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Prediction Markets for Corporate Governance

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PREDICTION MARKETS FOR CORPORATE GOVERNANCE

by Michael Abramowicz* and M. Todd Henderson**

Building on the success of prediction markets at forecasting political elections and other matters of public interest, firms have made increasing use of prediction markets to help make business decisions. This Article explores the implications of prediction markets for corporate governance. Prediction markets can increase the flow of information, encourage truth telling by internal and external firm monitors, and create incentives for agents to act in the interest of their principals. The markets can thus serve as potentially efficient alternatives to other approaches to providing information, such as the Sarbanes-Oxley Act's internal controls provisions. Prediction markets can also produce an avenue for insiders to profit on and thus reveal inside information while maintaining a level playing field in the market for a firm's securities. This creates a harmless way around existing insider trading laws, undercutting the argument for the repeal of these laws. In addition, prediction markets can reduce agency costs by providing direct assessments of corporate policies, thus serving as an alternative or complement to shareholder voting as a means of disciplining corporate boards and managers. Prediction markets may thus be particularly useful for issues where agency costs are greatest, such as executive compensation. Deployment of these markets, whether voluntarily or perhaps someday as a result of legal mandates, could improve alignment between shareholders and managers on these issues better than other proposed reforms. These markets might also displace the business judgment rule because they can furnish contemporaneous and relatively objective benchmarks for courts to evaluate business decisions.

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I.	INTRODUCTION.....	3
II.	A PRIMER ON CORPORATE PREDICTION MARKETS.....	6
A.	EARLY CORPORATE INNOVATORS.....	6
B.	DESIGNS FOR FUTURE CORPORATE EXPERIMENTATION.....	7
1.	<i>Subsidized Markets with Automated Market Makers.....</i>	7
2.	<i>Conditional Markets.....</i>	9
C.	OBSTACLES TO MARKET ACCURACY.....	9
1.	<i>Inefficient markets.....</i>	10
2.	<i>Manipulation.....</i>	10
3.	<i>Unlikely conditions.....</i>	11
4.	<i>Unavailable information.....</i>	12
5.	<i>Minor decisions.....</i>	13
III.	IMPROVING CORPORATE INFORMATION FLOW.....	14
A.	FLOW OF INFORMATION TO THE CEO AND THE BOARD.....	14
1.	<i>The Virtues and Limitations of Following Stock Prices.....</i>	15
2.	<i>Problems Impeding Information Flow.....</i>	17
a.	<i>Hierarchy.....</i>	17
b.	<i>Hidden profiles.....</i>	19
c.	<i>Heuristics and biases.....</i>	19
B.	FLOW OF INFORMATION TO THE MARKETS.....	20
1.	<i>Prediction Markets Instead of Internal Controls.....</i>	21
2.	<i>Prediction Markets Instead of Insider Trading.....</i>	23
3.	<i>Prediction Markets Instead of More Disclosure Regulation.....</i>	24
C.	OBJECTIONS.....	26
1.	<i>Wealth Constraints.....</i>	27
2.	<i>Time Horizons.....</i>	27
3.	<i>Workplace Culture.....</i>	28
4.	<i>Agency Costs.....</i>	28
5.	<i>Sabotage.....</i>	30
IV.	IMPROVING CORPORATE DECISIONMAKING.....	31
A.	CORPORATE STRATEGY.....	31
1.	<i>Shareholder Proposals.....</i>	31
2.	<i>Rules of the Game.....</i>	36
3.	<i>Takeovers and Other Major Corporate Transactions.....</i>	37
4.	<i>Prediction Markets vs. Markets for Votes.....</i>	41
B.	PERSONNEL.....	43
1.	<i>Board Member Selection.....</i>	43
2.	<i>Manager Hiring and Firing.....</i>	44
3.	<i>Executive and Board Compensation.....</i>	45
C.	CREDITORS AND OTHER NONSHAREHOLDER CONSTITUENCIES.....	48
1.	<i>Creditors.....</i>	48
2.	<i>Labor.....</i>	50
V.	CONCLUSION.....	51
VI.	253. CASS R. SUNSTEIN, BOUNDEDLY RATIONAL BORROWING: A CONSUMER’S GUIDE (JULY 2005).....	53

I. INTRODUCTION

Corporate governance scholarship seeks to evaluate and suggest legal mechanisms for improving governance and thus the welfare of shareholders and (perhaps) other constituencies. Prevailing legal approaches, however, avoid direct evaluation of substantive policy disagreements. Consider, for example, the recent battle for control of the H.J. Heinz Co. Nelson Peltz, whose hedge fund has invested in Heinz stock, wants five seats on its board of directors so that he can put in place governance changes; CEO William Johnson has resisted efforts to change the board.¹ Corporate law knows little about ketchup. And so, it focuses on procedure to ensure that the agents (Johnson and other managers) will act on behalf of principals (Peltz, shareholders, and perhaps other stakeholders), for example by regulating issues such as who pays the bills associated with shareholder votes.

Stock markets evaluate the impact (and beneficiaries) of managerial decisions more directly, providing real-time predictions of the discounted future profits that corporations will produce. Changes in stock price, however, have virtually no role in corporate governance. A CEO and members of a board may take actions that they expect will win the approval of the market, but neither statutes nor charters insist that a corporation follow the market's advice. This may seem puzzling. A principal goal of corporate law is to maximize shareholder wealth, and if stock market trends provide an objective, informed, and speedy assessment of whether a corporation's decisions advance that goal, then perhaps corporate law should take account of them in some way.²

A resolution of the puzzle lies in the difficulty of interpreting stock price reactions to corporate decisions. A stock price change might reflect some other event simultaneous to the decision or simply noise. In the Heinz case, the current stock price may reflect some probabilistic assessment of whether Johnson or Peltz will prevail multiplied by the expected benefit from their respective plans, but shareholders deciding how to vote or whether to sell may be unable to unpack the relevant numbers. Advisors of various kinds, like analysts, shareholder advisors, and proxy firms, may offer advice, but these views may be tainted by self interest or other extrinsic considerations, and will be noisy as well. Stock prices also can be misleading because current insider trading law, a firm's stock price does not fully reflect all available information about the firm, thereby undermining its value as a governance mechanism.

If stock market predictions were more easily interpreted and more fully informed, corporations might place more weight on them in their decisionmaking, and corporate law might nudge corporate decisionmakers to give such predictions increased weight. A new technology,

¹ See Steven Gray, *Ketchup Fight: Peltz, Heinz CEO Go at It*, WALL ST. J., Aug. 4, 2006, at C1.

² While stock market predictions in general play an important role in motivating corporate actors, this is as a result of individual acceptance of the general validity of the stock price metric, not as a result of any systematic scheme. When the stock price is falling, directors will be more willing to fire the CEO, and shareholders will be more willing to seek out new directors. See Jerold B. Warner, et al., *Stock Prices and Top Management Changes*, 20 J. FIN. ECON. 461 (1988) (finding increased CEO turnover for firms in financial distress). But no rule mandates personnel changes in response to market assessments, and corporations do not even adopt decisionmaking procedures that give presumptive weight to market assessments.

known as “prediction markets” or “information markets,”³ makes this possibility less hypothetical. Prediction markets are markets in which various contracts with payoffs tied to uncertain future events are traded. For example, the Iowa Electronic Markets (IEM), run by the University of Iowa Tippie School of Business, includes prediction markets for elections, economic indicators, and other future uncertainties.⁴ Prediction markets have been shown to forecast better than, or at least as well as, public opinion polls,⁵ public experts,⁶ and private experts.⁷ Rather than revisit the prediction market literature, we assume for the purpose of this paper that prediction markets are generally an accurate predictive tool. We ask how corporations can improve governance with prediction markets.

We argue that these markets, whether voluntarily deployed by firms or, more ambitiously, required by law, can solve many nettlesome corporate law issues. Our thesis is that corporate prediction markets have the potential to reduce information costs (by reducing asymmetries between a firm and its investors without disclosing corporate secrets), agency costs (by making shareholder monitoring easier), and the transaction costs of decisionmaking (by making corporate and insurgent decisions more informed, cheaper to make, and easier to understand). As a purely business matter, these markets may allow firms to extract and process information from all parts of the organization, encouraging anonymous whistleblowing and reducing the potential for fraud and waste. Prediction markets also can help ensure that corporations act in the interests of shareholders or other constituencies.

In the battle for control of Heinz, markets might estimate the value of the Johnson plan versus the Peltz plan. The mere existence of these markets, whether required by law or voluntarily created by managers or raiders, might have eliminated the conflict by providing a reliable assessment to different corporate players. Johnson and other managers may still have self-interested motivations (as, perhaps, may Peltz), but markets could help discipline their actions by exposing decisions expected to lower stock price. If the conflict nonetheless ended up in litigation, courts might consider evidence from the prediction markets to assess the controversy, rather than focusing solely on procedural issues.

These markets are still in early stages, and the initial challenge, not explored here, is to ensure that the law does not stymie voluntary experimentation.⁸ In the long term, however, legal

³ A dynamically updated bibliography of prediction market research is available at <http://www.chrisfmasse.com/3/3/papers> (July 12, 2006).

⁴ These markets are available at <http://www.biz.uiowa.edu> (visited June 5, 2006). For a discussion of how the IEM and like markets might inspire a revolution in management, see Barbara Kiviat, *The End of Management?*, TIME, July 6, 2004, at A4.

⁵ See Joyce Berg et al., *Accuracy and Forecast Standard Error of Prediction Markets* 33 (Henry B. Tippie College of Business Administration, University of Iowa, Working Draft, 2003), available at <http://www.biz.uiowa.edu/iem/archive/forecasting.pdf> (last visited July 4, 2006) (reporting that the Iowa Electronic Markets gave results closer to actual election results than election polls did on 451 of 596 days).

⁶ See, e.g., Refet Gürkaynak & Justin Wolfers, *Macroeconomic Derivatives: An Initial Analysis of Market-based Macro Forecasts, Uncertainty and Risk* (NBER Working Paper No. 11929, 2006), available at <http://www.nber.org/papers/w11929> (finding that prediction markets slightly outperform surveys of experts in estimating economic statistics).

⁷ See, e.g., Charles R. Plott & Kay-Yut Chen, *Information Aggregation Mechanisms: Concept, Design and Implementation for a Sales Forecasting Problem* 13 (Cal. Inst. Tech., Social Sciences Working Paper No. 1131, 2002), available at http://www.hpl.hp.com/personal/Kay-Yut_Chen/paper/ms020408.pdf (last accessed July 1, 2006). Other business experiments with prediction markets are described *infra* Section II.A.

⁸ See *infra* note 74.

institutions might encourage or even mandate prediction markets. Courts could, for example, require firms to use prediction markets to analyze the impact of certain fundamental business transactions as a precondition of receiving the lenient treatment of the business judgment rule.⁹ Regulators could require firms to use these markets to inform the market about financial and operational details, perhaps as an alternative or complement to other approaches to disclosure. Mandatory prediction markets on subjects like earnings results would be more reliable, less costly to implement, and more difficult to manipulate than the internal controls systems required under current law. We explore these and other potential applications in more detail below.

Corporate decisionmaking and governance should be an attractive application for prediction markets relative to other areas of law, both because corporations have already begun employing simple versions of prediction markets, and because stock markets already have a significant informal role in corporate decisionmaking. The legal literature on prediction markets, however, has ignored the possible use of these markets as tools of corporate law.¹⁰ Thomas Malone, a business school professor, has argued that businesses increasingly are decentralizing decisionmaking, and notes that prediction markets may serve as one of many tools in this process, but he does not explore the applications discussed here.¹¹

Early corporate experimentation with prediction markets is encouraging, but it has been limited in several ways.¹² First, corporations have created prediction markets to serve as inputs into other corporate decisions, rather than to assess corporate decisions directly. “Conditional markets” assessing the impact of decisions on variables such as stock price will be the focus of our discussion.¹³ Second, corporations have used prediction markets so far solely to move information to decisionmakers within the corporation. We will emphasize the possibility of corporations’ releasing predictions, bringing to all investors the value of inside information while avoiding an unequal playing field. Third, existing experiments with prediction markets have been conducted by the firms themselves. We anticipate that as prediction markets gain respect and credibility, they could become weapons in corporate politics, for example created by large individual shareholders.

In Part II, we sketch the basics of prediction markets with a focus on their use in the corporate context. We also briefly address concerns raised about the efficacy of these markets, including liquidity, accuracy, and manipulability. Part III describes difficulties in corporate information flow and explains how prediction markets can help. It compares prediction market solutions with alternative approaches, including mandating of internal controls, relaxing insider trading rules, and enhancing insider trading regulation. Information flow itself should reduce

⁹ See *infra* notes 82-84 and accompanying text.

¹⁰ The articles that come closest to our analysis are Saul Levmore, *Simply Efficient Markets and the Role of Regulation: Lessons from the Iowa Electronic Markets and the Hollywood Stock Exchange*, 28 J. CORP. L. 589, 594 (2003); and Henry G. Manne, *Insider Trading: Hayek, Virtual Markets, and the Dog That Did Not Bark* (ICER Working Paper No. 7-2005, Dec. 19, 2005), available at http://papers.ssrn.com/abstract_id=679662 (last visited July 13, 2006). Both, however, suggest that prediction markets might have lessons for legal regulation, not that prediction markets might be used as tools of legal regulation. For some other citations to the legal literature on prediction markets, see *infra* notes 37 & 51.

¹¹ THOMAS W. MALONE, *THE FUTURE OF WORK* (2004).

¹² See *infra* Part II.A.

¹³ See, e.g., Robin Hanson, *Decision Markets*, IEEE Intelligent Systems, 14(3), 16, 19 (1999), available at <http://hanson.gmu.edu/decisionmarkets.pdf> (discussing conditional markets and briefly considering corporate applications).

agency costs, but Part IV considers how specific applications of prediction markets could improve corporate governance. It explains how prediction markets could be used to assess corporate strategy and personnel decisions, and how prediction markets might be used to assess the interests of constituencies other than shareholders. We cover many possible proposals here, recognizing that each could be developed and scrutinized in far greater detail, because our purpose is to provide an overview of the use of prediction markets rather than specific policy recommendations. Part V offers some preliminary conclusions, identifies some open questions, and identifies possible avenues for future research.

II. A PRIMER ON CORPORATE PREDICTION MARKETS

The traditional design structure for a prediction market is simple: A market sponsor introduces one or more tradable contracts that provide for payment contingent on some future event. Each contract either pays off a fixed amount if the event resolves in a particular way (for example, if a particular candidate wins an election), or it pays off an amount that varies depending on some number that can be determined in the future (for example, one penny per percent of the vote that one candidate receives). The prices at which trades occur provide at least an approximate market-based prediction of the event.¹⁴

A. Early Corporate Innovators

Kay-Yut Chen, an employee of Hewlett Packard Laboratories, and Charles Plott, an experimental economist, conducted the earliest apparent study of the prospect of using these markets to improve corporate decisionmaking. They hoped that prediction markets would provide a means of aggregating “small bits and pieces of relevant information [that] exists in the opinions and intuition of individuals who are close to an activity,”¹⁵ and thus of measuring what James Surowiecki has called “the wisdom of crowds.”¹⁶ Participants were given real money that they could use in the game. Each market predicted the future monthly sales of various products. Meanwhile, HP continued to assign some employees to produce forecasts. Chen and Plott concluded that the consensus market predictions were a “considerable improvement” over official forecasts—beating official forecasts 15 out of 16 times in one experiment and 6 out of 8 in another—and that this result was robust to different possibility specifications of the method of calculating the probability forecast.¹⁷

One should be cautious before drawing broad conclusions from a single study. Perhaps Hewlett-Packard’s official forecasters were unusually bad, in which case the market’s beating them was no big feat. Hewlett Packard’s initial success with using prediction markets to improve internal estimations, however, has been replicated at a variety of other firms in numerous industries. For example, drug maker Eli Lilly established an internal prediction market to estimate drug development success.¹⁸ It allowed about 50 employees from a range of corporate

¹⁴ For an argument that prediction market prices can be interpreted as probabilities, see Justin Wolfers & Eric Zitzewitz, *Interpreting Prediction Market Prices as Probabilities* (Inst. for the Study of Labor, Discussion Paper No. 2092, 2006), available at http://ssrn.com/abstract_id=898597.

¹⁵ See Plott & Chen, *supra* note 7, at 3.

¹⁶ JAMES SUROWIECKI, *THE WISDOM OF CROWDS* (2004).

¹⁷ See Plott & Chen, *supra* note 7, at 12.

¹⁸ See James M. Pethokoukis, *All Seeing All Knowing*, US NEWS, Aug. 30, 2004. For a list of firms served by one leading

areas to trade on six drug candidates; the market aggregated toxicology data, clinical trial results, and marketing data better than any existing mechanism, correctly forecasting the three most successful drugs. Similar successes have been observed at Intel, which ran an experiment in which a prediction market outperformed existing mechanisms for allocation of manufacturing capacity;¹⁹ at Siemens to predict a project completion date more reliably than official forecasts;²⁰ at GE to generate new business ideas;²¹ and at France Telecom.²²

B. Designs for Future Corporate Experimentation

Firms have used a variety of different market and contract types in current experiments with this technology, only some of which may be useful in governance and other corporate law issues we investigate in this paper. We are particularly, though not exclusively, interested in subsidized, conditional prediction markets that forecast stock price contingent on different decisions that the firm might make. We will briefly catalog some of the key features of these markets. Our immediate goal, however, is not to offer full descriptions of the relevant mechanisms, let alone full evaluations of any associated technical problems, issues that the literature is already actively considering.²³ Rather, we merely intend to describe the mechanisms that we envision, to offer a brief explanation of their technical feasibility, and to explain their relevance to corporate decisionmaking and corporate law.

