private firms will be unable to maintain sufficient reserves or reinsurance to cover all possible losses.[37]

Nonetheless, Professors Scott and Mayer argue that the premiums that banks pay to the government should vary depending on their actual risk, rather than being uniform.[38] The challenge is determining how to set these premiums. Scott and Mayer suggest that no formula will be sufficient to set premiums efficiently,[39] and that there is a risk that the process of setting premiums might become politicized.[40] To that end, predictive decisionmaking seeks to replace a potentially flawed governmental decisionmaking process with a prediction. Accordingly, after considering other possibilities, Scott and Mayer offer a one-paragraph proposal suggesting a predictive approach[41] under which banks might be required to obtain private insurance for some small portion of their deposits.[42] According to Scott and Mayer, "[t]he resulting demand would bring a new form of private insurance into existence and thereby create a large, independent set of risk judgments."[43]

Professors 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 as-

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[37] Scott & Mayer, supra note 33, at 866–67.

[38] Id. at 886–92.

[39] 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.").

[40] Id.

[41] Id. at 895.

[42] 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.

[43] Id.

82   *Virginia Law Review*   [Vol. 92:69

sessed on their own terms, and an advantage of a partial insurance requirement is that it can be used in conjunction with different regulatory regimes.

D. Information Markets

Information markets can be established to generate consensus predictions about any variable of interest. Because information markets need not have any legal consequences, they 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, literature focusing on information markets has emerged across a variety of fields, including business,[44] economics,[45] finance,[46] law,[47] and pol-

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[44] See, e.g., Thomas W. Malone, Bringing the Market Inside, Harv. Bus. Rev., Apr. 2004, at 107 (discussing and providing examples of how internal use of information markets could lead to "dramatically streamlined decision making" within a corporation); 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).

[45] See, e.g., Paul W. Rhode & Koleman S. Strumpf, Historical Presidential Betting Markets, 18 J. Econ. Persp. 127 (2004) (analyzing the accuracy of large public markets for betting on elections, a historical precursor 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).

[46] See, e.g., Joyce Berg et al., Accuracy and Forecast Standard Error of Prediction Markets (July 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 (Jan. 2004) (unpublished manuscript, on file with author) (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 (June 2004) (unpublished manuscript, on file with author) (illustrating the use of an information market to analyze equity prices in the Standard & Poor's 500 Index).

[47] 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); Tom W. Bell, Gambling for the Good, Trading for the Future: The Legality of Markets in Science Claims, 5 Chap. L. Rev. 159 (2002) (assessing whether privately-run information markets are consistent with gambling laws and commodities futures trading regulation); Cass R. Sunstein, Group Judgments: Deliberations, Statistical Means, and Information Markets (John M. Olin L. & Econ., Working Paper No. 219, 2004) (arguing that information markets may help overcome flaws of deliberative processes); Miriam A. Cherry & Robert L. Rogers, Tiresias and the Justices: Using Information Markets to Predict Supreme Court Decisions (Feb. 18, 2005) (unpublished manuscript, on file with author).

icy.[48] Although scholarly interest has been pronounced of late, the first paper proposing the use of information markets to generate predictions used for other purposes was published just over a decade ago.[49] In this proposal, Professor Robin Hanson suggests that an information market, which he calls an "idea futures market,"[50] 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 demonstrate confidence in their views of the expected resolution of scientific questions.[51] Hanson suggests that an information market might be superior to traditionally structured peer review in rewarding scientific merit.[52]

In Professor Hanson's proposal, the market would work as follows: First, the creator of the market would identify a contested scientific proposition that eventually might be proven true or false. Next, shares would be distributed. The shares 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

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[48] See, e.g., Adam Meirowitz & Joshua A. Tucker, Learning from Terrorism Markets, 2 Persp. on Pol. 331, 333 (2004) (drawing lessons from a failed information markets initiative); Robert W. Hahn & Paul C. Tetlock, Using Information Markets to Improve Public Decision Making (AEI-Brookings Joint Ctr. for Reg. Stud., Working Paper No. 04-18, 2005) (providing a variety of policy applications for information markets); Justin Wolfers, Pricing Political Risks with Prediction Markets (Stan. Inst. for Econ. Pol'y Res. Pol'y Brief) (June 2004), available at http://siepr.stanford.edu/papers/briefs/policybrief_jun04.html (last accessed Oct. 4, 2005) (discussing how information markets can help assess the magnitude of political risks).

[49] See Robin Hanson, Could Gambling Save Science? Encouraging an Honest Consensus, 9 Soc. Epistemology 3, 7–9 (1995) [hereinafter Hanson, Could Gambling Save Science?].

[50] A variety of terms have been used for the phrase "information market." See Robin Hanson, Foul Play in Information Markets 1 (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.

[51] Perhaps the most famous example of a scientific (or, 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 Professor Paul Ehrlich and economist Julian Simon about whether prices would fall).

[52] Hanson, Could Gambling Save Science?, supra note 49, at 6–9.

Virginia Law Review [Vol. 92:69

market, with a bid-ask queue joining together buyers and sellers.[53] The prices at which shareholders exchange the shares 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 what the government should 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.

Professor Hanson's proposal fits the predictive decisionmaking paradigm perfectly: he opens his paper by arguing that peer review is "just another popularity contest" that 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 one's own."[54] 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 the participants would presumably be scientists, but they would have to put their money where their mouths are for their opinions to matter. Thus, as in the previous proposals, Hanson envisions substituting a mechanism for predicting a future decision (in this case, the eventual decision about whether a particular proposition has been proven true) for a normative one.

II. THE PROMISE AND PITFALLS OF PREDICTIVE DECISIONMAKING

A. Promise

To consider the promise of predictive decisionmaking, let us for now assume away the pitfalls. Imagine that a predictive decision-

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[53] Id. at 12–14. Another set of shares would pay off in reverse—for example, $1 if the proposition turns out to be false and $0 if the proposition turns out to be true. Id. This additional set of shares would not be essential, but it would allow profit on information that the proposition is more likely than previously thought to be false, without requiring short selling.

[54] Id. at 4 (citations omitted).

making mechanism consistently, and at low cost, yields the most accurate predictions possible 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. For example, the government could avoid the trouble of crafting detailed regulations to assess individual bank risk by relying on insurance prices for bank regulation. 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 produce some measurable effect, then instead of controlling the entity's actions directly, the government can use a predictive mechanism that will produce an independent estimate of the probability of the relevant effect. The government might then issue fines or bonuses based on this prediction, or it might condition a regulated entity's license on the prediction.