1. Subsidized Markets with Automated Market Makers

We anticipate that prediction markets would be subsidized at significant levels for corporate prediction markets, with the subsidy levels proportional to the importance of the decision. In the absence of a subsidy, prediction markets are a zero-sum game, and someone will generally participate only if the person derives utility from participation alone or if the person expects to win money from others who have entered the market. While this may be sufficient incentive for some firms or for some markets, it is unlikely that the kind of widespread use of markets we describe here would arise without substantial subsidies.

These subsidies can be in the form of cash, in-kind payments, or other forms. For extraordinary corporate decisions, like whether to pursue a merger or who should be the CEO, a

provider of prediction market technology and advice, see <http://us.newsfutures.com> (last visited Aug. 3, 2006).

¹⁹ See Kiviat, *supra* note 4.

²⁰ See Alex Tabarrok, In Defense of Prediction Markets, RED HERRING, Sept. 23, 2003.

²¹ See Michael Totty, *How to Decide? Create a Market*, WALL ST. J., June 19, 2006, at R9.

²² See Project Destiny, <http://qatlh.pair.com/~ftd/destiny/other.cgi> (last visited July 3, 2006).

²³ See, e.g., John Ledyard et al., *An Experimental Test of Combinatorial Information Markets* (2005), available at <http://hanson.gmu.edu/testcomb.pdf> (last visited July 5, 2006); David M. Pennock, *A Dynamic Pari-Mutuel Market for Hedging, Wagering, and Information Aggregation*, in EC '04: PROCEEDINGS OF THE 5TH ACM CONFERENCE ON ELECTRONIC COMMERCE 170 (2004), available at <http://research.yahoo.com/node/125/2021> (last visited July 5, 2006); Emile Servan-Schreiber et al., *Prediction Markets: Does Money Matter?*, ELECTRONIC MARKETS 14-3 (Sept. 2004), available at <http://bpp.wharton.upenn.edu/jwolffers/Papers/DoesMoneyMatter.pdf> (last visited July 5, 2006); Paul Tetlock et al., *Designing Information Markets for Decision Making* (AEI-Brookings Joint Center for Regulatory Studies, Working Paper 05-23, 2005), available at http://ssrn.com/abstract_id=869031; Justin Wolfers & Eric Zitzewitz, *Five Open Questions About Prediction Markets* (Inst. for the Study of Labor, Discussion Paper No. 1975, 2006), available at http://ssrn.com/abstract_id=884483 (last visited July 5, 2006) [hereinafter Wolfers & Zitzewitz, *Five Open Questions*]; Justin Wolfers & Eric Zitzewitz, *Prediction Markets in Theory and Practice* (Stanford Graduate School of Business, Research Paper No. 1927, 2006), available at http://ssrn.com/abstract_id=891232.

single prediction market might be given millions of dollars in subsidies. At this subsidy level, individuals will have incentives not only to participate, but also to seek out relevant information and to develop sophisticated models of whatever is being predicted. While a subsidy of several million dollars for a particular market may sound costly, it is comparable (or less) than firms currently spend internally and on fees for professional services (e.g., lawyers, compensation consultants, proxy solicitation firms, bankers, etc.) in such cases.

Even with subsidies, the number of participants in any given prediction market might be relatively low—the “liquidity problem”. Most prediction markets use a continuous double auction method that matches willing buyers and sellers in a way that poses no risk for the exchange. If some participants are expected to have excellent information, however, others will be hesitant to trade with them. Fortunately, recent market designs in effect can provide in effect infinite liquidity. We will summarize one such approach here,²⁴ the “market scoring rule” devised by Robin Hanson.²⁵ This approach builds on the concept of a scoring rule, a function that is used to reward a single individual for making a probabilistic prediction, with more accurate predictions receiving higher rewards.²⁶

Under the market scoring rule, any individual can make the first prediction as to a particular outcome, and then anyone can displace the previous predictor by committing to pay off the previous predictor according to the scoring rule, and then announcing a new prediction. The most recent prediction becomes the consensus prediction of the market. In laboratory experiments, the market scoring rule outperforms more traditional market mechanisms at predicting outcomes in low-liquidity environments, especially in cases where information asymmetry is a problem.²⁷

From a user interface perspective, the market scoring rule can appear to be no different from traditional markets. A user can buy or sell any number of contracts, with the price of the contracts changing with each incremental purchase. This approach ensures that traders will be able to cover any losses and that traders will lose no more than they have invested. In effect, these designs provide for an automated market maker, with the system offering to buy or sell contracts at prices that depend on the current predictions. Even if there turns out to be only one trader in these markets, the mere possibility that another trader will come along, along with the eventual resolution of the scoring rule in the market scoring rule approach, will provide that trader with an incentive to make honest predictions.

²⁴ An alternative approach, developed and patented by Yahoo!, is a dynamic pari-mutuel market, a variation on traditional pari-mutuel markets, like those used in horse race betting. See Pennock, *supra* note 23, at 174.

²⁵ See Robin Hanson, *Combinatorial Information Market Design*, 5 INFO. SYS. FRONTIERS 107 (2003).

²⁶ See, e.g., Morris H. DeGroot & Stephen E. Fienberg, *The Comparison and Evaluation of Forecasters*, 32 STATISTICIAN 12, 20 (1983) (discussing scoring rules and their limitations).

²⁷ Ledyard et al., *supra* note 31, at 12 (“The market scoring rule had the best performance overall, clearly beating all other mechanisms in one environment, and doing as well as any other mechanism in the other environment.”). A practical design advantage of the market-scoring rule is that it provides a relatively simple approach for creating a subsidy. The maximum subsidy is simply the largest amount that someone might receive under the relevant scoring rule. In effect, the market sponsor needs to worry only about paying the last predictor, though in practice, the market sponsor will serve as a bank to clear all transactions.

2. Conditional Markets

Corporate prediction markets are likely to be of significant valuable only if they can predict future outcomes of a variety of potential courses of action, which means estimating the impact of events that might not ever happen. Assessing the impact of a potential corporate strategy that might not be implemented is tricky, especially if the market recommends against implementing the strategy. A prediction market designed to forecast the impact on Heinz’s stock price *if* the firm adopts the Peltz plan must address two problems: (1) How are contracts resolved in case Heinz does not adopt the Peltz plan?; and (2) How can the markets avoid circularity, estimating not just the absolute impact of the plan, but also the probability that the plan would be adopted, which in turn depends on the prediction of the market itself?

The literature has developed various approaches to implementing “conditional markets,”²⁸ which allow the prediction of one variable contingent on the occurrence of a particular event. For our limited purpose of establishing the practical feasibility of such markets, it is sufficient to describe one means of implementing them.²⁹ The market sponsor can provide that all market transactions will be “unwound” if the event does not occur, so all market participants receive back any money that they invested over time, perhaps with interest.³⁰ This approach is already used and widely accepted in betting markets, such as those hosted by Tradesports.com: A tradable contract on how many votes a particular judicial nominee will receive in the Senate carries an implicit condition that the candidate actually receives a vote.³¹ This approach also addresses the circularity issue. An optimistic prediction market forecast may make a particular decision more likely, but it should not generally have a marked effect on the conditional predictions.³²

C. Obstacles to Market Accuracy

In discussing prediction market design, we have already responded to one significant potential criticism: that prediction markets might have too little liquidity to make meaningful assessments. This section discusses several other obstacles to prediction market accuracy. We recognize that these obstacles might well delay deployment of prediction markets and might reduce their effectiveness. Nonetheless, in the corporate context, there are particular reasons to believe that these problems can be overcome.

²⁸ Wolfers & Zitzewitz, *Five Open Questions*, *supra* note 23, at 19-20; Robin Hanson, *Decision Markets*, *supra* note 12, at 2.

²⁹ Hanson describes an alternative approach, using the market scoring rule to create many combinatorial markets. *See* Hanson, *supra* note 25.

³⁰ Many existing markets, like those hosted on Tradesports.com, use a similar approach to unwind implicitly conditional markets like “How many votes will Harriet Miers receive in the Senate?”.

³¹ When Harriet Miers withdrew her nomination from consideration, Tradesports.com unwound the bets on how many votes she would receive.

³² A caveat is that if predictions become self-fulfilling prophecies, the evaluation of rejected alternatives may be unreliable. *See infra* Part II.C.3 (addressing this issue). A separate caveat is nonconditional markets can become self-defeating prophecies. For example, if a market to predict an earnings restatement is run after the initial statement of earnings, then an indication of a problem ultimately may lead to the correction of the problem, preventing the person trading on the information from profiting. Design alterations, such as markets predicting final earnings numbers, can avoid this problem. *See infra* III.B.1 (discussing related markets).

1. Inefficient markets

A significant general objection is that markets can be inefficient, and in particular that they may be prone to speculative bubbles. Whatever the merits of this controversy, stock markets appear nonetheless to be superior to alternative approaches to distributing capital, such as assigning government officials or panels of experts to judging the future effectiveness of various companies. Likewise, while there is some recent evidence that suggests that some individuals do occasionally “beat the market,” past performance is not a reliable indication of future results.³³ And so, it would be difficult to designate specific individual corporate forecasters and have confidence that they will be the ones who will beat the market. The better approach is to allow these forecasters to bet in the market, and thus to influence prices, even if such arbitrage will only imperfectly offset problems that may lead to occasional mispricing.

Moreover, inefficiencies of equity markets will not necessarily be problems in prediction markets. Equity markets are subject to bubbles in part because of the possibility of earning fortunes from passive investments; prediction markets, on the other hand, have no inherent upward trend. Participants will recognize that they cannot simply throw money into the market, but that they must make predictions on specific markets. Occasional bubbles might form, for example because market participants misinterpret some trades as reflecting information. Such bubbles have occurred in laboratory experiments, though only rarely.³⁴ Derivatively informed trading in any event can be a rational market strategy that in general increases market efficiency, even if there are occasions in which the strategy leads the market astray.

2. Manipulation

An objection to reliance on prediction markets for decisionmaking is that individuals with an interest in the decisions might seek to manipulate the prediction markets. Someone who seeks to push a market in a direction not justified by valuable information, however, increases the incentive for others to enter the market and push it back in the other direction. Indeed, a laboratory experiment that gave some prediction market participants incentives to manipulate found that such incentives in general *improved* market accuracy, because the attempts at manipulation increased the liquidity of the market and the potential profits from trading.³⁵ A separate experiment in which the author sought to manipulate the IEM in randomly determined ways indicates that attempts at manipulation have only small and temporary effects on market prices.³⁶

³³ See BURTON G. MALKIEL, *A RANDOM WALK DOWN WALL STREET* (8th ed. 2004) (explaining the theory that securities prices exhibit a “random walk” unaffected by past price trends); Richard H. Thaler, *Anomalies: The Winner’s Curse*, 2 J. ECON. PERSPECTIVES 191 (1988) (demonstrating the difficulty of obtaining assets for less than their true value); Anna Bernasek & Burton Malkiel, *The Man Your Fund Manager Hates*, FORTUNE, Dec. 20, 1999, at 134; Burton G. Malkiel, *Indexes: Why the Critics are Wrong*, N.Y. TIMES, May 24, 1999, at A30, available at <http://www.princeton.edu/%7Ebmkalkiel/pdf/05-24-99wsj.pdf> (last visited July 6, 2006).

³⁴ See Colin F. Camerer & Keith Wiegelt, *Information Mirages in Experimental Asset Markets*, 64 J. OF BUS. 463, 490 (1991); David Porter & Vernon Smith, *Stock Market Bubbles in the Laboratory*, 1 APPLIED MATHEMATICAL FIN. 112 (1994); Lucy F. Ackert et al., *The Origins of Bubbles in Laboratory Asset Markets* (Fed. Reserve Bank of Atlanta Working Paper No. 2006-6, 2006), available at http://ssrn.com/abstract_id=903159 (last visited July 6, 2006).

³⁵ See Robin Hanson et al., *Information Aggregation and Manipulation in an Experimental Market* (Sept. 21, 2004), available at <http://mason.gmu.edu/~roprea/manipEX1.pdf> (last visited June 27, 2006).

³⁶ Paul W. Rhode & Koleman S. Strumpf, *Manipulating Political Stock Markets: A Field Experiment and a Century of*

It remains possible that manipulation might add some noise to prediction markets, because non-manipulating participants may slightly underestimate or overestimate the degree to which others are manipulating. But at least manipulation should not add any systematic bias, and the prospect of manipulation should increase liquidity and thus reduce noise overall. Corporations are in any event in a good position to reduce the danger of manipulation in prediction markets that they control. For example, in an internal prediction market involving only employees of the corporation, corporate officials might explicitly or implicitly threaten to punish anyone found to have attempted to manipulated the market.

3. *Unlikely conditions*

We have already shown how subsidies and automated market makers address the liquidity concern in markets generally. But what if the probability of the conditional event occurring is low? Corporations might want to assess the stock-price impact of decisions that are unlikely to occur. Would anyone trade in a market in which, say, there was a 90 percent chance that the market would be unwound? With sufficient subsidy, the answer is probably yes, but the risk inherent in such trading would increase the amount of subsidies necessary.

In any event, there are several possible solutions to this problem. We will consider one for low probability events and one for very low probability events. For low probability events, the market could be structured as a two-stage conditional market, with the first market predicting the outcome of the second market. Let us assume that the firm setting up the market wants to make a decision on June 1 on whether it should spin off one of its business units, but the market thinks that there is a low probability (say, a 10% chance) that the firm would actually take this action. The firm would establish a basic prediction market (call it “Market B”) starting, say, on one week before the decision is to be made, that would predict the impact of the spin off on the stock price. Market B would be a low-subsidy market in which few individuals would be expected to participate and little trading would occur because of the low probability of the event coming to pass. The value of this market would therefore not be in aggregating or processing information, since traders would have little incentive to research, but that it would provide a reference point for another, earlier market.

This earlier market (call it “Market A”) would be established, say, six months before the decision date, would be heavily subsidized, and would predict the outcome of Market B. Traders in Market A would thus be trading based on what they think traders in Market B will predict about the eventual decision (which will be made after Market B). As one of the authors has shown in prior work, it is irrelevant that Market B would involve trivial trading and little information generating activity. It is sufficient to generate trading volume in Market A that Market B will make a prediction, or more precisely, that there is *a chance* that Market B will make a prediction. If the price in Market A failed to reflect market fundamentals, then someone in Market B would have an incentive to trade on Market B. (This assumes that the market design allows a single person to trade against an automated market maker.) It is possible, of course, that no one will trade on Market B, since someone with information would have already traded on it in Market A. If no trades occur in Market B, then Market A is resolved based on its own final

Observational Data 2 (draft paper, 2006), available at [http://www.unc.edu/~cigar/papers/Manip_Paper_2005-17\(KS\).pdf](http://www.unc.edu/~cigar/papers/Manip_Paper_2005-17(KS).pdf) (last visited July 6, 2006).

trading price. Even in this case, Market A’s predictions are disciplined by the possibility of trading in Market B, and there is no need to unwind transactions for low probability events.

For very low probability events (perhaps less than a 1% chance, as determined by a separate nonconditional market), a “normative market,” that is a market that aggregates opinions, might be useful.³⁷ Instead of relying on Market B to discipline Market A, the firm could simply designate a particular individual (or set of individuals) to make a decision during the period when Market B would otherwise be operating. For example, before starting Market A, the firm could state that the firm will ask a randomly selected shareholder to evaluate the decision (or, perhaps, to select among various consulting firms that offer to conduct more thorough analyses). Market A would then be established to predict the estimate of the shareholder or the consulting firm. Because the random selection would be made only after Market A closed, the market would predict the average view of all eligible analysts.

4. *Unavailable information*

Another problem may arise because of informational asymmetries between the decisionmaker and any market participant. For example, a corporate decisionmaker, such as a CEO, might have information and experience unavailable to most market participants, and one might think that a prediction market would not be as effective as that individual decisionmaker. Even in cases where an individual has superior information, prediction markets can be useful. The superior information objection implies that a prediction market should not be used to discipline or constrain the decisionmaker. But the question is not whether a prediction market will perform as well as a corporate decisionmaker would in isolation, but whether a prediction market can improve on the initial recommendations of a corporate decisionmaker. The literature suggests that supplementary contributions to, and checks on, informed decisionmakers improve overall decision quality.³⁸

Lucian Bebchuk has made a similar point about shareholder voting.³⁹ Insiders may sometimes have information unavailable to shareholder voters, but a corporation can give an official recommendation on how to vote to those shareholder voters. There is no reason to believe, Bebchuk thinks, that shareholders will place too little weight on the official recommendations. This is even more strongly true in the context of prediction markets. If some participants in prediction markets place too little weight on the official corporate recommendation, others will have a profit incentive to take contrary positions. In cases in which a prediction market suggests that a corporate position is misguided, the consensus estimate is that the deference that should be given to the corporate decisionmaker on account of good information is not sufficient to overcome the intrinsic case against the decision. There is no theoretical reason to believe that such a market consensus is more likely wrong than right.

Even where a corporation does not announce an official recommendation, prediction markets may provide useful and easily digestible information to the CEO or other decisionmaker.

³⁷ See Michael Abramowicz, *Information Markets, Administrative Decisionmaking, and Predictive Cost-Benefit Analysis*, 71 U. CHI. L. REV. 933, 938-39 (2004).

³⁸ Herbert A. Simon, *Rational Decision Making in Business Organizations*, 69 AM. ECON. REV. 493 (1979)

³⁹ Lucian A. Bebchuk, *The Case Against Board Veto in Corporate Takeovers*, 69 U. CHI. L. REV. 973, 977-78 (2002).

Consider a prediction market estimating the firm's stock price following the adoption of the proposed strategy. The CEO or the board may think that it has superior information to potential participants in this market for a variety of reasons, ranging from experience and data to ego. Even so, there is no reason to exclude the sources of information reflected in the market. The market might signal an issue that management is unaware of, or it may corroborate management's view. Firms routinely spend large sums on consulting firms to corroborate the conclusions already reached by management, and the costs of establishing a prediction market will likely be far less. At the least, the market may inform the CEO about wider perceptions of the strategy, a valuable piece of information that a CEO might not be able to reliably obtain from other sources.

The possibility that corporate decisionmakers might have information unavailable to market participants does, however, present a potential technical complication in interpreting conditional markets.⁴⁰ A market prediction can confound an evaluation of the effects of a particular decision on the probability of an event with an analysis of what the fact that the decision was made indicates about the probability of the event. In the corporate context, suppose, for example, that a prediction market is used to predict corporate stock price conditional on a decision by the corporation to sell a major asset. Suppose, further, that market participants believe that there is some probability that the corporate decisionmakers have information indicating that the firm is in worse financial shape than the market believes, and that if this is the case, the firm would need to sell the asset. Then, even if it is unequivocally a good decision to sell the asset regardless of financial circumstances, market participants would recognize that if the firm does sell the asset, that could be an ominous sign of the firm's financial health. Therefore, the market might predict that the stock price conditional on the sale will be lower than the current stock price.

Despite this example, we doubt that this problem is serious in the corporate context, because conditional market predictions are suspect only in a case in which the corporation's decision affects the market's perception of the initial state of the firm. These cases will be rare for publicly traded corporations that are widely covered by analysts, rating agencies, the media, and large shareholders; publicly released prediction markets in which insiders can trade, as described in Part III, can make these cases rarer still. Sometimes, a decisionmaker may be expected simply to have better information than the market about the effects of a decision. In this case, the market prediction might exaggerate the market's perception of the benefits of a particular approach. But as long as separate markets predict the consequences of taking different paths, including doing one thing and not another, the market should still recommend the path that it thinks is best.

5. *Minor decisions*

So far, we have considered decisions that will have a significant effect on stock price. If the effect of a decision on stock price is relatively small, then conditional markets might not be able to tease it out.⁴¹ To take an extreme example, suppose that a corporation wishes to decide

⁴⁰ For further discussion of this problem in conditional markets, see Michael Abramowicz, *Information Markets, Administrative Decisionmaking, and Predictive Cost-Benefit Analysis*, 71 U. CHI. L. REV. 933, 955-57 (2004).

⁴¹ *Id.* at 1009.

whether to mow the grass outside corporate headquarters once or twice a week. As a theoretical matter, this might have some effect on shareholders: mow too often, and the corporation is wasting money; mow too little, and the corporation's image might suffer. The effect, however, is so small that it is likely to be swamped by noise. If, for example, a market prediction is derived from comparing the last price of transactions on two conditional markets corresponding to the two possible decisions, then it might be happenstance whether someone happens to make a purchase from one conditional market or another.

There are, however, possible solutions that would enable prediction markets to assess relatively minor decisions. First, conditional markets might be calibrated to predict not stock price at some point in the distant future, but instead stock price reaction to the announcement of a particular decision. Although other simultaneous news or announcements may also affect stock prices, these cannot be anticipated, and so the market prediction of the expected stock price change should be reliable even if the ex post measure is noisy. This approach should work as long as there remains some uncertainty about what the decision will be just before the announcement.

Second, a conditional market could predict something other than the stock price of the corporation. One possibility is to use a normative prediction market in which what is predicted is a subjective assessment of a particular decision. Ideally, the subjective assessment that disciplines the market should occur some time, perhaps several years, after the decision is or is not instituted. Delay can limit the danger that a normative market will merely impound the conventional wisdom.

III. IMPROVING CORPORATE INFORMATION FLOW

Much of corporate law seeks to design structures or processes to move information efficiently within a firm and from a firm to the market. In this way, corporate governance can be seen as the process of allocating power in ways that tend to minimize the sum of various costs, such as information costs, transactions costs, and agency costs. We argue that prediction markets may help lower the sum of transaction, information, and agency costs. For example, better information can allow shareholders to monitor managerial and board decisionmaking more easily; these markets may also be less expensive than alternative means of facilitating information flows to equity markets. In particular, we will argue that prediction markets have advantages over several alternative approaches to improving information flow, including institution of internal controls, abolition of insider trading rules, and enhancement of disclosure regulation.

A. Flow of Information to the CEO and the Board

In Enron, WorldCom, and many of the other recent corporate scandals, certain individuals or groups were able to hide valuable information from managers, the board, and others responsible for either making or monitoring decisions. This was possible because decisions within most firms are made only after information has been processed at numerous levels of firm hierarchy, each one of which adds not only the real costs of people, time, and resources, but also error costs and the potential for opportunism by those who might put personal profit ahead of firm welfare. The law's response has been largely structural and organizational—

for example, mandatory internal control systems, penalties and other incentives for increasing monitoring by directors, and increased legal protections for whistleblowers. There already exists, however, a potential market-based mechanism for efficiently conveying information through an organization to decisionmakers—the stock price. We will look briefly at the benefits of this approach, and then offer a better alternative.

1. The Virtues and Limitations of Following Stock Prices

One of the great virtues of a publicly traded corporation is that the overall health of the corporation can be assessed through a simple arithmetic operation, by calculating its market capitalization, that is, the stock price multiplied by the number of shares. Stock price accordingly is a central focus of firm behavior. CEOs may be fired when the stock price slips relative to competitors, and CEO contracts are designed to provide incentives to take actions that will increase investor confidence.

While there are risks of this focus on stock price, particularly when CEOs have incentives to present incomplete information to the market to ensure short-run increases in stock price, the discipline provided by stock prices advances the interests of shareholders, because the stock price proxy for corporate health reduces information costs. Even those who will scrutinize a corporation's health by a careful examination of a wide range of sources will often start with stock price as a reference point. They will then seek to find hidden sources of value that the market has not yet recognized (making the corporation undervalued), or hidden perils that the market has not yet appreciated (making the corporation overvalued).

The improved information that the stock price provides also reduces a corporation's agency costs. Agency costs have been defined as the sum of the monitoring expenditures that a principal incurs to supervise the agent, the bonding expenditures that an agency incurs to show faithfulness to the principal, and the residual loss from the nonalignment of the incentives of the principal and the agent.⁴² Because the stock price mechanism provides a means of monitoring the management of the corporation as a whole, it reduces the need for shareholders to spend money on alternative means of assessing the performances of management, and on procedures (such as shareholder votes) that might discipline management decisionmaking. Meanwhile, high-level managers can bond themselves by agreeing to accept some compensation in the form of stock options rather than cash. Because the stock price improves monitoring and bonding, it at least has the potential to reduce the residual loss from agency costs.

But stock prices have several significant disadvantages, especially when it comes to using them to make internal firm decisions, like whether to follow a particular strategy or who should sit on the board.⁴³ First, the stock price is too blunt, representing the per share value of the

⁴² Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure*, 3 J. FIN. ECON. 305, 308 (1976).

⁴³ Another potential objection to reliance on market prices is that maximization of shareholder wealth might not be the only goal of a firm. Some nonprofit firms, after all, might be seen as maximizing other variables, and even public corporations might care about constituencies besides their shareholders. *See generally* Einer Elhauge, *Sacrificing Corporate Profits in the Public Interest*, 80 N.Y.U. L. REV. 733 (2005) (arguing that the law does and should give managers discretion not to maximize shareholder wealth). We do not claim that stock price should be the sole relevant criterion in assessing a corporation's decisions. It is ordinarily a very important criterion, and at least it should be useful to assess corporate decisions and management against this metric. Prediction markets also might be used to assess how decisions will affect other constituencies. *See infra* Section IV.C.

expected cash flows for all future periods discounted back to the present, rather than a narrowly tailored market view on a particular issue. Any number of firm-specific or market-wide developments can thus be expected to affect the stock price in ways that may be difficult to unpack from the particular relevant event being analyzed. The bluntness of the stock price also may discourage trading. An investor may have information about one thing (say, a positive view about one project), but offsetting information about something else (say, a negative view about another project). The firm and market will not benefit from information disclosure, even if the basis for trading could be decoded.

Second, the stock price does not reflect all available information, since those with the very best information about the firm are legally prohibited from trading on the basis of that information. Insiders with information about the success or failure of corporate projects, public auditors with opinions about the veracity and completeness of firm financial statements, and outside counsel with views on the firm's compliance with the law, are all forbidden from transmitting their information to the market. In addition, an insider with material, non-public information about one aspect of the firm's business will be deterred from trading even if in possession of valuable information about another aspect of the firm's business, if such trading could give rise to trading liability. These realities seriously undercut the utility of the stock price as a decision input (or determinant) for corporate decisionmakers.

Third, in a world of reasonably effective insider trading laws, markets respond only to the public release of information about the firm. Thus, a firm deciding between one of two projects will only get the market's view on its choice once it has made the decision. This is valuable for some purposes, like disciplining managers, but is much less valuable for evaluating the merits of the two projects, because decisions announced and then unmade carry significant costs both in terms of actual expenditures and losses in reputation.

Fourth, stock prices also may suffer from upwards bias due to the limitations on short sales found in various federal laws and regulations.⁴⁴ If the stock price represents the average of the bets made by those who think the stock will rise and those who think it will fall, but those who think it will fall are disadvantaged in the number and type of bets they can make compared with those who think it will rise, then, all else being equal, the stock price may be upwardly biased in the short run. As David Schizer explains, "If pessimists cannot trade, optimists are likely to have a disproportionate influence on prices."⁴⁵ This phenomenon reduces the informational value of stock prices at any point in time, as it slows the "market's progress toward an equilibrium price."⁴⁶

Prediction markets do not suffer from any of these shortcomings: they can be narrowly tailored to specific decisions,⁴⁷ they can be used internally to assess different future possibilities, and they are not biased by any laws restricting trading. Prediction markets allow employees as

⁴⁴ See Edward M. Miller, *Risk, Uncertainty, and Divergence of Opinion*, 32 J. FIN. 1151, 1160 (1977).

⁴⁵ Michael R. Powers et al., *Market Bubbles and Wasteful Avoidance: Tax and Regulatory Constraints on Short Sales*, 57 TAX L. REV. 233, 240 (2004).

⁴⁶ *Id.*

⁴⁷ See Manne, *supra* note 10, at 185 ("Virtual markets even have some benefits the actual stock market does not, such as the ability to segregate specific causes of share-price changes.").

well as other insiders and market participants to convey information not just about the overall health of the firm, but about particular issues facing it. The markets can help alert decisionmakers to bad decisions or missed opportunities sufficiently early that they can try to apply pressure to reverse the changed policy. Designs like the market scoring rule make it easy to bet that a prediction is too high without trading short.

2. Problems Impeding Information Flow

Not only are stock prices generally insufficient to inform managers about the wisdom of particular future courses of action, but firm decisionmaking in general is also complicated by barriers to efficient information flow. Prediction markets can help avoid the distortions that occur when gatekeepers decide what information to present to their immediate superiors, turning information flow into a costly version of the children’s game “telephone,” or, worse, a way of misleading bosses and corporate stakeholders. At the same time, prediction markets help avoid the danger that employees will keep information to themselves lest the information interfere with interpersonal relationships, reputation, or even job status; this is especially true if anonymous trading is permitted. Prediction markets also give the few who recognize the heuristics and biases of others incentives to trade against those biases. We will consider how prediction markets can solve each of these three problems—hierarchy, hidden profiles, and heuristics and biases—in turn.

a. Hierarchy

Decisionmaking in firms is generally hierarchical. Every organization has a single decisionmaker, be it an individual or group, that must make decisions based on all available information. The problem is that the volume of information necessary to make a decision is often overwhelming. Hierarchy and filtering are one solution. The head of each business unit or team or division is responsible for getting all information from that group, synthesizing it, and reporting it up the chain of command. While this approach can sometimes lead to an optimal quantity and quality of information reaching the ultimate decision maker, it also has significant costs, and opportunistic or self-interested actors may abuse it.

Consider the information generated by the government about alleged Iraqi weapons of mass destruction. The President did not receive all the information collected by the executive branch, but rather only data filtered through his various advisors. Each of the various departments, not to mention each of their data collectors, may have had a particular ideological or personal agenda. High-ranking advisors are tasked with filtering and analyzing information, but the data that they received is filtered too by their subordinates.

Similar situations obtain in every business firm of considerable size. Replace the word “president” in the above with “CEO,” and the political departments with business divisions, and the story is the same. Like the president, the CEO faces decisions of consequence, from certification of financial statements to merger decisions, with little first-hand observation. The problem of information flow is especially important for today’s large, multinational firms. With hundreds of divisions in dozens of countries, a firm like General Electric can prepare financial statements only by aggregating those submitted by each division head or country manager into progressively broader organizational categories.

One potential solution to the informational asymmetry problem is to improve organizational design and incentives. This is the most common response to informational breakdowns, both in government and in firms. The creation of a Director of National Intelligence and the mandatory internal control provisions of the Sarbanes-Oxley Act are both examples of this type of solution. It is difficult to align incentives between principal and agent, however, and firms are always plagued by organizational costs, regardless of how well they are put together. These costs can be large, especially when individuals can benefit from deception.⁴⁸ It may or may not be worthwhile for a particular organization to invest more money in improving information transmission up each level of the hierarchy.

An alternative strategy is to facilitate the flow of information around the hierarchy.⁴⁹ An individual employee who dissents from an official report or sees a false idea propagating can try to go around the hierarchy or blow the whistle. These actions, however, are risky, because reputations and jobs are at stake. Protections for whistleblowers can encourage employees to raise concerns loudly, but these are difficult to calibrate properly. Excessively generous protection can allow some employees to make large amounts of money on either frivolous charges or charges that the employees did little to uncover. Blowing the whistle can also be a form of job protection, because some firms may be reluctant to fire employees for fear of bad press or a lawsuit. Inadequate protection, meanwhile, can lead many employees to keep their concerns to themselves. Whistleblower provisions, in any event, seem unlikely to be effective in encouraging the flow of information in cases where there is no question of illegal conduct.⁵⁰ An employee who believes that a supervisor has made a good faith but mistaken decision is unlikely to go over the supervisor's head. Organizations that encourage such insubordination risk exacerbating workplace tensions and wasting high-ranking officials' time.

Prediction markets provide a much simpler approach to allowing information to flow to top decisionmakers. They offer several advantages. First, prediction markets can prevent gatekeepers from filtering and distorting information. For example, allowing individuals to predict sales would reduce the possibility that errors (either innocent or profit-seeking) propagate through the hierarchy all the way to the top. Employees would have incentives to identify and correct distorted information, especially if they can trade anonymously.

Second, prediction markets can increase the possibility that those most capable of making accurate predictions will do so. Trades in prediction markets will be weighted by intensity of belief or knowledge. At times, of course, individuals will be overconfident of their positions, but on the whole, weighting seems likely to improve information. Even if a hierarchical organization

⁴⁸ For a discussion of the difficulties of designing effective incentives, see Bengt Holmstrom & Paul Milgrom, *The Firm as an Incentive System*, 84 AM. ECON. REV. 972 (1994); and Bengt Holmstrom, *The Firm as a Subeconomy*, 15 J.L. ECON. & ORG. 74 (1999).

⁴⁹ Some firms have developed creative ways to help alleviate the costs of hierarchy. For example, Cisco CEO John Chambers hosts a monthly "birthday breakfast" during which he chats informally with employees having a birthday in that month. See *How I Work: Lights! Camera! Cue the CEO!*, FORTUNE, Aug. 21, 2006 at 27. Although such sessions may occasionally help improve decisionmaking, their purpose and real value, if any, is as a morale building tool.

⁵⁰ A recent example of the limitations of such provisions is *Carnero v. Boston Sci. Corp.*, 433 F.3d 1 (1st Cir. 2006). In *Carnero*, the First Circuit held that the whistleblower provisions of SOX were not clearly intended by Congress to have extraterritorial effect. Thus, when Carnero was fired after reporting financial improprieties to Boston Scientific Corporation (BSC), an American corporation, he had no recourse under SOX, even though Carnero was employed by BSC's Argentinian and Brazilian subsidiaries.

picks excellent managers, predictive capacity is only one aspect of managerial skill. Indeed, sometimes an organization might want to select managers who are overconfident about the possibility of achieving success, because these managers can be effective motivators. Prediction markets may allow others to compensate for the predictive weaknesses of these managers, while still allow these managers to coordinate projects.

Third, prediction markets can boil down information to the concrete numbers that will be of most interest to top decisionmakers. For example, markets allowing employees to predict whether the firm will have to restate its financial statements would provide the CEO a simple barometer for assessing the veracity and completeness of the financial statements. This may be more useful, especially for a CEO not trained in accounting, than a detailed explanation of arcane accounting decisions. Of course, top decisionmakers will also sometimes rely on hierarchical decisionmaking structures to produce analysis to explain the numbers, but at least the CEO will be able to identify instances in which the analysis appears to be at variance with the consensus prediction.

b. Hidden profiles

A related problem that prediction markets can help overcome is the tendency for less than all information held by a group of individuals to be incorporated into group-based decisionmaking. Cass Sunstein points out that while groups of individuals, like the employees of a firm, have as a group a great deal of valuable information, the deliberative model used by most firms to aggregate and process this information is flawed.⁵¹ For one, the social pressures within any organization lead some members to sit quiet even though they may have valuable information to share—an effect known as “hidden profiles.” The result is that there is an emphasis on information shared by the group. Bad decisions can cascade when managers at each level of a hierarchy, initially potentially open to differing perspectives, place aside their conflicting views when facing recommendations from subordinates.

Prediction markets can combat both of these concerns. Individuals who might keep information to themselves nonetheless might trade on that information. Meanwhile, it may only take one or a small number of people who have correctly analyzed a problem to trade on their information and prevent cascades. Of course, employees will often trade on information without explaining their reasoning, and so some information cascades will persist, and liquidity constraints of employees may lead even those who have the correct analysis to limit the degree to which they correct the market. But prediction markets at least should help.

c. Heuristics and biases

Additional obstacles to information flow arise from the heuristics or mental shortcuts that impede individuals’ ability to collect and disseminate information effectively and efficiently. Recent work in behavioral economics reports that individual employees are risk averse, are overly optimistic, apply excessively high discount rates to the future, and suffer from other cognitive limitations when processing information.⁵² Unfortunately, employees most affected by

⁵¹ See Cass Sunstein, *Group Judgments: Statistical Means, Deliberation, and Information Markets*, 80 NYU L. REV. 962 (2005).