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. Insurance companies pricing bank risk, for example, would have an incentive to respond to relevant changes in the economic environment. Similarly, participants in an information market about scientific propositions could profit by trading on news affecting the validity of scientific propositions. So, if cold fusion were suddenly conclusively proven impossible, a government relying on the information market could stop funding such research without any separate analysis of its own.

Regulatory simplification also makes it more difficult for private parties to exploit loopholes. 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

government's rules.[55] 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.

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.[56] 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 litigation might depend on the particular normative views of a 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 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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[55] 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).

[56] 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.[57] Implicit in Professor Elhauge's case is his view that judicial prediction of legislative action is a more disciplined task than judicial exercise of normative discretion.[58] 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.[59]

Even if there is a substantial possibility of measurement accuracy or other forms of error in the eventual decision that governs a predictive decisionmaking mechanism, the mechanism itself might reliably produce the predictions sought. 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 depends on sound predictions, but sound predictions do not always turn out to be correct.

3. Aggregation of Diverse Preferences

The possibility of ex ante consistency despite ex post randomness means that predictive decisionmaking may also 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 that each decisionmaker

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[57] Consistency follows from the assumptions of accuracy and lack of bias, which we will reconsider below. See infra Sections II.B.2–3.

[58] See, e.g., Elhauge, Preference-Estimating, supra note 11, 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. 1389, 1415–18 (arguing that Elhauge's proposal undervalues the role of legal stability in an effective judicial system).

[59] See Abramowicz, supra note 47, at 977–79 (assessing some experimental data indicating that ideology of information market traders does not affect results).

within that group is likely to make bad decisions in his individual capacity because each might deviate greatly from a moderate position in one direction or the other. There may be contexts in which occasional deviation from moderation is useful,[60] but decisionmaking institutions still seek to prevent idiosyncratic decisionmaking in many situations. One way of accomplishing this is to ensure that a large number of decisionmakers (such as a large commission or an en banc judicial panel) address any particular question.[61] That can, however, be impractical in many circumstances, in part because of the large costs 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, Professor 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 the government funds research on the basis of these probability assessments, it probably makes sense for funding to reflect majority sentiment. Therefore, a nonpredictive institution allocating scientific funding cannot depend on a single peer reviewer, but must have enough reviewers (or reviewers of reviewers) to prevent idiosyncratic views from distorting research priorities. Yet this approach may be expensive and cumbersome. By contrast, a predictive decisionmaking approach might use a prediction mechanism to anticipate a decision by a decisionmaker to be chosen later. That

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[60] See, e.g., Heather K. Gerken, Second-Order Diversity, 118 Harv. L. Rev. 1099, 1102–04 (2005) (arguing that there may be benefits to governance structures that occasionally permit those in a minority position to run decisionmaking bodies). 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).

[61] The Condorcet Jury Theorem provides that if each independent decisionmaker has at least a 50% probability of arriving at the correct decision, then as the number of decisionmakers rises, so too does the chance of a correct decision. Nicholas R. Miller, Information, Electorates, and Democracy: Some Extensions and Interpretations of the Condorcet Jury Theorem, *in* Information Pooling and Group Decision Making 173, 174–77 (Bernard Grofman & Guillermo Owen eds., 1986).

decisionmaker might evaluate whether a 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 with 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: voting to determine who will be the decisionmakers for the relevant institution, and voting among those decisionmakers. Both types of voting seek to ensure that the decisionmakers' ultimate decisions represent the views of their constituents. 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. 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 one hundred scientists vote on each research proposal, at any given time the decisionmakers may have different views, on average, than the broader group of scientists that they purport to represent. 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.

90   *Virginia Law Review*   [Vol. 92:69

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 have a disproportionate influence on decisionmaking.[62] Theorists of regulation, for example, worry about the possibility that interest groups may "capture" administrative agencies, leading to regulation that supports private interests rather than the public interest.[63] The most extreme form of external influence, relatively rare in the United States but endemic in some other countries,[64] is bribery. Some people might argue that interest-group pressure or even bribery can promote efficiency by creating a market in regulatory outcomes,[65] but in many contexts we may wish to design systems that 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.[66]

Predictive decisionmaking institutions may help insulate decisions from outside influence, assuming that the predictive mechanisms themselves are not subject to manipulation.[67] It will be easier to insulate the decision from external influence in situations where the prediction focuses on more objective criteria. For example, Professor Hanson's information market assessing scientific predictions is designed, in part, to escape what Hanson sees as scientific

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[62] See George J. Stigler, The Theory of Economic Regulation, 2 Bell J. Econ. & Mgmt. Sci. 3, 3–6 (1971) (providing the seminal observation of this point).

[63] 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 and government regulatory agencies' susceptibility to control by industry groups).

[64] For an overview of the corruption problem, specifically focusing on the problems of developing countries, see generally Susan Rose-Ackerman, Corruption and Government: Causes, Consequences, and Reform (1999).

[65] Cf. Philip M. Nichols, Outlawing Transnational Bribery Through the World Trade Organization, 28 Law & Pol'y Int'l Bus. 305, 338–39 (1997) (referring to, but disagreeing with, "[t]hose who continue to believe that bribery serves merely as a lubricant that opens up markets").

[66] 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, 186–87 (1999) (finding that jury verdicts against out-of-state businesses are 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).

[67] See infra Section II.B.3.

reluctance to reject established views.[68] Therefore, Hanson's market will work most effectively if the eventual evaluation about the accuracy of a proposition is made in a way that prevents present scientific prejudice from having much influence. The partial insurance scheme for banks, meanwhile, seems likely to be successful in insulating individual bank evaluations from outside influence because of the relatively objective legal criteria for determining the occurrence of insolvency.

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 secure grants by convincing the grantor of the truth of particular scientific propositions. But with Professor Hanson's predictive decisionmaking market, the eventual decision acknowledging the truth of a proposition matters only because it disciplines the predictors in the information market. By the time the proposition needs resolution, it will already have been determined, in part through the information market, whether particular researchers will have received funds. Thus, the researchers will have no ex post incentive to manipulate the market. Further, even where ex post decisionmaking processes are quite 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

This Section identifies five possible pitfalls of 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.

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[68] See supra note 54 and accompanying text.

92   *Virginia Law Review*   [Vol. 92:69

1. Miscalibration

The miscalibration concern is that given predictions may not reflect what is important from a normative perspective for a particular decisionmaking institution. Concerns about miscalibration will generally be specific to the particular proposal, rather than trans-substantive. Nonetheless, the miscalibration concern presents a general danger: Predictive decisionmaking may place arguably legitimate considerations outside the decisionmaking calculus. For example, Professor Elhauge's approach would make it irrelevant that legislative preferences tend to reflect the input of concentrated interest groups more than those of diffuse interest groups.[69] Elhauge's proposal would therefore be inadequate to someone who believes that the judiciary should strive to mitigate the effects of powerful interest groups.[70] Furthermore, the predictions generated by the partial insurance requirement suggested by Professors Scott and Mayer will take into account all potential causes of bank failure, including poor macroeconomic policy, even though Scott and Mayer themselves conclude that banks should not bear such costs.[71]

2. Inaccuracy

Even if a predictive decisionmaking regime is not inherently miscalibrated, it may still be hobbled by a predictive mechanism that produces too much noise. While predictive decisionmaking regimes will not be perfectly accurate, they must produce forecasts that come close to reflecting expected values. Whether they can do so 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 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 differential risk of different policyholders? Will information markets be efficient enough that their prices can be relied on for legal purposes?

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[69] See Elhauge, Preference-Estimating, supra note 11, at 2083–84.

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

[71] Scott & Mayer, supra note 33, at 864–66.

These questions are too large and complex for comprehensive treatment here, and for most of these questions, the answers are not likely to come soon. 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.[72] Similarly, we cannot experiment to determine how powerful accuracy incentives will be because, although laboratory experiments might provide suggestive results, it usually will not be feasible to create real-world, natural experiments of these sorts of specific proposals. Therefore, normative evaluations of predictive decisionmaking proposals necessarily will depend on our intuitions about the anticipated accuracy of predictive decisionmaking mechanisms.

3. Bias

A specific 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. Expert witnesses might lie about the proportion of other experts who 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.

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 consequence 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 is important from a normative perspective in assessing a predictive

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[72] See Abraham, supra note 32, at 76–83 (discussing risk classification in insurance and why it may be limited).

decisionmaking institution. Perhaps inaccuracy in predictive deci-sionmaking is less tolerable when it stems from conscious deci-sions, as opposed to inadvertent misprediction.

Inaccuracy from bias may be less tolerable than inaccuracy from incomplete competence for reasons related to equality. If personal connections with well-connected insurance company executives helped bad drivers obtain licenses in a predictive licensing institu-tion, such bias would produce both efficiency and fairness con-cerns. Similarly, if certain groups were able to manipulate informa-tion markets successfully,[73] that would be a concern not merely because erroneous predictions might produce bad policy, but also because those groups might receive ill-gotten gains. In addition to equality concerns, there is also the problem of deception. For ex-ample, we might be concerned about the potential for biased judi-cial predictions about legislative actions because we value judicial candor and would prefer decisions that admit normative prefer-ence to those that seek to conceal it.

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. Witnesses subject to sanctions for inac-curacy may devote additional effort to ascertaining the truth, and they may thus demand greater compensation for testifying. Insur-ance companies will pass along the cost of their actuaries via pre-miums. And for information markets to be effective, they likely will need to be subsidized, presumably by the government for most legal applications. The costs associated with a given regime obvi-ously depend on its design and scope.

In addition to direct financial outlays, predictive decisionmaking mechanisms may impose a cost in the form of risk. Insurance prices

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[73] Preliminary analysis suggests that attempts to manipulate information markets are unlikely to have sustained effects on prices. See Abramowicz, supra note 47, at 972–76 (assessing the dangers of manipulation). Counterintuitively, such attempts may im-prove accuracy by increasing market liquidity. See Robin Hanson et al., Information Aggregation and Manipulation in an Experimental Market, J. Econ. Behav. & Org. (forthcoming 2005) (manuscript at 6–7, on file with author) (showing that manipula-tion attempts increased market liquidity and thus market accuracy).

will rise, for example, to the extent that an insurance company cannot diversify away the costs of risk.[74] Information market participants will participate only if they anticipate that their expected gains from participation (such as 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 participants will want to undertake before accepting the risk.

The institutional designer will therefore often face a tradeoff between accuracy and cost because devoting more resources to prediction will increase both. The ability of the designer to choose a particular tradeoff is a significant virtue of predictive decisionmaking institutions relative to nonpredictive alternatives. With nonpredictive alternatives, it may be possible to change the effectiveness of institutions by devoting greater or fewer resources, but the means of doing so are relatively clumsy. The government, for example, might develop detailed bank examination guidelines, or more or less cumbersome scientific review procedures, but these are complex transformations. With a partial insurance requirement or an 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 some predictions at very low cost. Nonpredictive institutions entail a degree of formality, for example, in the form of a right to a hearing or a written explanation of a decision. These formalities 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*

Many still would not trust predictive decisionmaking even if the predictive mechanisms were perfectly calibrated, accurate, and unbiased. Indeed, they might condemn the process even if the predictions cost nothing. There might be any number of reasons for such

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[74] See Abraham, supra note 32, at 2 (discussing the benefits of risk pooling).

condemnation, but some critics may focus on the loss of democratic deliberation in predictive decisionmaking. We may value deliberation intrinsically or because we believe that it improves decisions more than some of the other decisionmaking processes. One could argue that judicial decisionmaking in the course of filling statutory gaps might stimulate public discourse more than mere prediction. In the same vein, one could claim that the participation of trial witnesses may itself reflect a kind of democratic engagement, and the provision of financial incentives would inevitably change this engagement.

Such claims are difficult to evaluate because the intrinsic value of deliberation is subjective and because any educational benefits of deliberation are virtually impossible to measure. There are, however, at least three caveats that must be addressed. First, there are surely some contexts in which democratic deliberation is 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 it is a strain to argue that regulators' discussions in assessing individual banks will meaningfully improve public discourse on other issues. Second, deliberative institutions suffer from pathologies of their own. Professor Cass Sunstein, for example, has chronicled some of the problems of deliberative institutions and argued that information markets sometimes may help counter them.[75] 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.

III. AN ANALYTICAL FRAMEWORK FOR PREDICTIVE DECISIONMAKING

The above analysis of the promise and pitfalls of predictive decisionmaking suggests that the value of an individual proposal may be evaluated based on its relative ability to satisfy at least three important standards: first, whether what is being predicted will provide a sound basis for decision; second, whether the predictive

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[75] Sunstein, supra note 47, at 3–7.

mechanism will be sufficiently accurate and unbiased; and third, whether the mechanism of translating predictions into policy is legitimate and sufficiently inexpensive in a particular context. Section III.A uses this framework to evaluate past proposals. Section III.B proposes a new application of predictive decisionmaking to safety regulation and applies the framework to compare different approaches to implementing this new application.