⁵² See, e.g., Derek E. Bambauer, *Shopping Badly: Cognitive Biases, Communications, and the Fallacy of the Marketplace of Ideas*, 77 U. COLO. L. REV. 649, 673-96 (2006).

such biases may be most likely to succeed. As Donald Langevoort recently wrote in describing the Enron scandal: “[T]raits such as over-optimism, an inflated sense of self-efficacy and a deep capacity for ethical self-deception are favored in corporate promotion tournaments, so that people who possess them are disproportionately represented in executive suites.”⁵³ This should result not only in the occasional massive fraud, but also in far more numerous small mistakes that can decrease firm profitability.

These factors alone or in combination can contribute to potential problems. For example, risk-averse employees may place great emphasis on a small danger of losing their jobs. Therefore, they may go along with bad decisions or even participate in frauds originated at higher levels. Studies also show that corporate leaders, like most of us, are plagued by excessive optimism.⁵⁴ This trait may cause individuals in the information hierarchy to be overconfident in ways that impede information flow. A sales person might overestimate expected sales, and, if things do not work out as expected, be tempted to cover up for fear of being fired. This course of action is especially likely for individuals suffering from overconfidence bias, because the bias will apply also to an employee’s estimate of the probability of getting away with misbehavior. Even where overconfidence does not cause employees to break laws or rules, it may lead them to make excessively optimistic progress reports to their supervisors, ultimately leading to poor decisionmaking.

Use of prediction markets might allow some frauds to be uncovered by decisionmakers far up the chain of command or outside the firm, as various individuals would have incentive, be it financial or otherwise, to trade against the official report to management. The markets effectively give voice to those who otherwise would remain silent due to various pressures or expected costs from speaking out. The biases that prevent good decisionmaking may also distort the information flow to the market, but the misinformed or overly optimistic trades of these individuals will attract those with better information and less bias. Those who are aware of others’ cognitive imperfections will recognize profit opportunities, and their trading should at least partially correct for biases.

B. Flow of Information to the Markets

So far, we have seen how internal firm prediction markets can help reduce the error costs of information flow in hierarchical organizations, as well as enable truth telling in a low risk, cost effective manner. Of perhaps even more relevance to legal scholars and policy makers is the role these markets can play in improving information flow from the firm to shareholders, creditors, and other market participants. In this section, we argue that prediction markets can prove more effective at transmitting information to markets than several other possible strategies: imposing auditing and internal controls, relaxing insider trading laws, and enhancing mandatory disclosure requirements.

⁵³ Donald C. Langevoort, *Resetting the Corporate Thermostat: Lessons from the Recent Financial Scandals About Self-Deception, Deceiving Others, and the Design of Internal Controls*, 93 GEO. L.J. 285, 288 (2004).

⁵⁴ See Donald C. Langevoort, *Organized Illusions: A Behavioral Theory of Why Corporations Misperceive Stock Market Investors (and Cause Other Social Harms)*, 146 U. PA. L. REV. 101 (1997) (noting that corporate information flows are affected by managerial optimism, and other problems of managerial heuristics, including cognitive conservatism, decision simplification, and self-serving beliefs).

1. Prediction Markets Instead of Internal Controls

A common element of all the recent wave of corporate scandals was an apparent breakdown in firms' internal and external auditing functions, which in theory should bring relevant information to the markets. For example, at Enron, Andrew Fastow and others manipulated internal reports to serve their personal ends, and Arthur Andersen failed in its obligation to make sure that Enron's financial statements represented a true picture of the firm. In response, policymakers in Congress, the SEC, and the newly created PCAOB, adopted a series of requirements designed to improve the reliability of public disclosures of financial reports: beefing up accounting expertise and independence on boards, banning accountants from selling consulting services to firms they serve, requiring annual reports on the efficacy of new internal control systems for financial reporting, and mandating financial statement certification by the CEO and CFO. Fraudulent certification carries a possibility of multi-million dollar fines and two decades in prison.⁵⁵

While these reforms raise the cost of malfeasance and may help deter abuses, the consensus is that the costs are high. For example, several studies show that the burden is so great that many firms are opting to "go private" to avoid the costs, hassle, and legal risks from this uncertain process.⁵⁶ Even supporters, like Langevoort, have doubts. He wonders whether the institution of a "firm-specific central intelligence agency . . . to spy on line managers and audit both the qualitative and quantitative aspects of their disclosure" will be beneficial, pointing out that the "costs [of such an approach] should not be underestimated."⁵⁷ Ultimately, the new approach relies on directors or auditors or other gatekeepers to enforce a new discipline on managers, either through new independence requirements (for directors and auditors) or whistleblowing protections (for lawyers and employees). These parties, however, may be complicit in wrongdoings, may be undermotivated to act properly given that they may too suffer from cognitive or other biases, and may be rational in not acting to stop an alleged fraud based on a reasonable calculation of their own self interest.

As important, the costs of auditing are increasing dramatically without any clear sign that the value of auditing services or the financial information provided by firms is improving. Part of the problem is that no consensus exists on the best approach to summarizing audit information. There are currently vigorous debates on accounting issues raging from the general approach to firm audits (rules or standards?) to the details of specific types of disclosures (should executive compensation be disclosed in footnotes or tables?). Greater expenditures on audits can reduce the possibility that auditors will miss a red flag, but they will not necessarily ensure that information is conveyed to the market in the most useful, cost-efficient manner.

Prediction markets are a potential alternative or complement to Section 404 internal controls, allowing information to flow around a hierarchy rather than merely improving information flow up a hierarchy. Suppose that a CEO believes that there is a possibility that certain executives have been shifting sales from one period into another. The CEO could create a

⁵⁵ Sarbanes-Oxley Act of 2002, § 906, 18 U.S.C. § 1350(c)(2) (2002).

⁵⁶ See Larry E. Ribstein, *Market vs. Regulatory Responses to Corporate Fraud: A Critique of the Sarbanes-Oxley Act of 2002*, 28 J. CORP. L. 1 (2002).

⁵⁷ Langevoort, *supra* note 54, at 315.

prediction market forecasting whether the firm will be required to restate its earnings over some period of time, or what the firm's final statement of earnings will be. Because most frauds materialize eventually, traders could profit on markets with sufficiently long time horizons. Or, the market might predict more specifically whether an investigation into possible earnings shifting will find wrongdoing in a particular group. Such a market could help focus investigators' efforts, lowering costs and reducing the danger that they will reach a premature conclusion.

A similar approach could be applied to any number of current dilemmas where corporate law and accounting intersect. Prediction markets could be used to assess whether particular accounting treatments or disclosures will be found to be accurate. An ambitious approach would create a prediction market corresponding to each significant numeric line of a disclosure, forecasting the correct amount that should be input on the relevant line. The firm could commit to spending extra resources investigating some percentage of disclosure lines, say 10%, chosen at random. The markets could be structured as conditional markets, anticipating the correct disclosure that will be identified in an investigation if the particular disclosure line is selected for a random examination. Using the two-stage market approach described above, employees could profit from trades even in cases in which disclosures did not turn out to be randomly selected.

It might appear that these strategies will work only if accounting rules are refined sufficiently so that there is an objective correct answer to the relevant accounting questions, but if such refinement occurs, then prediction markets might seem to be less useful. An advantage of prediction markets, however, is that they can effectively aggregate different potential views on questions. For example, if different accounting investigators would be expected to reach different conclusions about a particular number disclosed, the market will produce a weighted average of the different views. Prediction markets can thus work effectively even if some accounting standards remain vague. Indeed, with prediction markets, vagueness might be preferable to the extent that it makes it less likely that firms will legitimately but misleadingly exploit loopholes.

Because managers and firms have only limited incentives to reform their accounting practices, the impetus for prediction markets someday might come from regulators. When these markets are sufficiently reliable and the design questions we and others have raised are addressed, it might be sensible for the SEC or other regulators to require firms to use these markets to aggregate and process information about a firm's fiscal health. Firms would set up or participate in prediction markets designed to estimate various financial metrics, like earnings. Even at this relatively early stage, the SEC should consider testing these markets or encouraging firms to experiment with them, at the very least by assuring firms that such experimentation will not lead to enhanced regulatory scrutiny.

The ongoing debate about the role of external auditors in the recent options backdating scandals illustrates the limitations of traditional approaches. Regulators at the SEC and PCAOB argue that auditors shirked their duties by not investigating more fully the granting of options by the firms they audit, while auditors defined their job in a limited way, arguing that they are not there to ferret out wrongdoing and that they should be allowed to take firm documents at face value.⁵⁸ The role of auditors could be expanded to include an investigatory role, or specialized

⁵⁸ See David Reilly, *Backdating Woes Beg Question of Auditors' Role*, WALL ST. J., June 26, 2006, at C1. A related problem is whether auditing firms should be permitted to disclose "soft information," such as impressions or color about a firm's reported

auditors or forensic accountants or consultants could be required, but these approaches may be costly and ineffective.

Prediction markets are an alternative. Firms could install board-monitored prediction markets on a set of core issues, like whether a firm's reported earnings are accurate. The SEC someday might require firms to set up these markets or participate in markets created by the SEC itself. Stock exchanges might also sensibly require firms to use such markets as part of listing requirements. Finally, state courts might put real teeth into duty-to-monitor requirements by requiring boards under certain circumstances to deploy these markets in a monitoring capacity. Questions remain about how exactly to design these markets, what subjects should be mandatory versus voluntary, what entity is best positioned to require these markets, what should be disclosed and when, and so on. These issues are beyond our scope, and are, in any event, unresolvable as a theoretical matter at this stage in the evolution of these markets.

2. *Prediction Markets Instead of Insider Trading*

Another use of prediction markets is as a harmless end-run around insider trading restrictions. Markets can give insiders an incentive to reveal information to the firm and the market while muting the normative concerns that are the basis for insider trading laws. Henry Manne, the leading anti-establishment thinker in this area, has long argued that insider trading could increase market efficiency and could help smoke out corporate frauds.⁵⁹ In a recent article, he argued that the success of corporate prediction markets should highlight the potential benefit of relaxing insider trading laws.⁶⁰ Insider trading, however, may impede the efficient allocation of capital. On anonymous exchanges, market makers do not know whether they are trading with someone with inside information or someone without, so they increase the bid-ask spread in order to compensate for the risk that the trade is with the former. This increase in bid-ask spreads reduces the number of possible transactions in the marketplace, and therefore results in less market liquidity.⁶¹

Perhaps the most obvious and simple corporate prediction market is one that would attempt to replicate the informational component of the firm's stock price by simply forecasting future stock prices.⁶² A sample contract might be: "What will Firm X's stock price in 6 months?" The argument against the applicability of insider trading laws is that participants would not be buying or selling a "security," a requirement for application of federal securities law. The key legal questions are whether a prediction market contract qualifies as a "stock" or as an "investment contract."⁶³ It is almost certainly not a "stock," because it provides no voting

numbers, or be limited solely to "hard information," that is, the numbers themselves. As could be expected, auditors are pushing to limit their obligation to provide soft information, while investment bankers and others that rely on it to give them the real story of the firm are pushing for continuation of the practice.

⁵⁹ See HENRY G. MANNE, *INSIDER TRADING AND THE STOCK MARKET* (1966).

⁶⁰ See Manne, *supra* note 10.

⁶¹ Kee H. Cung & Charlie Charoenwong, *Insider Trading and the Bid-Ask Spread*, 33 FIN. REV., Aug. 1998, at 1 (reporting the results of an empirical study confirming that stocks with more insider trading have larger bid-ask spreads).

⁶² Larry Ribstein & Bruce Kobayashi, *Outsider Trading as an Incentive Device*, 40 U.C. DAVIS L. REV. (forthcoming 2006) (manuscript at 11-12), available at http://ssrn.com/abstract_id=888188.

⁶³ See, e.g., *Great Lakes Chem. Corp. v. Monsanto Co.*, 96 F. Supp. 2d 376 (D. Del. 2000); see also 15 U.S.C. § 77b(a)(1) (2000) (providing the complete statutory definition).

rights,⁶⁴ and an investment contract requires investment in a “common enterprise”⁶⁵ rather than a mere prediction. The question is not entirely free from doubt, however. Participants might be considered to be trading in a derivative of a security, and thus fall within the regulatory ambit of the CFTC, though the CFTC’s jurisdiction over prediction markets remains unclear.⁶⁶ CFTC jurisdiction seems less likely for prediction market contracts whose payoffs do not depend directly on the stock price.

Whatever their present legal status, corporate prediction markets should generally not be seen as invoking the same normative concerns as insider trading regulation, at least to the same degree. To the degree that any concern exists, it may depend on who is permitted to trade. The argument for insider trading rules is particularly weak if insiders are trading these contracts solely with other employees or those in contractual privity with the firm. Prediction markets are not used to raise capital, mitigating concerns about market integrity. Especially when subsidized, internal prediction markets function more as job performance inducements than as 401(k) plan. Insider trading in public prediction markets may raise greater concerns, because of the increased possibility that individuals will use prediction markets for hedging purposes rather than for betting. Even so, normative concerns seem minimal. Trading in these markets would be purely voluntary, and anyone who wishes to avoid betting against insiders could continue to invest in equity or traditional derivative markets for retirement or other savings. Indeed, by bringing insider information to the public, and by giving insiders a discrete outlet for profit, prediction markets should make the playing field in traditional markets even more level than before.

3. Prediction Markets Instead of More Disclosure Regulation

Prediction markets may also have value as a substitute for (or compliment of) existing securities disclosure requirements under federal law. Disclosure is the silver-bullet answer for nearly all corporate law problems these days. Consider the current flap about executive compensation made prominent by recent academic work,⁶⁷ an endless series of media exposes, and the options backdating scandals. While there are many conceivable regulatory responses, ranging from nothing to tax penalties for certain types of compensation to ceilings, the SEC’s response—new disclosure rules—is hardly surprising. Ever since President Franklin Roosevelt made Louis Brandeis’s slogan about sunlight being the best disinfectant the touchstone of the securities laws,⁶⁸ disclosure of more information to investors has been the preferred regulatory response. After seven decades of more and more mandatory disclosure, the costs and benefits of this regime are unclear.

If prediction markets prove to be successful and become widespread, however, they could provide an alternative supplement, or someday perhaps even partially displace the costly mandatory disclosure regime of the securities laws. The fundamental purpose of the periodic disclosure requirements of the ’34 Act is to provide investors with equal access to relevant

⁶⁴ See *id.* at 385 (citing *United Hous. Found. v. Forman*, 421 U.S. 837 (1975)).

⁶⁵ *Id.* at 384-85 (citing *SEC v. W.J. Howey Co.*, 328 U.S. 293 (1946)).

⁶⁶ See sources cited *supra* note 74.

⁶⁷ See *infra* note 143 and accompanying text.

⁶⁸ See JOEL SELIGMAN, *THE TRANSFORMATION OF WALL STREET* 41-42 (3d ed. 2003).

information about the firm.⁶⁹ Prediction markets forecasting stock price can by themselves provide relevant information about insiders' views about the health of the firm as a whole. More focused prediction markets can provide information about particular projects or issues. In theory, the SEC might someday specify certain markets that firms must create, based on experience with which market types prove most useful at providing investors with valuable information. In the meantime, if firms generally develop these markets, certain types of mandatory disclosure might become less necessary.

Carefully designed prediction markets might provide alternatives to concrete disclosure requirements, including new proposals. Consider, for example, Lucian Bebchuk and Robert Jackson's call for the release of information on executive pensions.⁷⁰ Disclosure in this area might be complicated, because of the complex nature of pension agreements, and the contingent nature of some executive compensation. An alternative approach would be to use a prediction market to forecast payments to be made to executives in each of a number of future years, apart from salary. This information might be more useful to the market, because market participants would not need to engage in expensive analysis of disclosures about pension plans. It also might be cheaper than producing detailed reports, although that depends on the size of the market subsidy.

The more speculative question is whether prediction markets might substitute for existing disclosure requirements. Imagine a hypothetical firm that has ten projects of varying sizes, risks, and potential returns. Under current law, the firm would likely disclose the existence and basic factual information for each of the projects, including periodic updates when any "material" changes occur. The goal of these disclosures, which often run to tens, if not hundreds, of pages is to provide investors with information they need to make investment decisions, as well as encouraging good behavior on the part of the firm by requiring disclosure.

This regime suffers from serious problems. Few investors actually read the materials that firms spend so much time and money putting together and distributing. While average investors may free ride on those few (professional) investors who do read the information, this may raise normative concerns about broad and equal access to information.⁷¹ In addition, when deciding what to disclose, the firm must balance a complicated tradeoff. The threat of legal liability may generally encourage more disclosure, albeit in a boilerplate fashion that is not information rich, while competitive pressures and the desire to keep strategic secrets may encourage less disclosure. Faced with the possibility of a strike suit in the event of a decline in the stock price, firms may choose, as a pre-litigation strategy, to make voluminous but meaningless disclosures. A firm will list so many generic risk factors for particular projects that it will be difficult *ex ante* for an investor to appreciate which factors are most significant. An additional cost of the

⁶⁹ *Basic, Inc. v. Levinson*, 485 U.S. 224, 234 (1988) ("We have recognized time and again, a 'fundamental purpose' of the various Securities Acts, 'was to substitute a philosophy of full disclosure for the philosophy of caveat emptor and thus to achieve a high standard of business ethics in the securities industry.'" (quoting *SEC v. Capital Gains Research Bureau*, 375 U.S. 180, 186 (1963))).

⁷⁰ See Lucian Arye Bebchuk & Robert J. Jackson, *Executive Pensions* (NBER Working Paper No. W11907, Dec. 2005).