A. Evaluation of Past Proposals

This Section applies the analytical structure discussed above 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 of this Section is not to reach conclusions about the merits of the proposals, for such a task 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 also illustrates how this analytical framework highlights central issues concerning the suitability of particular proposals.

1. The Object of Prediction: Whether what is being predicted will provide a sound basis for decision

Elhauge. Each of the three issues is best examined by assuming away the other problems. Thus, in considering Professor Elhauge's proposal, we first will 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 argument in favor of Elhauge's position is clear,[76] but potential objections arise. Perhaps judges should not be seen as mere handmaidens to legislators, and instead they should be viewed as active partners in the lawmaking process, uniquely situated to ensure that the law reflects principle and not just expedience.[77] Relatedly, al-

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[76] See supra text accompanying note 19.
[77] Professor Elhauge confronts an argument along this line by offering a brief rebuttal to Professor Ronald Dworkin's theory of judging. See Elhauge, Preference-Estimating, supra note 11, at 2044–47.

though legislators' enactments may be entitled to a presumption of democratic legitimacy,[78] perhaps we should not elevate their hypothetical decisions to the status of law. These arguments illustrate that predictive decisionmaking proposals will sometimes demand analysis that a predictive decisionmaking theory cannot provide.

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. 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.[79] 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 pool. 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 Professors 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 premiums 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 premiums 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.

Hanson. Assessing the object of prediction in Professor Hanson's proposal is difficult in part because he only vaguely defines

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[78] Jeremy Waldron, The Dignity of Legislation 92–123 (1999) (offering an Aristotelian defense of the legitimacy of legislation).

[79] Cooter & Emons, Truth-Bonding, supra note 22, at 320.

the proposal for what the government should do with the predictions. Indeed, because information markets have no legal consequences on their own, the uses to which the government can put them are virtually limitless. But this also may mean that the policy implications of information markets are not always obvious. For example, assuming that the government channels research funds based on information markets, it might not be optimal for the government to fund only those research projects geared toward proving or developing propositions that are likely to be 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,[80] some research effort might still be justified because of the large payoff if 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.

2. The Prediction Mechanism: Whether the predictive mechanism will be sufficiently accurate and unbiased

Elhauge. Would judges' predictions of hypothetical legislative decisions be sufficiently accurate and unbiased? Professor 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 judges can make sufficiently accurate assessments.[81] He also confronts the possibility of bias, acknowledging that "open-ended interpretive power" creates the danger not only of "error costs (good

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[80] See United States Department of Energy, Report of Review of Low Energy Nuclear Reactions, (Dec. 1, 2004), at http://www.science.doe.gov/Sub/Newsroom/News _Releases/DOE-SC/2004/low_energy/CF_Final_120104.pdf (indicating that further research into cold fusion is needed before it can be determined whether it has a scientific basis).

[81] For example, Professor Elhauge recognizes that judges sometimes might rely on the preferences of the enacting legislature rather than the preferences of the current legislature when the former is more easily ascertainable. Elhauge, Preference-Estimating, supra note 11, at 2095–96. Similarly, Elhauge insists that judges refrain from relying on every "changed reading of the political tea leaves," assessing current preferences instead only by considering official political actions. Id. at 2107. In a companion piece, Elhauge argues that where current preferences are not readily ascertainable, 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, 2165 (2002).

faith errors in guessing about changing legislative preferences),"
but also of "agency costs (furthering judges' personal preferences
in the guise of following current legislative views)."[82] Elhauge an-
swers that actual judicial practice demands relatively objective evi-
dence of current legislative preferences.[83]

Yet Professor Elhauge's reasoning allows for the possibility that
judges sometimes may make difficult predictive assessments[84] and
that, arguably, these assessments may reintroduce judicial prefer-
ences in disguised form.[85] Perhaps more troublingly, Elhauge does
not directly confront the objection that judges' personal prefer-
ences might affect not only which policy resolution they anticipate
the legislature would select when there is relatively little evidence
of current legislative preferences,[86] but also whether they conclude
that there is sufficient evidence of such preferences in the first

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[82] Elhauge, Preference-Estimating, supra note 11, at 2107.

[83] See id. at 2112–59 (surveying the types of evidence that courts will tend to con-
sider).

[84] A hypothetical offered by Professor 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. He recognizes, however, that "courts will
rarely have these sorts of precise percentages in mind." Id. at 2081. Given such inher-
ently uncertain figures, if the percentages really are 60% to 40%, it will often be plau-
sible to argue that the percentages are 40% to 60%. With percentages relatively close
to 50%, judicial political preferences may affect predictions.

[85] Allowing judicial preferences to affect decisionmaking in disguised form may re-
sult in more inferior doctrine 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 Inter-
pretations of Statutory Provisions, 41 Vand. L. Rev. 301, 305–07 (1988) (discussing
"creative interpretation," in which judges pretend to be interpreting a statute that
does not speak to an issue).

[86] There is a large body of literature suggesting that judges' ideological preferences
affect their decisions. See, e.g., Frank B. Cross & Emerson H. Tiller, Judicial Partisan-
ship and Obedience to Legal Doctrine: Whistleblowing on the Federal Courts of Ap-
peals, 107 Yale L.J. 2155, 2168–71 (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 Just. Sys. J. 219, 221 (1999) (providing "a compendium of empirical undertakings
connecting party ID with judicial ideology"); Cass R. Sunstein et al., Ideological Vot-
ing on Federal Courts of Appeals: A Preliminary Investigation, 90 Va. L. Rev. 301,
304–05 (2004) (showing that an opinion author's own ideology and the ideology of
other panel members may affect judicial voting).

place.[87] The preference-estimating approach leaves considerable room for debate about whether it should apply in any given case,[88] 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. To ensure predictor objectivity, predictive decisionmaking proposals sometimes must be limited to situations where the predictive task is relatively easy. Often, there will be no objective guideposts for determining whether a predictive task indeed is easy, and decisionmaking regimes which permit predictive decisionmaking only where a task is easy introduce the possibility for bias in that determination.

Cooter and Emons. Professors Cooter and Emons's analyses are buttressed by mathematical models demonstrating various desirable properties of their predictive mechanism. One such property is the optimization of each witness's incentive to be honest, assuming that the mechanism is properly calibrated and the witness is a

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[87] Professor 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 evidence, however, suggests that judges' political preferences may affect their threshold determinations of whether statutes are ambiguous. See, e.g., Cross & Tiller, supra note 86, at 2169 (predicting that a "court panel is more likely to follow *Chevron* when the agency has issued a policy consistent with the panel's assumed policy preferences . . . than when there is no such alignment"); 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, 1104 (2001) (providing evidence of ideological voting among D.C. Circuit judges but rejecting the theory that ideological preferences are affected by the party controlling Congress or the Presidency).

[88] A 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 12–13. Professor Elhauge's analysis implies that even if there is a small probability of action, as long as the relative probabilities are clear, then preferences can be estimated.

rational, risk-neutral economic actor.[89] These assumptions, though, are potentially subject to attack. A mechanism might not be properly calibrated, thereby leaving some residual incentive to shade testimony if the individual setting the sanction underestimates the exogenous incentive to shade in a particular direction.[90] Additionally, 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. 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. The danger is that the court might misread the implications of such a refusal. Of course, even with some degree of deviation from the articles' assumptions, the predictions generated might still be more reliable than unconstrained testimony. In general, however, 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.[91] 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. Thus, the proportion of the risk that banks are required to insure might determine the accuracy of insurance prices.

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[89] Professors 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 22, at 267.

[90] 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.

[91] See supra note 72 and accompanying text.

Hanson. Whether information markets are sufficiently accurate and unbiased for practical application is the central question for evaluating their effectiveness. Preliminary research suggests that information markets are effective predictive tools.[92] 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.[93] Professor Hanson's proposal has inspired the creation of real-world information markets, including at least one that trades scientific claims,[94] though only for "play money."[95] The predictions produced seem at least facially plausible,[96] 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 several different proposals for how to structure them. Although Professor Hanson in his original article downplayed concerns that there might be too little trading in information markets to generate reliable predictions, he has offered, in subsequent work, an information market specifically designed to overcome the possibility that information markets might be thin.[97] Central to this proposal, as well as some

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[92] See, e.g., Wolfers & Zitzewitz, Prediction Markets, supra note 45 (providing an overview of the research).

[93] Joyce Berg et al., Results from a Dozen Years of Election Futures Markets Research, at http://www.biz.uiowa.edu/iem/archive/BFNR_2000.pdf (last accessed Oct. 4, 2005) (providing an assessment of the accuracy of the Iowa Electronic Markets).

[94] See The Foresight Exchange, http://www.ideosphere.com/fx/docs/fxdocs.cgi#Welcome (last accessed Oct. 4, 2005) (introducing an "idea" futures market where users bet "funny money" on claims relating to science and technology, as well as arts and entertainment, finance, news, and politics).

[95] Some real-money information markets have involved trading in claims that might hinge on resolution of scientific uncertainties. See, e.g., NeoTek/MarTek SARS 2004 Markets Homepage, http://hanson.gmu.edu/PAM/Martek/SARS_2004_home.html (last accessed Oct. 4, 2005) (providing materials on a market used to predict the severity of the SARS epidemic).

[96] For example, the Foresight Exchange, as of September 25, 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 Claim CFsn: Cold Fusion, http://www.ideosphere.com/fx-bin/Claim ?claim=CFsn (last accessed Oct. 4, 2005).

[97] Robin Hanson, Combinatorial Information Market Design, 5 Info. Sys. Frontiers 107, 107–08 (2003).

104   *Virginia Law Review*   [Vol. 92:69

others,[98] 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 pre-
sumably can be made more or less accurate depending on the re-
sources that the government is willing to devote to prediction, and
therefore assessments of information markets necessarily will need
to be context-specific. Concerns about the danger that information
markets might be manipulated will also depend on context, includ-
ing the incentives that individuals might have to manipulate the
market and the ability of others to detect and correct for such ma-
nipulation.

3. The Legitimacy of Prediction: Whether prediction is inherently undesirable or excessively costly

Elhauge. Is there something inherently inappropriate about rely-
ing on predictions rather than normative decisions, assuming that
legislative decisions are normatively desirable objects of prediction
and predictions are sufficiently accurate and unbiased? Professor
Elhauge comes closest to examining this issue in addressing why he
believes that his proposal should apply only where there are statu-
tory 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, a judge cannot overturn this decision by making a predic-
tion of what the current legislature would prefer.[99] This conclusion
is odd, however, because Elhauge's general argument for prefer-
ring the preferences of the current legislature to those of the enact-
ing legislature should apply in this context as well.[100]

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[98] See, e.g., Abramowicz, supra note 47, at 960–62 (providing an approach to subsi-
dizing an information market).

[99] Elhauge, Preference-Estimating, supra note 11, 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.").

[100] Professor 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 only as to the legislation that it in fact en-
acts. 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 stat-
utes are ambiguous?

Though Professor Elhauge supplements this argument with concerns about the accuracy of the prediction mechanism,[101] he appears to assume that using predictive decisionmaking to trump statutory meaning would be inappropriate in all circumstances. Presumably this assumption reflects an assertion of constitutional principle, even though Elhauge never addresses the question of 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 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. This cost is independent of the merits of the prediction as policy, in assessing a predictive decisionmaking regime.

Cooter and Emons. Professors Cooter and Emons acknowledge "many practical obstacles" to their proposal that will need to be overcome.[102] Even if these obstacles could be overcome and everyone agreed that the object and mechanism of prediction could be defined perfectly, some people would be uncomfortable with witnesses accepting variable compensation and bets. Perhaps the prediction mechanism might undermine public confidence in the courts[103] or make those who ordinarily would be inclined to volunteer to testify truthfully unwilling to participate for fear of appearing too mercenary.[104] Opposition may reflect the traditional discom-

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[101] 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").

[102] Cooter & Emons, Truth-Bonding, supra note 22, at 322.

[103] See, e.g., Charles Nesson, The Evidence or the Event? On Judicial Proof and the Acceptability of Verdicts, 98 Harv. L. Rev. 1357, 1358–59 (1985) (offering 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, 542–54 (1986) (offering a powerful rebuttal to Nesson's thesis).

[104] Similar arguments have been used to critique proposals that would allow the sale of organs. See Emanuel D. Thorne, When Private Parts Are Made Public Goods: The

fort of bringing purported mathematical precision into the court-room.[105] Yet maybe it is the unfamiliarity of predictive decision-making that makes its implementation seem objectionable, at least on casual reflection.

Scott and Mayer. Professors 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 be required to obtain some private insurance, even when it may not be socially optimal to impose such a requirement. 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 may be a relatively cost-efficient way for the government to determine risk premiums. At least in contexts in which insurance is familiar, insurance requirements are unlikely to provoke moral objections, and partial insurance requirements may alleviate concerns about the feasibility of obtaining insurance.