⁷¹ Regulation FD is a recent regulatory change that recognizes equal access as an important element of securities law policy. 17 C.F.R. §§ 243.100-243.103 (2006). The key provision states, "Whenever an issuer, or any person acting on its behalf, discloses any material nonpublic information regarding that issuer or its securities to any person described in paragraph (b)(1) of this section, the issuer shall make public disclosure of that information . . ." 17 C.F.R. § 243.100(a) (2006).

disclosure regime is the litigation, both meritorious and frivolous, that results as lawyers look for material misstatements or omissions in each descriptive disclosure.

In a world with well-functioning prediction markets, the firm might instead (or in addition) set up one or more markets for each project. If the market were a purely internal market, the firm could disclose the results on a periodic basis; if the market were a public market, the disclosure would be continuous and ongoing. The ability of the firm to disaggregate its value into discrete projects, each of which is tracked based on a prediction market, would provide much more information and in a more usable form than the current disclosure regime. In addition, this type of disclosure might alleviate many of the litigation risks firms and investors now face. Firms would have less incentive and ability to deceive investors with faulty or insufficient disclosures, as the prediction markets would provide a natural market check. In addition, investors of all types would have an easy-to-understand metric for evaluating the firm's prospects. Moreover, firms would no longer be able to package disclosures (the good from one project with the bad from another) in a manner that may lead to socially wasteful conduct and investor losses.⁷²

Firms' incentives to experiment in improving their disclosures may be limited, because firms are unable to capture any competitive advantage from publicly disclosed innovations.⁷³ Once prediction markets become better established as decisionmaking aids, the SEC could, as a modest first step, sponsor a pilot program designed to identify best practices for using markets as disclosure tools. The SEC might operate the markets itself, and could choose a disclosure topic, such as executive compensation rules. Some firms would be randomly selected to adopt new rule-based disclosure obligations, other firms to adopt a market designed to provide investors with stock-price-like measure of the firm's compensation practices, and still others to adopt other market designs. Participation could be voluntary, and firms that participate in the pilot program could be compensated in a variety of ways, for example, through exclusive use of the design for a period of time or temporary relaxation of some other rules.

C. Objections

There are a number of valid objections to the use of prediction markets for internal decisionmaking and to convey information to markets.⁷⁴ We consider several here: that wealth constraints may prevent employees from trading on information, that employees may be with a firm for too short a period of time to profit from prediction markets with long time horizons, that

⁷² See James C. Spindler, *Why You Want Your CEO to Lie to You After Dura Pharmaceuticals* (2002), available at http://elawsite.usc.edu/faculty/workshops/documents/Spindler_000.pdf (last visited July 4, 2006) (discussing the incentives that managers have to bundle good and bad disclosures).

⁷³ See generally Michael Abramowicz, *Speeding up the Crawl to the Top*, 20 YALE J. ON REG. 139 (2003) (explaining why firms may have insufficient incentive to initiate governance innovations).

⁷⁴ Another possible impediment is that these markets might be illegal in some cases or subject firms to costly disclosure requirements. As to the law, the primary obstacles are gambling regulation and federal commodity futures trading regulation. See generally Tom W. Bell, *Gambling for the Good, Trading for the Future: The Legality of Markets in Science Claims*, 5 CHAP. L. REV. 159 (2002); Tom W. Bell, *Prediction Markets for Promoting the Progress of Science and the Useful Arts*, GEO. MASON L. REV. (forthcoming 2006). The academic consensus is that the markets we envision in this article should not be illegal, especially given the important positive externalities (and lack of negative externalities) they will have. Another issue about which some firms appear to be concerned is how prediction markets might affect their disclosure obligations, but we do not believe this to be a significant obstacle. Whether firms create internal reports, hire external consultants to prepare an analysis, conduct a poll of the board or certain employees, or use a prediction market, the end result—another input for the decisionmaker—is the same.

prediction markets may adversely affect workplace culture, and that managers might not have the incentives to adopt these markets because of agency costs. (We have already considered some general objections to prediction markets, such as the danger of market inefficiency, above.) We believe each of these objections has merit, but that none is clearly fatal to expanded use of prediction markets.

1. Wealth Constraints

One concern is that individual employees have limited liquidity, so they may be unable to trade on information in sufficient volume to reveal information to the market. In other words, wealthy executives or shareholders would be able to sway the market in ways that lower-level employees or individual shareholders could not, even if the latter group has more accurate information. This concern is most valid for markets that seek to reveal information that only a very small number of individuals might have, such as information revealing the occurrence of fraudulent activity. Admittedly, there will be some cases in which so few people have information that the prediction market will help, but not enough to call attention to an issue at high levels. Nonetheless, there will be many other situations in which enough people have the correct information that they can significantly counteract misleading statements by corporate officials. For example, many employees in a group may recognize that their boss is unduly optimistic. Employees could also borrow (known as trading on “margin” in equity markets) from professional traders or the firm or even a bank to finance the trade.

Moreover, in situations in which only a few employees have access to specific information, external traders may be willing to pay these employees for the information that they have available. This is a common practice in equity markets, and there is no reason to think that it wouldn’t work here as well. In the famous case involving the fraud at Equity Funding, the insider who knew about the scam tipped his friend the stockbroker, who then sold for his account and those of his clients, thus revealing the fraud.⁷⁵ Moreover, one can imagine some trading firms advertising that they will compensate employees who present them with useful information on which to trade. Arrow’s disclosure paradox presents a potential obstacle here; these firms might refuse to pay for information and then trade on it anyway. But some firms might acquire reputations for paying for good information and maintaining employee anonymity, and especially when employee information is convincing, these firms might be able to effect significant market movements. These considerations emphasize the usefulness of allowing real money markets in which third parties can participate.

2. Time Horizons

Employees may be hesitant to trade on prediction markets that depend on outcomes far into the future. This will be especially true if employees are forced to cash out their portfolios on leaving a firm. This consideration, too, argues in favor of real money markets in which anyone can participate. With cash markets, money invested could be allowed to earn interest while prediction markets remain pending,⁷⁶ so the time value of money should not be an inherent

⁷⁵ Dirks v. SEC, 463 U.S. 646, 659 (1983).

⁷⁶ TradeSports pays interest on some deposits. TradeSports Trading & Betting Exchange, part of Trade Exchange Network, <http://tradesports.com/aav2/rulesAndFaqs.jsp?helpPage=banking#16> (last visited July 7, 2006).

problem. Even if markets are limited only to employees, however, prediction markets can still be useful in many contexts. Those with information implicating effects far into the future will often expect that the market will at least partially learn this information in a shorter time frame. An employee could thus trade on the information and make a profit in cashing out of the market well before the issue is formally resolved.

3. *Workplace Culture*

Prediction markets also could change firm culture in ways that might be hard to predict. Will employees be judged on their trading profits? Will employees who bet against the interests of their superiors be subjected to retribution? Will prediction markets undermine vital aspects of teamwork and esprit de corps that are essential to a well-run business? What will firms do with existing systems for budgeting, accounting, product analysis, and so on if prediction markets turn out to be as good or better at forecasting, and would layoffs adversely affect morale?

We do not know the answers to these questions, and we do not expect firms or academics to answer them easily or quickly.⁷⁷ Nonetheless, our preliminary hunch is that prediction markets are more likely to improve than detract from workplace culture.⁷⁸ For many employees, the opportunity to participate in decisionmaking should help invest employees in the firm. (Those who don't like to participate need not do so; different employees will make different contributions to the firm.) As all readers of Dilbert know, workplace culture is not so great already, and a recurring problem for employees is the need to defer to superiors who may be making foolish decisions. Increasing information transparency and improving decisionmaking should make workplaces more pleasant, though admittedly their might be significant transitional costs.

4. *Agency Costs*

Agency costs present a possible obstacle to the adoption of prediction markets. Corporate officials reasonably might conclude that the benefits they personally will obtain from the ability to use prediction markets to assess particular questions might be smaller than the costs. Managers may not want shareholders to be able to more easily and more credibly propose changes in strategy; managers may not want the power to make decisions diffused down the hierarchy; and managers may not even want more accurate predictions for things like sales forecasting, because overconfidence by sales managers may be a signal of a particularly attractive trait and may encourage more work to meet the unrealistic targets.⁷⁹

⁷⁷ There is some limited discussion of these issues, largely on blogs. *See, e.g.*, Tyler Cowen, *Marginal Revolution: Why don't more businesses use prediction markets?* http://www.marginalrevolution.com/marginalrevolution/2006/03/why_dont_busine.html (last visited July 7, 2006).

⁷⁸ Sociological and physiological studies find that even modest changes to work environments can help improve productivity. Such findings, however, raise the concern that "Hawthorne effects" are present, i.e. that employees perform better simply because observers (i.e., researchers) are present, and the changes themselves are not driving increases in productivity. *See* F.J. ROETHLISBERGER & WILLIAM J. DICKSON, *MANAGEMENT AND THE WORKER: AN ACCOUNT OF A RESEARCH PROGRAM CONDUCTED BY THE WESTERN ELECTRIC COMPANY, HAWTHORNE WORKS, CHICAGO* (1939) (finding that any changes in lighting, up to the point where the workplace was too dimly lit for workers to see their work, produced increased productivity).

⁷⁹ *See, e.g.*, Donald C. Langevoort, *Taking Myths Seriously: An Essay for Lawyers*, 74 *CHI.-KENT L. REV.* 1569, 1573 (2000) ("I find irresistible the inference that the overconfidence is evolutionarily adaptive.").

There is no reason, however, that shareholders cannot create such prediction markets on their own. Even today, third parties might create prediction markets in jurisdictions in which they are plainly legal, such as Ireland.⁸⁰ For example, financier Carl Icahn has launched a campaign to change various corporate policies at Blockbuster, Inc.⁸¹ It might be difficult for shareholders to determine whether Icahn’s proposed changes in fact are beneficial. And shareholders (and the board) may believe Icahn is motivated by short-term or private value. Icahn, however, could subsidize prediction markets predicting future stock price contingent on the corporation’s future decision to take or not take a particular step he recommends. Doing so might help provide an objective data point to shareholders about the advisability of his plans, and might help advance his goals in any subsequent proxy contest.

Courts might also encourage the use of these markets, for example by taking prediction market assessments into account in assessing whether directors should be held liable for their decisions, be it whether to sell firm assets or how much to pay the CEO. A justification of the business judgment rule, which grants great deference even to catastrophic decisions, is that the rule protects against hindsight bias.⁸² After all, litigation results only when corporate decisions turn out badly, and courts are worried that judging decisions in this light might be especially difficult given what seems like a reasonable business decision at time T_1 might seem foolhardy at time T_2 . Accordingly, courts routinely defer to business judgments so long as they were made based on a reasonable process and were not self-serving.⁸³ This stingy standard of review makes sense only if the error costs of ex post judgments are high relative to the gains to be made from the discipline (both general and specific) of judicial review. Contemporaneous predictions of the effects of corporate decisions, however, do not suffer from the hindsight problem and therefore could be given some role in judicial analysis.

Another reason courts engage in little ex post review of business decisions is a concern about institutional competence. As one court famously described the justification for the business judgment rule, “courts are not business experts.”⁸⁴ Although this argument seems to prove too much—courts are not medical experts either, but that doesn’t stop them from assessing medical malpractice claims—it is nevertheless commonly touted as a reason for deferring to well-

⁸⁰ TradeSports, for example, is based in Ireland, as are TradebetX (<http://www.tradebetx.com>) and Betdaq (a purely sports-oriented market, available at <http://www.betdaq.com>), while BetFair (another sports market, also known as Flutter, available at <http://www.betfair.com>) is based in London. See also Chris F. Masse, Exchanges – Prediction exchanges (a.k.a. betting exchanges) organizing real-money and play-money prediction markets, <http://www.chrismasse.com/3/3/exchanges/> (last visited July 7, 2006).

⁸¹ See, e.g., Shirley Won, *Analysts Approve of Company’s Bid to Turn Itself Around in Tough Market*, GLOBE & MAIL, June 5, 2006, at B8.

⁸² See, e.g., *Roselink Investors, L.L.C. v. Shenkman*, 386 F. Supp. 2d 209, 224 (S.D.N.Y. 2004) (“[T]he business judgment rule is intended to protect directors against just such attacks because their decisions are not to be second-guessed by courts with the benefit of hindsight.”).

⁸³ Consider this recent statement of Delaware law:

Our law presumes that in making a business decision the directors of a corporation acted on an informed basis, in good faith, and in the honest belief that the action taken was in the best interests of the company. Those presumptions can be rebutted if the plaintiff shows that the directors breached their fiduciary duty of care or of loyalty or acted in bad faith. If that is shown, the burden then shifts to the director defendants to demonstrate that the challenged act or transaction was entirely fair to the corporation and its shareholders.

In re *Walt Disney Co. Derivative Litigation*, 2006 WL 1562466, at *15 (Del. Ch. 2005) (internal quotations and footnotes omitted).

⁸⁴ *Dodge v. Ford Motor Co.*, 170 N.W. 668, 684 (Mich. 1919).

considered business judgments. A related point is an evidentiary one about private value. Litigants in business disputes often make claims about corporate or shareholder value that courts fear are conflated with the complaining shareholders' private value. In other words, a corporate raider may claim that its plan is designed to increase firm value but a court may be concerned that the raider's motivation is to extract rents. In complex business transactions courts may have a hard time unpacking these, and therefore may have no choice but to defer to the incumbent managers.

Prediction markets, if admissible, can help solve both of these problems. For example, a shareholder considering a takeover battle and expecting to challenge a firm's use of takeover defenses could create a prediction market designed to estimate the impact of the firm's various options on its stock price. If the market shows that the shareholder's proposed transaction would create more value than management's alternative plan (including takeover defenses), then the court might admit this fact as evidence in any judicial proceeding. We imagine that prediction markets will play no more than a minor role in judicial decisionmaking for years after the adoption of conditional markets, but that courts increasingly might focus on them as the technology underlying them and their reputation improves.

Finally, incentives to use these markets may come from a variety of other sources, ranging from the SEC or the PCAOB, which could write rules regarding their usage even before firms deploy them routinely, to corporate watchdogs or institutional investors, who set general standards for corporate best practices. The interviews we conducted with firms and service providers in this field today suggest that part of the caution that firms feel about deploying these markets is regulatory uncertainty—not just whether the markets will be legal or subject to onerous regulation, but also whether they would be valuable in meeting obligations under current law, whether it is Delaware takeover law or SOX or GAAP. A proactive approach from regulators, defining how these markets might be used, would, we believe, be an impetus for firms interested in doing further experiments with these markets.

5. Sabotage

Another general concern about prediction markets is that even if they improve decisionmaking, they might create other unfortunate incentives. Most troublesome is the possibility of sabotage, that is, that someone might do something bad in the real world to achieve prediction market profits. For example, a participation market participant might set fire to a plant. These risks, however, already exist, and are in fact greater, on public securities markets. As Robin Hanson points out, there were some concerns that terrorists might have profited from the September 11th, 2001, attacks, although initial investigations proved such concerns unfounded.⁸⁵ In theory, one could already make a great deal of money by taking a large position shorting General Motors stock, and then blowing up one of its factories. Prediction markets on particular issues facing GM seem unlikely to increase the risk of sabotage already presented by securities markets, especially considering the stakes will be much, much smaller in the prediction

⁸⁵ This concern apparently also contributed the demise of the terrorism prediction market proposed by DARPA. *See, e.g.,* Seth Grimes, *Futures Shock: What Happens when the Government Tries to Use the Futures Market to Predict Terrorism? (Decision Support)*, INTELLIGENT ENTERPRISE, Oct. 10, 2003, at 14 (“By supporting trading of assassination futures, is the government condoning or even promoting illegal and immoral tactics?”).

markets. The rarity of sabotage suggests that it is not anyway a big problem, perhaps because of the difficulty of accomplishing it without being caught.

Corporate prediction markets, however, might in some cases increase the risk of smaller acts of sabotage. Suppose, for example, that a prediction market is forecasting a project completion date. Someone might delay her contribution to ensure receipt of some profit from a bet against completion. Ordinarily, such acts will be unlikely, or at least relatively inconsequential, because there will be generally greater incentives to be a good employee than to make some money on a prediction market, especially if the employee’s motives could be readily discerned. Relatively high-ranking corporate employees, meanwhile, will generally have stock options and other incentives to keep the stock price high, and these incentives will generally outweigh any incentives created by prediction markets themselves. In the end, sabotage incentives can be controlled by limiting subsidies to a level where the exogenous incentives provided by the markets will be smaller than the endogenous incentives provided by the structure of the corporation itself.

IV. IMPROVING CORPORATE DECISIONMAKING

So far we have considered using prediction markets to improve the flow of information within a firm and from a firm to potential providers of capital. The benefits for shareholders are the possibility of generally reducing information costs, thus encouraging better behavior by their agents and reducing agency costs. The use of prediction markets can also be tailored to help solve specific corporate governance problems or reduce current costs of governance. We assess two broad sets of corporate governance issues: first, questions of strategy (including rule-of-the-game decisions, for example about bylaws or about the use of prediction markets themselves), and second, questions about specific major transactions (such as takeovers). Then, we consider the possibility that prediction markets might be used not just to maximize shareholder welfare, but also to commit to considering the interests of other constituencies, such as creditors and labor. Contracts could constrain corporations to take these other groups into account, providing an alternative basis for mediating the interests of different stakeholder interests.

A. Corporate Strategy

The first potential application of prediction markets in corporate governance is to improve shareholder consideration of certain corporate transactions. Shareholder participation in management decisions is limited, and for good reason. But shareholders do vote on some fundamental transactions and are permitted to express their voice on a variety of other matters. In this section, we consider how prediction markets can improve the current system for shareholder participation in firm governance, including “rules of the game” decisions such as when prediction markets should generally be deployed, as well as how they might be used in takeovers and other voting battles. Finally, we consider how prediction markets are superior to markets for corporate votes, which are implicitly developing in many of these areas.

1. Shareholder Proposals

The ability of shareholders directly to control corporate policy is extraordinarily limited. Having shareholders participate in operational decisions is unnecessary (given the liquidity of capital markets and the ability of investors to sell their shares and make other investments in case

they disagree with management), would be grossly inefficient (given the heterogeneous preferences and small stakes of investors, and their lack of information and incentive to acquire it), and would defeat the many purposes of delegating decisionmaking in the first place. The “business judgment rule” and other well-established corporate law doctrines are manifestations of this policy choice. This is not controversial, but beyond this, consensus among corporate scholars breaks down. Some scholars and regulators believe that increasing shareholder voice will improve corporate governance, while others are comfortable with a weak shareholder model of the public firm.

Among the former group, commentators have called for an increased role for shareholders, especially institutional investors, in corporate governance. Bernard Black, for one, argues that institutional investors can supplement board-based decisionmaking in governance because of the well-documented potential for abuse and because such investors have the “incentives and competence . . . to address issues that are common to a number of companies.”⁸⁶ The SEC’s proposed (but floundering) rule that would allow shareholders access to the proxy to nominate directors under certain circumstances would be a relatively limited manifestation of the argument that shareholders should play a more active role in firm decisions.⁸⁷ A more expansive approach comes from Lucian Bebchuk, who argues that shareholders should be empowered to intervene in “rules-of-the-game” decisions, like adopting takeover defenses or the state of incorporation, and in “game-ending” decisions, like mergers or asset sales.⁸⁸ Bebchuk documents potential abuses in these cases, showing how managers can entrench themselves and how their behavior can be self-serving and largely unchecked in final periods.

There is a rival school—call them the “traditionalists”—who believe that the current model of “strong managers, weak owners,” to use Mark Roe’s phraseology,⁸⁹ is the best available model.⁹⁰ Stephen Bainbridge argues that corporate law statutes manifest a strong preference for board decisionmaking authority, noting that “managerial discretion is the default presumption” and concluding that there is a “strong efficiency justification” for the separation of ownership and control with a limited role for shareholder policing of director accountability.⁹¹ This view is supported by Frank Easterbrook and Daniel Fischel’s insight that corporate governance frameworks are priced into a firm’s cost of capital, giving firms incentives to choose governance forms that maximize shareholder returns.⁹² In a series of articles written over the past 25 years, corporate lawyer Martin Lipton has defended the strong board, calling proposals to increase shareholder voice “an attack against the most basic principles underlying the American corporation.”⁹³

⁸⁶ Bernard S. Black, *The Value of Institutional Investor Monitoring: The Empirical Evidence*, 39 UCLA L. REV. 895, 897 (1992).

⁸⁷ Security Holder Director Nominations, 68 Fed. Reg. 60,784 (proposed Oct. 23, 2003) (to be codified at 17 C.F.R. § 240.14a-4 to -6, -8, -11, -12, -101).

⁸⁸ See Lucian Arye Bebchuk, *The Case for Increasing Shareholder Power*, 118 HARV. L. REV. 833 (2005).

⁸⁹ MARK J. ROE, *STRONG MANAGERS, WEAK OWNERS: THE POLITICAL ROOTS OF AMERICAN CORPORATE FINANCE* (1995).

⁹⁰ See, e.g., Leo E. Strine, Jr., *Toward a True Corporate Republic: A Traditionalist Response to Bebchuk’s Solution for Improving Corporate America*, 119 HARV. L. REV. 1759 (2006).

⁹¹ Stephen Bainbridge, *Director Primacy and Shareholder Disempowerment*, 119 HARV. L. REV. 1735 (2006).

⁹² Frank H. Easterbrook & Daniel R. Fischel, *THE ECONOMIC STRUCTURE OF CORPORATE LAW* 18 (1991).

⁹³ Martin Lipton, *Twenty-Five Years After “Takeover Bids in the Target’s Boardroom”: Old Battles, New Attacks, and the Continuing War*, 60 BUS. LAWYER 1369, 1376 (2005) [hereinafter Lipton, *Twenty-Five Years*]; see also Martin Lipton, *Takeover*

The debate between these rival schools rages on, but for now let us put these large issues in brackets, putting aside the question of *whether* we should encourage more shareholder voice or in exactly what cases it is most appropriate. We will come back to this shortly. For now, we would like to consider *how* shareholder voice can be most efficiently encouraged, assuming it is a good idea in some or all cases.

The current model for shareholder participation in non-fundamental transactions (i.e., other than mergers, choosing the board, etc.) is the “precatory proposal,” which allows shareholders to put proposals of various kinds before other shareholders and have the corporation solicit proxies on the proposal for them on the corporation’s proxy statement.⁹⁴ This might appear to give shareholders considerable power, but the rule makes clear that corporations can exclude a proposal from the proxy statement for any of a number of reasons. The results, in any event, are not binding on the firm, at least in the most important corporate law jurisdiction, Delaware.⁹⁵ Under Delaware law, at least by default, the affairs of a Delaware corporation are managed by the board of directors,⁹⁶ so shareholder proposals cannot direct particular directions in policy.

Skepticism about the importance and value of these proposals is borne out by the fact that shareholders do not generally use precatory proposals to resolve disputes about business strategy. Proposals are used primarily for political causes, ranging from boycotting apartheid in South Africa to animal rights to studying universal health insurance,⁹⁷ which are often far removed from questions of profit maximization. These proposals rarely receive the majority of the vote that would be necessary to win, and in any event are nothing more than recommendations that have no binding legal effect on firms. The average cost per firm of defending against frivolous proposals is almost \$100,000 per firm, which means U.S. firms spend about \$100 million per year arguing with the SEC about what proposals to include and what proposals to exclude. The costs of voting on precatory proposals thus might appear too great to justify the benefits, at least from the perspective of the firms themselves.

Sometimes, however, proposals important to firm governance are offered. For example, according to data from Institutional Shareholder Services (ISS), there were 1042 shareholder proposals in the 2003 proxy season, of which about 76 involved poison pills. This is a very small number, but the governance issue is sufficiently important that it may be enough to justify the precatory proposal machinery. The challenge is separating the proposals that might help solve collective action problems among diffuse shareholders (like majority election of directors) from

Bids in the Target’s Boardroom, 35 BUS. LAWYER 101 (1979).

⁹⁴ 17 C.F.R. § 240.14a-8 (2006) (“This section addresses when a company must include a shareholder’s proposal in its proxy statement and identify the proposal in its form of proxy when the company holds an annual or special meeting of shareholders. In summary, in order to have your shareholder proposal included on a company’s proxy card, and included along with any supporting statement in its proxy statement, you must be eligible and follow certain procedures.”).

⁹⁵ For example, the corporation can exclude a proposal that relates to the redress of a personal claim or personal benefit, if it does not relate to operations accounting for less than 5 percent of earnings or gross sales, if it is about day-to-day operations, or if it “is not proper subject for action by shareholders under state law.” 17 C.F.R. § 240.14a-8(i) (2006).

⁹⁶ DEL. CODE ANN. tit. 8, § 141 (2006) (general corporations); DEL. CODE ANN. tit. 5, §§ 742, 1531, 1642 (2006) (financial institutions).

⁹⁷ See, e.g., *Lovenheim v. Iroquois Brands, Ltd.*, 618 F. Supp. 554, 556 (D.D.C. 1985) (proposing an investigation into methods of production of foie gras by a French supplier); *New York City Employees’ Retirement Sys. v. Dole Food Co.*, 969 F.2d 1430, 1432 (proposing a study of national health care policy).

those that serve ends such as political activism. A relatively modest use of prediction markets might be to use them to decide, or at least to recommend, whether shareholder proposals should be included on a proxy statement. Many of the bases for exclusion are designed to screen out frivolous requests, because it may not be worth wasting the corporation's resources and shareholders' time on proposals that are irrelevant.

A simple solution would be to use conditional prediction markets to anticipate the proportion of shareholders who would vote for a proposal if it were placed on the ballot. Participants in this prediction market would recognize that shareholders ultimately will vote against both proposals that they disagree with and proposals that they believe are issues that are not appropriate for shareholder resolution. If the threshold were set at, say, 25 percent, the corporation could easily avoid proposals with little chance of passage, but managers would not be able to exclude relatively serious ones. (At the height of the battle over investment in South Africa, divestment proposals routinely received less than 15 percent of the vote.) This approach could supplant (or perhaps initially supplement) the current "no-action" letter review by the SEC.

A more ambitious use of prediction markets would be as a substitute for or alternative to shareholder proposals themselves, rather than merely as a new form of gatekeeper. Assuming, as a theoretical and practical matter that more shareholder "voice" on issues beyond what is currently considered appropriate is, at least occasionally, beneficial, a conditional market might assess the impact on stock price of a strategic decision or other contingency. As with existing shareholder proposals, such prediction markets need not constrain the corporation's decisionmakers, although such markets might make managers and directors hesitate before making value-reducing decisions (or before foregoing value-increasing decisions).

The principal advantage of prediction markets over shareholder voting on proposals is informational. Each shareholder has only a limited incentive to study the relevant shareholder proposal. (In cases in which shareholders are not anonymous, some shareholders also may have an incentive to vote in a way that pleases the corporation's directors) Perhaps some large shareholders, such as institutional shareholders, will study a question in some detail and perhaps distribute information about it to other shareholders, but because they reap only some of the benefits from doing so, their efforts will generally be suboptimal. The incentive problem is made worse by the fact that the proposals are not binding, thus reducing even more the incentive to collect information.

This problem is not solved by contractual arrangements that consolidate information gathering functions in a centralized body, such as Institutional Shareholder Services (ISS). Although specialization and economies of scale may reduce these costs, the incentives are still not aligned, because significantly less than all shareholders will compensate ISS for its services. A further weakness is that the proposals and information gathered by investors and specialists like ISS are only tenuously linked with changes in firm value. For example, ISS may recommend a vote for a proposal suggesting removal of a poison pill, but the argument will be a general dislike of these provisions. ISS will not project an impact on stock price, or support its analysis with data.

While the proffered reason for or against a particular proposal may be couched in economic terms, the true grounds are often the political or private interests of large pension funds

or other large shareholders, who are the primary constituents of ISS.⁹⁸ Lipton argues that special interest shareholders, like unions and public pension funds, pressure boards to vote the way they want “without consideration, perspective or even interest in the long-term interests of the corporation and its shareholders as a whole.”⁹⁹ The problem, according to critics of shareholder “activism,” is that shareholders with private interests not shared by other shareholders—perhaps short-term profit-seeking interests or political interests—couch their proposals and votes in terms of overall shareholder value, thereby deceiving the firm or other voters about the best course of action.

Prediction markets, in contrast, can solve many of these problems. Prediction markets provide a neutral, objective estimate of the impact of the proposed strategy or action on firm value. Moreover, they solve the problem of rational ignorance. Even if only a small number of people participate in the markets, those people will have strong incentives to conduct research and to become informed about the issues. Third parties, such as large shareholders or would-be shareholders, might be permitted to propose policy directives for prediction markets to consider. An investor could detail a particular proposal, and conditional markets would predict stock price or stock price changes at some point in the future if the proposal were accepted or rejected. An investor also might be allowed to offer a proposal alternative to ones already being considered (whether initiated by the managers or shareholders), resulting in the creation of an additional prediction market.

In a recent radio commentary, Ian Ayres proposed a new mechanism for expressing shareholder voice: a certain number of shareholders would be chosen at random in a lottery (weighted by share ownership), and this group would deliberate on a particular issue, like how much the CEO should be paid or whether to adopt a new strategy, which would then be transmitted to the board as the official recommendation of the shareholders, either before or after a shareholder vote on the issue.¹⁰⁰ While this proposal is innovative and somewhat related to the one we propose, it suffers from the problems that plague group decision making that we addressed briefly above. In addition, any given random group might reach a decision different from the one that most groups would reach. A prediction market along the same lines would not be subject to these problems, and would enable firms to reduce agency and decisionmaking costs without running the risk of increasing error costs.

Managers may be reluctant to deploy these markets, and they may prefer the current regime for shareholder voice precisely because it is broken. Shareholder actions that are not frivolous and costly typically threaten incumbent management power. Managers may not want a mechanism that identifies frivolous proposals, because that mechanism may make it more difficult to fight the meritorious proposals. Accordingly, it is important that third parties, like investors, be able to propose and deploy these markets. The SEC someday might also consider requiring firms to use these markets to evaluate precatory proposals.

⁹⁸ See, e.g., Paul Rose, *The Corporate Governance Industry* (Northwestern Public Law Research Paper No. 902900, May 17, 2006), available at <http://ssrn.com/abstract=902900> (arguing that “conflicts of interest within some governance firms cast doubt on the reliability of their proxy advice and governance ratings”).

⁹⁹ Lipton, *Twenty-Five Years*, *supra* note 93, at 1377.

¹⁰⁰ *Marketplace: How to strengthen shareholder democracy*, <http://marketplace.publicradio.org/shows/2006/07/06/PM200607065.html> (last visited July 10, 2006).

Moreover, prediction markets may help resolve the debate between those who prefer strong shareholders and those who prefer strong managers. The use of prediction markets by managers, boards, shareholders, or other stakeholders should discipline firm decisionmaking more efficiently than shareholders currently can. The current mechanism for shareholder discipline is the takeover or proxy battle, both of which are sufficiently rare that some critics believe they are generally ineffectual.¹⁰¹ Prediction markets, in contrast, would allow shareholders a mechanism to convey credible market assessments to decisionmakers, would allow under-informed boards to sanity-check managerial claims, and would allow managers to avoid making value-destroying decisions. In each case, the mere existence of prediction markets and their potential application might be sufficient to constrain agent overreaching. Therefore these markets simultaneously lower the cost of shareholder voice while making shareholder voice less necessary.

2. Rules of the Game

The same techniques that could be used to assess corporate strategy in general can be applied to forecast the impact of potential changes in corporate governance. For example, a corporation considering changes to its bylaws might predict the immediate stock price effect of an announcement of such changes. A corporation also might use prediction markets to assess the wisdom of adopting or discarding defensive tactics even in the absence of an actual takeover attempt. Similarly, a corporation might use a prediction market to assess the impact of reincorporating in another jurisdiction.¹⁰²

Without venturing into the realm of the ridiculous, it is possible that prediction markets might be used even to make decisions about prediction markets' role in corporate governance. We have seen that prediction markets might be used to determine when shareholder proposals should be presented for shareholder votes, and also that prediction markets might provide an alternative to such votes. Combining these ideas, prediction markets might be used to determine when prediction markets should be used as an alternative to shareholder votes. A prediction market might be used to determine whether to create another specific prediction market, or to determine whether to use prediction markets in some class of situations. Moreover, prediction markets, perhaps normative prediction markets,¹⁰³ might be used to determine the degree to which other prediction markets should be subsidized. Of course, corporate decisionmakers will need to decide at least whether to create the prediction market that makes decisions about other prediction markets, and also to determine how much to subsidize this initial prediction market.

The recognition that prediction markets can be used to make decisions about prediction markets suggests an answer to an objection to the use of prediction markets for corporate governance: even if prediction markets are sufficiently accurate, we might not want corporations to rely on them, because sometimes it is useful for corporations to precommit to particular courses of action. Based on work by Finn Kydland and Edward Prescott that eventually

¹⁰¹ See, e.g., Lucian A. Bebchuk, *Letting Shareholders Set the Rules*, 119 HARV. L. REV. 1784, 1784 (2006); Lucian A. Bebchuk, *The Myth of the Shareholder Franchise* (Oct. 2005), available at <http://ssrn.com/abstract=829804>.

¹⁰² See Roberta Romano, *Competition for Corporate Charters and the Lesson of Takeover Statutes*, 61 FORDHAM L. REV. 843, 845 (1993) (discussing the dominance of Delaware in the interstate competition for incorporations and reincorporations).

¹⁰³ See *supra* note 37 and accompanying text.

contributed to a Nobel Memorial Prize in Economics,¹⁰⁴ economists recognize that sometimes institutions can maximize their welfare through precommitment. In the corporate context, a corporation might want to commit to maintaining a particular corporate strategy because potential suppliers, other business partners, or customers will be willing to act in ways that will benefit the corporation only if they remain confident that the corporation will follow through on its initial plans. In effect, a prediction market determining or recommending bylaw provisions on prediction markets is determining when it is advisable for the corporation to precommit not to use prediction markets. Prediction markets also might be used to make other forms of precommitment. Indeed, whenever a prediction market is used to determine whether to enact a particular bylaw or corporate charter change, the prediction market is being used to assess the wisdom of making some kind of precommitment.

3. Takeovers and Other Major Corporate Transactions

One of the most debated issues in corporate law is the governance of firms that are takeover or merger targets. Prediction markets might be useful not only as a means of making recommendations about general policy, but also in deciding whether a corporation should engage in particular “fundamental” transactions, such as mergers, acquisitions, or asset sales. This is an area where, for the most part, shareholder participation—in the form of a vote—is required by state law. For example, in the case in which one firm wants to acquire another firm through a statutory merger, all states require the majority consent of the target firm’s shareholders.

Some scholars have argued against shareholder voting mechanisms serving as the basis for determining whether a target corporation agrees to be acquired. Ronald Gilson and Alan Schwartz note that a general problem with voting, different voters (in this case, shareholders) having different interests in the vote, is acute in the takeover context.¹⁰⁵ Gilson and Schwartz distinguish “management shareholders,” specifically “members of current management and individuals and entities who would do better if the takeover were defeated, such as unions and, perhaps, suppliers and customers,” from “independent shareholders,” that is, “those who benefit from their shares only as shareholders.”¹⁰⁶ Managers may be inclined to vote against the offer, because they would lose their jobs if their firm is acquired. Management’s assessment of the value of the firm’s shares once acquired (that is, the adequacy of the deal premium) therefore includes private value that inures solely to the incumbent managers. Management shareholders may be more motivated to vote, and may seek to use the corporate information machinery to discourage others from approving a transaction, and so voting may reject efficient takeovers.¹⁰⁷

Another problem that complicates firm voting is the heterogeneity of interests of various non-management shareholders. Merger arbitrageurs typically make substantial bets on both the target and the acquirer after a merger is announced. A frequent approach is to “lock in the spread” by buying the target and shorting the acquirer.¹⁰⁸ There may be situations in which their

¹⁰⁴ Finn E. Kydland & Edward C. Prescott, *Rules Rather than Discretion: The Inconsistency of Optimal Plans*, 85 J. POL. ECON. 473, 477-80 (1977).