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 having science policy depend on capital markets. The title of Professor Hanson's initial paper—*Could Gambling Save Science? Encouraging an Honest Consensus*[106]—recognizes this implicitly. Yet Hanson himself may have underestimated popular discomfort, as he helped organize[107] an information market that the Defense Department planned to institute. This market would have predicted,

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Economics of Market-Inalienability, 15 Yale J. on Reg. 149, 171–73 (1998) (arguing that a ban on sales of organs might increase efficiency).

[105] This discomfort may result in part from concern that mathematical precision may sometimes be incomplete and lead courts to make bad decisions. See Laurence H. Tribe, Trial by Mathematics: Precision and Ritual in the Legal Process, 84 Harv. L. Rev. 1329, 1330 (1971) (suggesting an analytical framework for assessing the potential and dangers of current and proposed uses of mathematical methods in litigation).

[106] Hanson, Could Gambling Save Science?, supra note 49.

[107] See Robin Hanson, Policy Market Analysis and Future(MAP) Archive, at http://hanson.gmu.edu/policyanalysismarket.html (last accessed Oct. 4, 2005) (discussing the genesis of the Policy Analysis Market and Hanson's role).

among other things, the likelihood of terrorism.[108] The plan was scrapped after criticisms that it amounted to a betting parlor on terrorism.[109] Life insurance companies bet on death,[110] but life insurance may prompt less concern, in part, because the predictions made by such companies are necessary incidents to an institution widely considered to be necessary.

From the perspective of predictive decisionmaking, information markets' greatest strength is the independence of their predictions from decisions about what government should do with their predictions. This quality, however, may prove to be the greatest obstacle to the successful implementation of information markets. 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 to focus analysis on the merits or drawbacks of specific proposals and predictive mechanisms. Concerns that prediction is an inappropriate 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.

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 entities with command-and-control approaches. Although the command-and-control approach has received much criticism in

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[108] Carl Hulse, Pentagon Prepares a Futures Market on Terror Attacks, N.Y. Times, July 29, 2003, at A1 (describing the Pentagon's plan).

[109] 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).

[110] 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).

the environmental field,[111] it has received much less attention in the safety context. Critics have generally suggested less regulation rather than an alternative approach to regulation.[112] But 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[113] because entities subject to safety regulation cannot anticipate the number of workplace accidents that will occur in advance.

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 occurrences for any particular regulated entity. These predictions can then be used to prevent activities predicted to produce excessive dangers. Commentators have not generally considered predictive approaches to safety regulation, presumably because the advantages of a predictive decisionmaking approach are not immediately obvious.

The key question for a predictive approach to safety regulation is selection of an appropriate prediction mechanism. Simply asking governmental officials to make explicit predictions about specific regulated entities does not seem likely to represent an improvement in policy, as different government officials might 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. Accidents and incidents, however, often will be sufficiently exceptional so that any individual governmental official's predictive performance is likely to depend substantially on chance. Therefore, accuracy incentives would make

[111] See, e.g., Bruce A. Ackerman & Richard B. Stewart, Reforming Environmental Law, 37 Stan. L. Rev. 1333, 1334–40 (1985).

[112] See, e.g., Thomas A. Lambert, Avoiding Regulatory Mismatch in the Workplace: An Informational Approach to Workplace Safety Regulation, 82 Neb. L. Rev. 1006, 1012–13 (2004) (exploring the "fertile middle ground" between the pure libertarian strategy and the command-and-control approach favored by the Occupational Safety and Health Administration).

[113] For an overview of emissions-trading programs, see T.H. Tietenberg, Emissions Trading: An Exercise in Reforming Pollution Policy (1985).

compensation relatively uncertain without greatly enhancing decisionmaking.

The most straightforward market approaches to safety regulation would be either to impose enterprise liability[114] or to require purchase of full liability insurance. There are, however, drawbacks to 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 under-protect 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 indirectly or directly on private predictions, it will either have to impose a heavy future liability on regulated entities or forego improving unsafe conditions that seem unlikely to trigger negligence liability.

Forcing regulated entities to internalize the full costs of their actions may, in any event, be infeasible because the relevant entities might be judgment-proof in the event of a sufficiently large accident, and the cost of insurance may be too high. Congress cited the difficulty of obtaining adequate insurance in justifying the Price-Anderson Act,[115] which limits the liability of nuclear power plant operators.[116] Given the massive potential consequences of a nuclear accident, insurance reserves might be inadequate to cover a major accident. An unfortunate consequence of the Act, however, is that moral hazard may lead nuclear facilities to invest too little in safety.[117] 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. This approach allows governmental regulation to be

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[114] I do not count enterprise liability as a predictive decisionmaking approach, however. See supra note 2.

[115] Price-Anderson Act, 42 U.S.C. § 2210 (2000).

[116] See generally Duke Power Co. v. Carolina Envtl. Study Group, Inc., 438 U.S. 59, 84 (1978) (finding the statute constitutional); Harold P. Green, Nuclear Power: Risk, Liability, and Indemnity, 71 Mich. L. Rev. 479, 481–87 (1973) (providing a historical overview of the evolution of the Act).

[117] Anthony Heyes, Determining the Price of Price-Anderson, Reg., Winter 2002–2003, at 26, 29–30 (discussing the possibility that limiting liability may discourage safety operations that are already in place).

based on the full costs that an activity is expected to generate 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, 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. The premium would contain a deduction reflecting the insurance company's expected profits and costs to the extent such costs are impounded into prices. Even if the formula for calculating risk 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 premium presumably would reflect some experience rating based on plant incidents short of catastrophes. The nuclear facility management would have to convince insurers that it had 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.[118] This approach avoids immunizing nuclear energy from

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[118] The government in this plan might be issuing insurance, which then would be paid to victims, or simply charging 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

most liability, which critics have argued represents a distortionary subsidy. 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 would advance that goal somewhat. Indeed, it is not even essential to rely on lawsuits brought by victims against the regulated entity. The government, for example, could require regulated entities to purchase partial insurance but require those entities to auction to third parties 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. This payment would, in essence, operate as a bet between the third parties about some event that the government specifies, such as the occurrence of deaths or injuries at a particular workplace. The regulated entity's net cost would be approximately the cost to these parties of taking on the risk, which might be considerably less than even the small proportion of damages.

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 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.[119] 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 then could ex-

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Insurance: Jack Hirshleifer's *War Damage Insurance* After Fifty Years, 9 Conn. Ins. L.J. 19, 23 (2002) (noting that the government may be unable to precommit to a policy of not paying disaster aid).