¹⁰⁵ Ronald J. Gilson & Alan Schwartz, *Sales and Elections as Methods for Transferring Corporate Control*, 2 THEORETICAL INQ. IN LAW art. 8 (2001), available at <http://www.bepress.com/cgi/viewcontent.cgi?article=1036&context=til>.

¹⁰⁶ *Id.* at 15.

¹⁰⁷ *Id.* at 16-17.

¹⁰⁸ For an explanation of this practice, see Shaun Martin & Frank Partnoy, *Encumbered Shares*, 2005 U. ILL. L. REV. 775, 810-11

short interests in the acquirer will lead merger arbitrageurs to favor completion of an acquisition, even when there might be some other potential acquirer who would offer a more favorable deal. Potentially more troubling still is the possibility that hedge funds or other large players might enter into transactions that give them large voting stakes without economic risk.¹⁰⁹ For example, in one recent attempted acquisition, a hedge fund with a large stake in the target firm wanted to ensure that the deal went through at the premium announced, even though market sentiment quickly turned against the deal, and thus obtained votes in the acquirer.¹¹⁰ The reverse could happen as well, with a hedge fund acquiring votes but no economic interest in a target because of its interest in the acquirer.

Gilson and Schwartz suggest that this heterogeneity of investor interests means that the Delaware courts should reverse their preference for elections over markets. The market mechanism that Gilson and Schwartz have in mind is the tender offer, that is, offering each individual shareholder the opportunity to sell shares separately from the collective decision. The literature has demonstrated, however, some problems associated with tender offers. In some cases, a rational shareholder who wants a bid to succeed might not tender,¹¹¹ but in other cases, a rational shareholder who wants a bid to fail might tender anyway.¹¹²

Some proposed reforms may improve results, but voting regimes have systematic problems that likely cannot be solved. Lucian Bebchuk and Oliver Hart point out that shareholder voting on specific acquisitions will work well, when an affirmative shareholder vote is a necessary and sufficient condition for the acquisition to occur.¹¹³ They do not, however, directly confront the arguments of Gilson and Schwartz about the propensity of different shareholders to vote.¹¹⁴ Paul Edelman and Randall Thomas take what they describe as an “intermediate position,” concluding that “shareholders should be able to vote to remove any defensive tactic that is interfering with the right to sell or vote their stock,” but that the target’s board be allowed to delay such votes for a limited period of time, no greater than 13 months.¹¹⁵ Such delays may be less than ideal, and the proposal still depends on shareholders having sufficient knowledge to make informed decisions about whether to remove defensive tactics.

(2005).

¹⁰⁹ We consider the efficiency of markets for votes below. See *infra* Part IV.A.4. Our immediate concern is the danger that parties may acquire votes because of interests unrelated to any ownership interest in the firm whose votes are acquired.

¹¹⁰ For differing takes on the problem, compare David Skeel, *Beyond the Hedge*, LEGAL AFFAIRS, Nov./Dec. 2005, available at http://www.legalaffairs.org/issues/November-December-2005/feature_skeel_novdec05.msp (describing the tactic as “rigging” the deal and “manipulation”), with Dale Oesterle, *Hedge Fund Paranoia: Fretting Over the Mylan/King Deal Hedge*, Business Law Prof Blog (Oct. 27, 2005), available at http://lawprofessors.typepad.com/business_law/2005/10/hedge_fund_para.html (“This strategy is not as dangerous as Skeel and others make it out to be.”) (last visited Jul. 11, 2006).

¹¹¹ See Sanford J. Grossman & Oliver Hart, *Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation*, 11 BELL J. ECON. 42 (1980).

¹¹² See Lucian A. Bebchuk, *Toward Undistorted Choice and Equal Treatment in Corporate Takeovers*, 98 HARV. L. REV. 1695 (1985).

¹¹³ See Lucian Bebchuk & Oliver Hart, *Takeover Bids vs. Proxy Fights in Contests for Corporate Control* (Harvard Univ. John M. Olin Center for Law, Econ., and Bus. Discussion Paper No. 336, 2002).

¹¹⁴ Bebchuk and Hart note in a footnote simply that the Gilson and Schwartz model and others “focused on issues other than the ones we analyze.” *Id.* at 3 n.2.

¹¹⁵ See Paul H. Edelman & Randall S. Thomas, *Corporate Voting and the Takeover Debate*, 58 VAND. L. REV. 453, 485-87 (2005).

An alternative approach would be to use prediction markets to predict the value of the proposed transaction for the target, allowing each shareholder to receive an assessment of the value that is not biased by private values, short-term liquidity positions, or undisclosed interests that may conflict with the valuation assessment. For example, a conditional market could assess the value of any consideration received for the target's shares at some point in the future after consummation of the transaction being considered. Although this is ostensibly what the public stock price is designed to measure, the shortcomings outlined above may cause distortions in this valuation in these special cases, as well as the general noise and information problems in stock prices identified above. Bebchuk and Hart worry that it is difficult for relatively uninformed individuals to determine from stock prices alone whether to accept takeover bids, because those prices are endogenous; that is, they reflect not only any benefit of the transaction, but also the market's assessment of the probability that the transaction will occur.¹¹⁶

In theory, prediction markets could solve the long-standing debate about defensive tactics and the duties of the board in fundamental corporate transactions. Using prediction markets to predict the value, other than private value, that each shareholder will receive if an acquisition is or is not accepted has at least some advantages over alternative approaches. Unlike a shareholder vote, there is no danger that different intensity of preference will lead to an embrace of inefficient transactions. At the same time, participants in the prediction market would not be making individual decisions about whether to tender securities, and so prediction markets would not present any conflict in which an individual tender decision might conflict with the individual's preferences. Participants in the prediction market would have incentives to consider that if a particular bid were denied, the bidder or some third party might offer a higher bid.

Markets in the takeover context are particularly useful because they help constrain corporate actors to act in the interest of shareholders. But markets are also useful for the general reason identified in Part III, that they reduce the costs and distortions of information flows within a firm, allowing decisionmakers better access to valuable information necessary to make reasoned and fully informed decisions. Commentators frequently point to the merger transaction process as evidence of broken corporate governance. The CEO of a firm has proposed to the board a merger with a competitor. The board must decide whether to approve the merger and on what terms. The board, however, is composed of part-time employees without day-to-day experience or access to information except through the CEO. The CEO can thus present a merger "in a way so as to avoid or undermine any board critical evaluation of it."¹¹⁷ Recognizing this limit on their ability to gauge the true value of the merger, and recognizing that the public market's reaction includes the noise of self-interested arbitrageurs, short sellers, speculators, and profit takers as well as long-term holders of the firm's equity, the board could construct a prediction market to process its informational decision more effectively.

These markets might also overcome the problems that non-expert courts have in performing valuation. When courts engage in valuation analysis today, whether in a post-merger appraisal proceeding or a bankruptcy proceeding, the valuation decision is based primarily on the court's view on a battle of experts. This approach has serious limitations, since these

¹¹⁶ Bebchuk & Hart, *supra* note 113, at 5.

¹¹⁷ See James A. Fanto, *Breaking the Merger Momentum: Reforming Corporate Law Governing Mega-Mergers*, 49 *BUFF. L. REV.* 249, 293 (2001).

presentations can be highly technical, biased by events or information revealed after the decision in question, and include private value considerations that may be hard to disaggregate. Instead, courts could rely on prediction markets established by others. For example, a court could rely on a prediction market that would estimate the value of a dissenting shareholder's shares during the appraisal process. Conceivably, courts someday might establish prediction markets themselves. A court, for example, could use the normative market approach discussed above, in which the market would estimate the valuation that some neutral party would choose. In the shorter term, courts might allow litigants to present prediction market results as evidence and place great weight on the results if the markets have been designed properly.

One specific valuation application of prediction markets would be to help reduce uncertainty in bankruptcy. In a recent paper, Douglas Baird and Donald Bernstein argue that expected variance in valuation results in observed deviations from the absolute priority rule.¹¹⁸ In traditional valuation, there is no market transaction, so it is “the bankruptcy judge’s perspective—and how senior and junior investors perceive it—that counts.” The uncertainty of the judicial valuation process “generates option value” for various junior claimants, and senior claimants are willing to compensate them for that, even in cases in which all parties “share the same view of the business’s prospects.” Baird and Bernstein propose several possible solutions to the problem of valuation uncertainty, including court-appointed experts and various procedural changes that encourage parties to submit non-extreme valuations. A prediction market forecasting the estimate of a court-appointed expert would provide an objective, market-based assessment that could reduce valuation uncertainty. Even absent judicial reliance on this prediction market, creditors or creditor tranches might independently use these markets to estimate firm value.¹¹⁹ These markets at least could reduce the possibility that parties would have different assessments of the outcome of litigation, reducing the need for litigation to occur.

Two additional uses of prediction markets along the same lines are worth briefly considering. The first is in freezeout transactions where valuation problems may allow value-destroying transactions to proceed and may prevent value-creating transactions from occurring. Under state law, owners of a certain percentage of a firm’s stock (typically 90%) can cash out the minority shareholders through a statutory short-form merger that does not require a shareholder vote.¹²⁰ The danger is that majority shareholders may abuse this power and their informational advantage to cash out minority shareholders at prices that undervalue their shares.

The Delaware courts’ solution to this potential for abuse is an ex post judicial valuation proceeding in which the majority shareholders must show that the transaction is “entirely fair,” which includes both procedural fairness (usually through a “special committee” of so-called “independent directors”) and price fairness.¹²¹ There are at least two problems with this approach. First, courts, even the specialty Delaware courts, may have difficulty accurately determining a fair value for shares given the informational asymmetries and their own institutional competence.

¹¹⁸ Douglas G. Baird & Donald S. Bernstein, *Absolute Priority, Valuation Uncertainty, and the Reorganization Bargain*, 115 YALE L.J. 1930 (2006).

¹¹⁹ Baird and Bernstein suggest the possibility of market-oriented mechanisms to reduce valuation uncertainty. *See id.* at 1963-65.

¹²⁰ *See* Del. Gen. Corp. Law § 253.

¹²¹ *See, e.g.,* Kahn v. Lynch Comm. Sys., 638 A.2d 1110 (Del. 1994) (holding that the judicial standard for evaluating cash-out merger by dominating shareholder is “entire fairness”).

Second, firms are, after the recent *Siliconix* decision, deploying a new technique—tender-offer freezeouts—to avoid entire fairness review altogether.¹²²

Leading freezeout scholar Guhan Subrahmanian frames the key freezeout issue as follows: “Using what process, and on what terms, should minority shareholder[s] exit a publicly traded company?”¹²³ Subrahmanian’s solution is primarily a procedural one that tries to replicate an arm’s-length transaction—a review by a disinterested special committee of directors followed by a vote of the minority shareholders. As described above, there are obvious problems with voting in such cases, and minority shareholders may still have less than the best available information about the value of their shares. A prediction market could be used to value these shares more easily. This technique could be deployed by acquiring firms, target firms, majority shareholders, minority shareholders, or perhaps even the courts.

A second additional potential use would be for estimating the value of private firms. Many legal disputes in closely held corporations and other private business forms arise because valuations are difficult in the absence of a market for the firm’s securities. Private equity firms that specialize in valuing these firms rely on costly due diligence reviews and expert analysis, and ultimately rely on a comparison with prior deals with similar firms or with public firms. The costs and uncertainty of accomplishing valuation through litigations inhibit efficient ex ante contracting and capital raising. Firm stakeholders are subject to abuse by controlling shareholders in the absence of an easy way to exit the firm with some reasonable certainty about getting fair value for their stake. Prediction markets may help alleviate these uncertainties in the same way that they do for public firms. Indeed, a firm recently formed that intends to provide market-oriented valuations for private firms.¹²⁴

4. *Prediction Markets vs. Markets for Votes*

Both of these potential applications of prediction markets—for shareholder voice and for takeovers—resemble a market for votes, in which shareholders (or even third parties) can participate in corporate decisionmaking through borrowing or buying share voting rights, with the economic rights either decoupled from or hedged away.¹²⁵ Some commentators believe that we are moving toward, if not already in, a world in which vote buying (through borrowing and other means) is common, especially for contentious issues.¹²⁶ For example, in a recent survey of vote borrowing and buying, Henry Hu and Bernard Black conclude that the practice of voting shares not “owned” and voting shares with no economic interest is widespread, and that “[c]leverness in vote buying . . . may well become important for success” in takeovers and other corporate governance matters.¹²⁷ An empirical study by several finance scholars supports this

¹²² See Guhan Subrahmanian, *Fixing Freezeouts*, 115 YALE L.J. 2 (2005).

¹²³ *Id.*

¹²⁴ See <http://www.numeria.us/> (last visited Jul. 11, 2006).

¹²⁵ See Martin & Partnoy, *supra* note 108.

¹²⁶ See, e.g., *id.*; see also Susan Christoffersen et al., *Vote Trading and Information Aggregation* (AFA 2006 Boston Meetings Paper, Jan. 20, 2005), available at <http://ssrn.com/abstract=686026>.

¹²⁷ Henry T.C. Hu & Bernard S. Black, *Empty Voting and Hidden Ownership: Taxonomy, Implications, and Reforms* (Univ. of Tex. Law & Econ. Research Paper No. 70, Apr. 2006), available at <http://ssrn.com/abstract=874098>.

claim, finding that share borrowing increases significantly immediately preceding “record-dates,” that is the date on which “ownership” of the vote of a particular share is determined.¹²⁸

The prediction markets described above may be superior to any conceivable market for votes. One of the biggest complaints about the shadow market for corporate votes is the lack of transparency to other voters, to the firm, and to the public. A more open and official market for corporate votes, in which a market price was established for the votes of individual shares, could solve that problem, however. The scholarly consensus is still developing on this issue. Saul Levmore identifies a paradox that presents a significant problem with a market for votes: The value of any share is worth very little while the value of a large block of shares is high. Accordingly, individuals entitled to vote (say through share ownership) are likely to sell their votes “at trivial prices” absent a way of coordinating because if they hold out there are many others willing to sell for a non-zero amount.¹²⁹ There is no guarantee that anyone will buy votes at more attractive prices at any point in the future, because someone will be willing to buy votes only so long as it is possible to obtain a majority. Each individual shareholder may have an incentive to sell voting rights to someone who has a private economic incentive to use those voting rights in a way that will harm the shareholders’ collective economic interests.

Levmore concludes that “competition among buyers [may] allay[] sellers’ fears of selling too cheaply because of their collective action problem,” especially in the corporate law context where mechanisms like the tender offer allow some protections against these problems.¹³⁰ Richard Hasen is even more bullish, concluding that corporate vote buying is efficient and would not increase agency problems.¹³¹ Even if these commentators are correct that collective action problems can be overcome, however, the fix might require regulation. Levmore argues that “early sellers [might need to be] protected . . . if prices rise.”¹³² While it may be possible to solve this problem through charter amendment or statute or judicial review, as Levmore suggests, each of these mechanisms has the potential to be quite costly.

Prediction markets can avoid many of these issues, achieving the same goals with little additional costs. In a prediction market, no individual shareholder is forced to make an early decision about whether to sell, and the danger that someone might seek to buy up votes to advance private interests not to the benefit of shareholders generally is altogether avoided. The prediction market will update continuously until the market closes, not only relieving the pressure on individual choice, but also embedding more information into the price through continuous participation. Vote buying markets, in contrast, are able to capture less information because early sales, which by definition are based on incomplete information, freeze some percentage of the vote in an informationally stale state. The prediction market can avoid ex post litigation over the sale of early votes, but also capture all information between the time the market is announced and its close, as opposed to a decreasing percentage of available information.

¹²⁸ See Susan E.K. Christoffersen et al., *The Market for Record-Date Ownership* (EFA 2002 Berlin Meetings Presented Paper, July 4, 2002), available at <http://ssrn.com/abstract=302522>.

¹²⁹ Saul Levmore, *Voting with Intensity*, 53 STAN. L. REV. 111, 121-41 (2000).

¹³⁰ *Id.* at 139.

¹³¹ Richard L. Hasen, *Vote Buying*, 88 CAL. L. REV. 1323 (2000).

¹³² Levmore, *supra* note 129, at 139.

A final benefit of prediction markets is that there is less potential for manipulation. The concerns above about transparency (Hu & Black) and early sellers (Levmore) hint at the possibility that sophisticated investors and corporate raiders or activists may be able to structure offers or arrange in transactions that effectively disenfranchise shareholders or buy their votes at significantly reduced prices. While Levmore is right that regulation (both ex ante and ex post) can prevent some manipulation, it may be under- or over-inclusive and will be costly in any event.

B. Personnel

1. Board Member Selection

A corporate law issue of perennial and especially contemporary concern is who should nominate directors, how long they should serve, and what percentage of votes is needed to win a director election. In the ongoing battle over who has power in firms—shareholders or managers—these issues take center stage. This is because defenders of the status quo of manager power point to board elections, either regularly or in proxy fights, as providing managers with disciplinary oversight. The Delaware courts have proclaimed, “The shareholder franchise is the ideological underpinning upon which the legitimacy of directorial power rests.”¹³³ Critics view the elections, in which directors are nominated solely by management and need only a plurality of votes to win, as ineffective to constrain managers.¹³⁴

The battle over director elections is currently being waged on two fronts: in the SEC, through a proposal to allow shareholders to nominate one or two rival directors for inclusion on the firm’s proxy under certain circumstances,¹³⁵ and in the increasingly popular precatory proposals calling for amendments to firms’ by-laws requiring directors to win a majority of votes for election.¹³⁶ Both of these approaches could be improved through prediction markets technology. Markets could be used at a minimum to evaluate the merits of the precatory proposals and to determine whether to allow rival directors proposed by shareholders on the ballot.