[119] One might argue that a 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, 72 U. Chi. L. Rev. 537, 594–95 (2005) (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.

trapolate from insurance prices the dangerousness of a particular workplace. The $100,000 value might reflect a low valuation of life, but that is irrelevant in a partial insurance scheme whose only purpose is to aid the government in generating price data.

How well would insurance companies assess risk? An advantage of relying on insurance companies is that they have experience in risk classification. The context, however, differs in important ways from traditional insurance contracts. Regulated entities would want to provide information to insurance companies to justify a low insurance premium, for example, because of the large collateral consequences of the insurance rating.[120] Regulated entities might provide this information by voluntarily submitting to random third-party inspections or adhering to regulations provided by the insurance companies. The limited risk that insurance companies would face from partial insurance, however, may not justify such expenditures. It is thus difficult to gauge how accurate insurance rating would be, and accuracy would depend in part on the degree of partial insurance that regulated entities are required to obtain.

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 insurers might have an incentive to collude, agreeing on a low price for the type of liability insurance whose price the government would match and a higher price for some other product, such as life insurance for employees of the regulated entity. One possibility is to prevent the insurers from issuing other products to regulated entities, but this still leaves the danger that regulated entities might make cash side payments to insurance companies.

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[120] 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 P. Milgrom & J. 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).

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 anticorruption 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, at least for now.

As a practical matter, concerns about the normative desirability of predictive decisionmaking for safety are 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. The partial insurance approach to safety regulation, however, is potentially consistent with any particular level of regulation. The market approach can even increase safety in instances where governmental regulation pays too little attention to some risks.[121] 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.[122]

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[121] Critics, for example, have charged the Nuclear Regulatory Commission with paying too little attention to the danger that terrorists might attack nuclear plants. See Shankar Vedantam, Nuclear Plants are Still Vulnerable, Panel Says, Wash. Post, Apr. 7, 2005, at A12; Cat Lazaroff, Nuclear Plants Called Vulnerable to Terrorist Attack (Sept. 26, 2001), at http://www.commondreams.org/headlines01/0926-01.htm (last accessed Oct. 1, 2005).

[122] See, e.g., Lisa Heinzerling, The Rights of Statistical People, 24 Harv. Envtl. L. Rev. 189, 189–90 (2000) (noting the difficulties with valuation of life).

Virginia Law Review   [Vol. 92:69

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 but to illustrate variations on the mechanisms described earlier.

A. Government Spending and Investment Matching

Partial insurance requirements generate insurance company predictions about undesirable outcomes such as accidents. In theory, insurance companies might be used to anticipate desirable outcomes, but a predictive mechanism requiring insurance companies to do so would rely on insurance company adaptability rather than any experience in making such predictions. Other institutions, however, make predictions when a range of outcomes are possible. For example, the capital markets generally invest in businesses, recognizing some chance of success and some 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.

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 on the performance of the associated government contractors, measured by some proxy variable or by a subjective ex post governmental evaluation. The contractor, meanwhile, would receive project funding at some multiple of the amount provided by third-party investors.

An alternative to this approach would be to use a pure pay-for-performance scheme in which a contractor's compensation de-

pends on some measurement of the contractor's performance.[123]
The investment-matching approach, however, reduces the risk of
random variation in a proxy variable or in a subjective valuation.
The third-party investors will bear some risk associated with the
noisiness of any measurement, but the total risk will be only a frac-
tion of the risk if payment were based wholly on performance. Pre-
sumably, government contracting does not rely entirely on pay-for-
performance in part because the government is a relatively risk-
neutral actor, and this approach allows the government to take on
the bulk of the project's risk of success or failure.[124]

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
an objective evaluation. A principal concern about the subjective
approach 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. Even an independent decisionmaker might
prefer to save the government money. The decisionmaker 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.

Many of the same concerns about partial insurance requirements
may be levied at partial matching requirements. Once again, side
payments are a danger. Government contractors might promise to
pay third-party investors in exchange for inducing extra invest-
ment, recognizing that this extra investment will increase the
chances of selection and the amount of the government match. In
addition, the success of this approach depends on the ability of
third-party investors, relative to government actors, to predict in-
vestment success.

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[123] A particularly promising approach along these lines would combine an auction
with information markets. See Robert W. Hahn & Paul Tetlock, Big Ideas: The Mar-
ket's Last Frontier, Milken Inst. Rev., First Quarter 2005, at 83, 84–86.

[124] It may be efficient motivation for the contractor to assume some risk. If this is so,
the contractor could enter into an agreement with a separate third party, in which a
payment might be made to or from the contractor depending on performance in the
contract. This agreement might make the project more attractive to third-party inves-
tors.

116   *Virginia Law Review*   [Vol. 92:69

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 might not occur. Consider, for example, opinion letters issued by lawyers. In a number of contexts, from tax[125] to intellectual property,[126] lawyers will provide formal opinion letters to their clients informing them of an activity's permissibility. Such letters may have some legal effect, for example, by making it less likely that enhanced damages will be imposed for willful infringement,[127] but the legal analysis of many such letters will never be reviewed by a court.[128]

Lawyers eager to please their clients thus have an incentive to shade their evaluations in their clients' favor. A predictive decisionmaking regime might alter lawyers' incentives by giving them incentives to predict what courts would in fact decide. The problem is that the issues in opinion letters will eventually be litigated only a fraction of the time. It is relatively straightforward, however, to create a predictive decisionmaking mechanism that will provide countervailing incentives.

One approach would require a lawyer who provides 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.[129] A lawyer's expected fee would be equal to the fee mul-

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[125] See Noël B. Cunningham & James R. Repetti, Textualism and Tax Shelters, 24 Va. Tax Rev. 1, 29–31 (2004) (discussing concerns about abuse of opinion letters).

[126] 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 non-infringement opinions).

[127] See, e.g., SRI Int'l, Inc. v. Advanced Tech. Labs., Inc., 127 F.3d 1462, 1464–65 (Fed. Cir. 1997) (noting that a legal opinion may prevent an award of enhanced damages, but that the court will consider factors such as the objectivity of the advice presented).

[128] See Lynnley Browning, U.S. is 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).

[129] 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 A. Mitchell Polinsky & Steven Shavell, Punitive Damages: An Economic Analysis, 111 Harv. L. Rev. 869, 873–74 (1998) (suggesting

tiplied by the probability that the court agrees with the lawyer. Even this regime might not produce optimal incentives because many lawyers would take positions that are more likely to generate business in the future rather than maximize profits in that specific instance. Courts would be able to rely to an even greater extent on such opinions in determining the clients' good faith if those who seek to immunize their conduct on the basis of opinions of counsel waive attorney-client privilege in advance.[130]

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.[131] 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 the 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 have an incentive to favor the more powerful parties.[132] The legislature in these situations would want to implement a mechanism that disciplined arbitrators' decisions through random selection of a small percentage of cases for hearing in the district courts.

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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 would occur only if the client ignored the advice.

[130] 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., 383 F.3d 1337, 1343–45 (Fed. Cir. 2004) (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.

[131] See Jeffrey J. Rachlinski, A Positive Psychological Theory of Judging in Hindsight, 65 U. Chi. L. Rev. 571, 608–24 (1998) (discussing some approaches that the legal system might take to reduce hindsight bias).

[132] 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).

118   *Virginia Law Review*   [Vol. 92:69

Such a mechanism might work like this: A governmental agency would use a computer-generated random number 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.[133] If the result is incorrect, then the arbitrator would have to pay ten times the fee to the government. If the result is correct, then the arbitrator would receive ten times the fee from the government.[134] With this mechanism, an arbitrator would always have an incentive to resolve a case as he believes the court is most likely to resolve it.

As with other predictive decisionmaking designs in this Article, this approach to disciplining arbitrators may or may not be desirable. Perhaps the existence of judicial review already forces arbitrators to act as judges would.[135] In that case the mechanism would be redundant. The mechanism may also prove more costly than traditional arbitration since one-tenth of all cases would be subject to an expensive traditional adjudication. 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 that predictive decisionmaking can be used to provide

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[133] 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).

[134] The program might 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, 394–409 (1994).

[135] 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.

incentives to one set of decisionmakers to act like a second set simply 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 predictive decisionmaking might be useful.

C. Interest Rates and Conditional Prediction

The opinion letter and arbitration proposals provide incentives to make predictions of an event that only *might* occur. It also is possible to induce pairs of predictions, anticipating some variable conditional both on an event's occurrence and on an event's non-occurrence. 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.[136] If policymakers are interested in knowing the effect of policy x on variable y, information markets could 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 could be used to predict the effects of the proposed change on these variables over some set time frame. 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 in 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 pre-announced tradeoff between inflation and unemployment. Some economists have considered replacing central bankers with some form of a rule that may

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[136] See, e.g., Joyce A. Berg & Thomas A. Rietz, Prediction Markets as Decision Support Systems, 5 Info. Sys. Frontiers 79 (2003) (providing an account of an information market used to assess conditional probabilities); see also Abramowicz, supra note 47, at 952–57 (providing an overview of conditional markets).

120   *Virginia Law Review*   [Vol. 92:69

or may not take into account a number of variables concerning past economic performance,[137] but critics have argued that no rule could anticipate all of the economic conditions that might be relevant to an interest rate decision.[138] The conditional 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 tradeoff between these variables might be resolved in advance.

More generally, predictive decisionmaking evades the common critique of rules that they are necessarily overinclusive and underinclusive.[139] 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 dangers associated with decisionmaker discretion. The monetary-policy literature suggests that countries should precommit to pursuing lower inflation than they would choose if given discretion at each point in time.[140] Inflation is caused in part by expectations of inflation, so expectations of loose monetary policy are harmful even if looseness reflects the ideal tradeoff ex post. Some countries thus seek to precommit to low inflation by appointing relatively conservative central bankers[141] and

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[137] See, e.g., Milton Friedman, A Program for Monetary Stability 89–92 (1959) (advocating constant growth of the monetary stock).

[138] See, e.g., Patrick Minford, Time-Inconsistency, Democracy, and Optimal Contingent Rules, 47 Oxford Econ. Papers 195, 195 (1995) (noting that rules may be inappropriate in monetary policy because of the need for a "flexible response" to economic shocks).

[139] See supra text accompanying note 8.

[140] See Robert J. Barro & David B. Gordon, Rules, Discretion and Reputation in a Model of Monetary Policy, 12 J. Monetary Econ. 101, 101–02 (1983) (recognizing the benefit of hand-tying).

[141] 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.").

by giving central bankers broad independence.[142] Other countries have had difficulty in this arena, so a rule in these countries might further precommitment.

Interest rate policy is the classic example of the time-consistency problem, as Professors Finn Kydland and Edward Prescott noted in an article[143] that formed a central basis for their award of the 2004 Nobel Memorial Prize in Economics.[144] In some contexts, optimal policy ex ante differs from the optimal policy ex post. The optimal policy is "time inconsistent" in such cases, and precommitment may be needed to achieve it.[145] Predictive decisionmaking, however, can potentially allow for achievement of time-inconsistent policy even without rules. A decisionmaker could be asked twenty years from now to make a retrospective assessment of what the best interest rate would have been. A predictive mechanism could be used to predict that decision and to determine policy today. A central banker making a retrospective evaluation would not have the usual incentive to engineer a surprise inflation[146] because the central banker's decision would only serve to discipline the information market rather than to set future interest rate policy. The predictive approach thus could 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 ex ante.

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[142] See generally Alex Cukierman, Central Bank Strategy, Credibility, and Independence 349–454 (1992) (reviewing and extending the theoretical and empirical literature on central bank independence).

[143] Finn E. Kydland & Edward C. Prescott, Rules Rather than Discretion: The Inconsistency of Optimal Plans, 85 J. Pol. Econ. 473, 477–80 (1977).

[144] See Press Release, The Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel (Oct. 11, 2004), at http://nobelprize.org/economics/laureates/2004/press.html (explaining the basis for awarding Kydland and Prescott the Prize).

[145] 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).

[146] See, e.g., Katherine S. Neiss, Discretionary Inflation in a General Equilibrium Model, 31 J. Money, Credit, & Banking 357, 359 (1999) (offering a model describing the benefits to central bankers of engineering surprise inflations).

CONCLUSION

The literature on predictive decisionmaking is small, and predictive decisionmaking will not emerge overnight. Nor should it. Our institutions work tolerably well for the most part, 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.[147] The near-term prospects for wholesale adoption of predictive decisionmaking proposals are thus slight. Incremental change, such as increasing the use of prediction mechanisms to inform policymakers, is possible, however, and will allow for more complete academic evaluations of predictive decisionmaking in the future.

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[147] That predictive decisionmaking might condemn itself is perhaps most clear with respect to Professor 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 such a rule. Elhauge, Preference-Estimating, supra note 11, 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.