Just as conditional markets can be used to assess shareholder proposals and inform shareholders about their likely effects on stock prices, so too could conditional markets be used to inform shareholders about the consequence of electing different directors. A corporation, for example, might establish a policy of using conditional markets to assess the stock price effects of elections of particular directors and to include this information on the proxy sent to shareholders. The corporations most likely to do this would be those confident that the official management recommendations in fact will be viewed by the prediction market as best for shareholders, but if the approach proves successful, shareholders might press other corporations to follow suit. Because the effect of the election of a single director may in some cases be small, the conditional

¹³³ *Blasius Indus. v. Atlas Corp.*, 564 A.2d 651 (Del. 1988).

¹³⁴ See Bebchuk, *supra* note 88, at 851-56.

¹³⁵ See Lucian Arye Bebchuk, *The Case for Shareholder Access to the Ballot*, 59 BUS. LAWYER 43 (2003) (commenting on *Proposed Rule: Director Nominations*, Exchange Act Release No. 34-48626 (Oct. 14, 2003)).

¹³⁶ See *ISS Announces New Policy on Majority Voting*, available at <http://www.issproxy.com/governance/publications/2005archived/037.jsp> (noting that 80 such proposals were made in the first six months of the proxy season, and announcing support for these proposals) (last visited Jul. 11, 2006).

markets should probably predict the immediate effect on stock prices of the announcement of the director or, more likely, a slate of directors, rather than the long term impact of the selection.¹³⁷

These markets will likely prove most valuable in cases in which there is an open conflict between management and shareholders over the board, and where the addition of one or a few board members is a sign of a broader shift in power within the firm. The recent battle at Disney between CEO Michael Eisner and dissident shareholders provides a good example of a case in which the impact of a single director's election could be measured. In effect, the question before Disney shareholders was how much power the CEO should have vis-à-vis the board, and the outcome of the election of directors seemed likely to have a significant impact on the firm's future.

2. *Manager Hiring and Firing*

Prediction markets may be somewhat less useful in the selection of managers compared with the selection of directors. Hiring practices for senior management positions are typically shrouded in confidentiality. CEO candidates from other firms do not want their potential interest publicly known, and internal candidates too might be less willing to be considered if there is a risk that it will be known that they sought and were refused particular positions. This does not mean that prediction markets can have no role in the process. Where specific candidates have been widely speculated about, a corporation (or a group of interested shareholders) might use prediction markets to make an assessment. Similarly, one might imagine a nonprofit, such as a university, using a prediction market to assess which potential president will have the most success in increasing the institution's endowment or ranking.

A corporation also might run a prediction market with participation limited to members of a search committee or search firm, to improve the chance that the search firm in fact recommends the candidate that members of the committee believe most likely to increase shareholder welfare. Prediction markets can be designed to give small numbers of individuals incentives to share their reasons for particular positions, and so a market can serve as the locus of small group deliberation.¹³⁸ Prediction markets also might be used to select among possible search firms or search committees.

We believe, however, that prediction markets may be more useful for assessing the impact of the departure, voluntary or involuntary, of an executive, such as the CEO.¹³⁹ In this case, the identity of the relevant official is already obvious, and so there is no difficulty associated with secrecy. The magnitude of the impact is also potentially very large, based on recent high-profile CEO departures.¹⁴⁰ The problem for firms, which prediction markets can solve, is that this impact was seen only *after* the decision was announced. While a firm may have had some information, based say on interviews with investment bankers or analysts, that the

¹³⁷ See *supra* Part I.C.1.e.

¹³⁸ See Abramowicz, *supra* note 37.

¹³⁹ In an unpublished work, Robin Hanson has explored the possibility of using prediction markets in this way. Robin Hanson, *Markets for Dumping CEOs*, <http://hanson.gmu.edu/dumpceo.html> (Apr. 26, 1996) (last visited July 12, 2006).

¹⁴⁰ Matt Krantz, *Ousting CEOs Often Boosts Stock Price*, USA TODAY, Feb. 10, 2005, available at http://www.usatoday.com/money/companies/management/2005-02-10-departing-ceos-usat_x.htm (noting that stocks rally 3.5%, on average, when underperforming CEOs are forced out).

stock price would increase after the decision, prediction markets would provide a powerful tool that would increase, on the margin, the number of cases in which firms could make a value-increasing decision about which manager to run the firm.

Such markets in effect would provide a real time continuous measurement of the market's assessment of the expected future performance of a particular official. While the general stock price measure of a firm may help discipline CEO actions, making officials less likely to make value-decreasing decisions, prediction markets focused directly on the CEO could be considerably more powerful. Such markets would assess the degree to which a corporation's future anticipated success is dependent on a particular official. Even the CEO of a corporation that happens to be successful for reasons having little to do with the CEO would have to strive to establish personal value. We recognize, of course, that few CEOs will decide to implement such markets, and, as with many of this Article's proposals, such markets may be feasible only in the long run, if prediction markets gather sufficient momentum. Once again, however, shareholders or outsiders interested in the corporation's performance themselves might establish this type of prediction market.

As in the case of director elections, the cases in which such markets may be most useful are the extreme cases in which a power struggle within a firm is open and notorious. The recent battle at Disney is again informative. The struggle for control of Disney was effectively a referendum on the leadership of CEO Eisner. Dissident directors and shareholders waged a multi-part campaign to oust Eisner, including precatory proposals on board elections, a proxy fight, a public relations campaign, and several shareholder derivative suits alleging Eisner and his cronies were paid excessive and wasteful compensation. The battle was long, expensive, and, most important, based on little more than speculation about Eisner's value and what impact his departure would have. A prediction market might be able to short-circuit much of this by trying to get a consensus answer to that specific question.

3. Executive and Board Compensation

There is a natural transition from discussions of CEO value to questions about compensation, since the two theoretically should be related. The simplest use here could be simply as a means of aggregating information about compensation levels and practices to the market. Much of the academic and media criticism is aimed at the ability of executives, through convoluted pay packages, to conceal the true amounts of compensation.¹⁴¹ A market that estimates the total value to an executive, and therefore the total cost to the firm, would solve this problem. The value of many elements of an executive's compensation—like options—are highly uncertain. The best available tools, like the Black-Scholes formula for valuing options, are of questionable accuracy and are difficult to apply in practice, even when the details of compensation are disclosed.¹⁴² A simple prediction market approach might predict the value that an analyst chosen at random would assign to a pay package.

¹⁴¹ See, e.g., LUCIAN BEBCHUK & JESSE FRIED, PAY WITHOUT PERFORMANCE: THE UNFULFILLED PROMISE OF EXECUTIVE COMPENSATION 67-70 (2004); Gretchen Morgenson, *Executive Pay, Hiding Behind the Small Print*, N.Y. TIMES, Feb. 8, 2004, § 3 (Money and Business), at 1.

¹⁴² See, e.g., Craig Schneider, *Forget Black-Scholes?: Why the Traditional Option-Pricing Model May Not Be the Best Way to Value Employee Grants*, CFO MAGAZINE, May 1, 2004.

More ambitiously, prediction market assessing the stock market implications of a particular executive's departure itself provides a baseline for assessing that executive's compensation. At least, it would seem that corporations generally should not pay executives more than their value to the corporation, at least unless the corporation has pre-committed to doing so. Conditional prediction markets provide a way of measuring the value of executives relative to the next best alternatives. This may be valuable in deciding how much to pay particular executives. For example, if a prediction market estimates that the stock price would increase upon an executive's departure, it would suggest that the executive was overpaid. If, on the other hand, the market predicts a stock price decrease upon an executive's departure, it suggests that the executive is not overpaid.

Prediction markets also might be used to assess the possibility of making discrete changes in compensation packages, for particular employees. For example, a corporation might use a conditional prediction market to assess the impact on stock price of different possible changes to compensation, including different levels of decreases and raises and different baskets of cash, stock options, and perks.¹⁴³ Such markets would factor in that higher compensation increases the probability that the corporation will be able to retain the particular official and to attract officials in the future. A prediction that the corporation would be best off docking someone's salary would indicate either that the corporation would be best off pushing the official out the door or that the financial savings would be worth any increased risk of a departure.

Prediction markets also might facilitate contracting about salary. The literature describes this primarily as an agency cost problem. Managers generally control the pay-setting process and appointing the board that sets their salary, controlling the information that flows to the board. Recently, there have been questions about the independence of outside firms that consult on executive compensation matters,¹⁴⁴ and some outside firms might assert their independence by relying in part on models derived from prediction markets. In addition, prediction markets could be used as a supplement or alternative to existing compensation mechanisms. Corporations today sometimes reward top officials in part with stock options because such options will produce desirable incentive effects. But this is an imperfect device, as an increase in a corporation's stock price may not necessarily be attributable to any particular director or CEO's contributions.¹⁴⁵ Although some stock option plans seek to control for this by basing compensation on the performance of a corporation relative to its competitors, this too is imperfect. Even some portion of firm-specific performance may be attributable to factors other than CEO performance; perhaps a firm simply happened to be lucky in stumbling into a lucrative business. An alternative is for a firm to contract specifically to base bonuses on prediction market assessments of the CEO's value, for example based on conditional predictions of the stock price effect of the CEO's possible departure.

¹⁴³ See generally M. Todd Henderson & James C. Spindler, *Corporate Heroin: A Defense of Perks, Executive Loans, and Conspicuous Consumption*, 93 GEO. L.J. 1835 (2005) (explaining why it may be optimal for firms to give executives perks rather than just cash).

¹⁴⁴ See, e.g., BEBCHUK & FRIED, *supra* note 141, at 37-39; see also Gretchen Morgenson, *Troubling Conflicts: Advice on Boss's Pay May Not Be So Independent*, NY TIMES, Apr. 10, 2006, at A1.

¹⁴⁵ There is a robust academic debate about how much of CEO compensation is based on "skill." Compare Robert Daines et al., *The Good, the Bad and the Lucky: CEO Pay and Skill* (Univ. of Pa. Inst. for Law & Econ., Aug. 2005), available at <http://ssrn.com/abstract=622223> (finding that CEOs with low skills are often overpaid, while CEOs with high skills are significantly underpaid), with Marianne Bertrand & Sendhil Mullainathan, *Are CEOs Rewarded for Luck? The Ones Without Principals Are*, 116 QUART. J. ECON. 901 (2001).

These markets are, for the theoretical and practical reasons cited above, likely to be superior to various reform measures proposed to address alleged problems in how executives are paid. In *Pay Without Performance*, Lucian Bebchuk and Jesse Fried claim that high agency costs allow managers (who have the power and the incentives to care about compensation) to extract more than the optimal amount from shareholders.¹⁴⁶ They propose various governance reforms—such as shareholder access to the proxy, increased independence of boards, and so on—as mechanisms for constraining managerial power and overreaching. More moderately, Jeffrey Gordon proposes requiring firms to disclose more detail about their pay philosophy and approach in a narrative in firms’ disclosure documents—to be called “Compensation Discussion and Analysis.”¹⁴⁷ Both proposals seek to reduce agency costs by increasing shareholder power, either through monitoring and governance roles or through increased information provision. Others have argued, however, that shifting the balance of power within firms from managers to shareholders will impose large costs, while providing only speculative benefits from reduced compensation.¹⁴⁸ Disclosure requirements are also costly, and have been shown in the compensation area to be fraught with unintended consequences.¹⁴⁹ Prediction markets, on the other hand, can help reduce agency costs, without these potentially costly changes to corporate governance.

Prediction markets have the potential not only to create new procedures for determining salaries, but also for lowering the amounts that top managers are paid. The current model of executive compensation rewards top managers richly based on the assumption that it is their decisionmaking skills that create or destroy shareholder value. A greater role in firm decisionmaking for prediction markets will necessarily require a reassessment of the compensation scheme and what is needed to attract, motivate, and retain top managers. As decisionmaking becomes more diffuse, one might expect the pay of managers to decrease, as their role becomes, on the margin, less important.

In the extreme case, where these markets are so effective that they are contractually or legally delegated as the decisionmaker, the manager’s role, and hence compensation, should look substantially different from today. For example, fewer options or other contingent compensation may be needed, since decisionmaking incentives are less important; this might have the impact of dramatically reducing total compensation, since the bulk of CEO pay, and nearly all of the growth in pay over the past several decades, is based on incentive compensation. Indeed, fewer managers may be needed, if many decisions are delegated to prediction markets. In effect, managerial skills can be outsourced through prediction markets, instead of obtained only through employment relationships.

The skills valued in top managers may evolve in ways that are difficult to predict. For example, future managers may spend more time managing these markets and their impact on a firm, both internally and externally. Not only may these markets fundamentally change how

¹⁴⁶ BEBCHUK & FRIED, *supra* note 141.

¹⁴⁷ See Jeffrey N. Gordon, *Executive Compensation: If There’s A Problem, What’s the Remedy? The Case for “Compensation Discussion and Analysis,”* 30 J. CORP. LAW 675 (2005).

¹⁴⁸ See, e.g., Bainbridge, *supra* note 91.

¹⁴⁹ For a discussion of the pros and cons of disclosure, see Edward M. Iacobucci, *The Effects of Disclosure on Executive Compensation*, 48 U. TORONTO L.J. 489 (1998).

individual employers do their work and are motivated, but they have the potential to create rivalries or be destructive to teamwork and morale. Managers, meanwhile, will still have to figure out how to implement the recommendations of the markets. Much of the work of executives is not knowing what to do, but doing it—that is, mustering the internal will and playing the right internal political cards to make sure the policy is well executed. These essential traits of today’s managers will still be required, and insofar as today’s compensation schemes are about execution, we should expect less change.

C. Creditors and Other Nonshareholder Constituencies

So far, we have assumed that firms would use prediction markets to maximize stock price, to the benefit of the firm’s equity holders. But it also might be possible for prediction markets to forecast effects on other capital providers, like creditors, and even other stakeholders, like, most importantly, labor. We will bracket the normative question of if and how much firms should take the views of other firm constituencies into account in decisionmaking, and focus for now on how these various constituencies can most efficiently be included in corporate decisionmaking. Prediction markets could be useful in two ways. First, they could enhance monitoring of the firm’s activities by one or more of these groups. Second, they could facilitate contracting between shareholders and these other constituencies, allowing the firm to commit to taking their interests into account, at least to some degree, in making decisions.

1. Creditors

The potential for prediction markets to reduce agency costs applies not just for shareholders but creditors as well. When firms finance projects partially with debt, such as bonds and loans, a potential for conflict arises between lenders on one hand and managers and shareholders on the other. Actions that may increase the value of shares—like investments in risky projects and payment of dividends—will decrease the value of the firm’s debt. Shareholders, generally including managers, may therefore prefer some risks that decrease overall corporate value, including the value of both equity and debt. Shareholders receive more of the upside from such actions than they bear of the downside. The potential losses from such actions and the costs that lenders and borrowers expend to reduce these risks are known as the agency costs of debt.¹⁵⁰

Lenders use contractual provisions, known as covenants, to try to reduce these costs. Covenants, which can run to hundreds of pages, routinely limit dividend payments, restrict the ability of a firm to take on additional debt, and give lenders access to firm information that allows them to prevent the firm from taking actions that would prejudice creditors in favor of shareholders. The benefit of covenants is that they can reduce shareholder opportunism, lowering the agency costs of debt for lenders. That in turn allows the firm to lower its cost of capital. Covenants, however, are an imperfect oversight device. They entail large monitoring and enforcement costs, and they can prevent actions that can increase overall corporate value, that is, increase the value of equity more than the decrease in the value of debt. Covenants are costly because they can be over- or under-inclusive, and in any event, require lenders to collect,

¹⁵⁰ See Jensen & Meckling, *supra* note 42, at 333-37.

process, and interpret incomplete data from the borrower.¹⁵¹ Covenants are costly even for good quality borrowers, who, in an attempt to differentiate themselves from poor quality borrowers, will expend resources on aggregating data and persuading lenders about their compliance.

The proposed academic solutions to these problems are, like those proposed for shareholder agency costs mentioned above, largely organizational in nature. For example, with respect to public bonds, Yakov Amihud, Kenneth Garbade, and Marcel Kahan propose the creation of a “supertrustee” that has the power to “actively monitor, renegotiate, and enforce bond covenants” and that is paid pursuant to an “incentive-based compensation scheme.”¹⁵² As for bank debt, scholars argue that banks should be limited in the types of services they can offer lenders (to reduce potential conflicts of interest) and should be prohibited from transferring the credit risk of their loans to third parties, such as hedge funds (to maintain their incentive to monitor).¹⁵³

Prediction markets can help both lenders and borrowers reduce the agency costs of debt by providing a complement to, or perhaps even a substitute for, loan and bond covenants. There are three increasingly ambitious possibilities. First, prediction markets can help lenders monitor, and borrowers signal compliance with, existing loan covenants. For example, corporate loan agreements typically include “state-of-the-firm” covenants that require borrowers to maintain certain accounting and financial ratios, such as minimum net working capital or specific ratios of debt to assets. Borrowers therefore compile data on all of these metrics and report them to lenders. This system entails the same collection and verification problems that we saw above with other types of internal and external financial reporting. To reduce error costs and the potential for manipulation, the borrower or lender could separately or together create prediction markets that estimate the specific figures or, more simply, the likelihood of the borrower’s compliance with the covenants. Even with significant subsidies, which might be needed to give participants incentives to do research, these markets are likely to be a much less costly mechanism for covenant monitoring.

The second possibility is that prediction markets could displace the use of covenants all together. After all, the set covenants in a particular loan agreement is nothing more than a proxy for the question the bank really cares about—will the bank get its money back?—and there is no reason that prediction markets cannot be used to give an estimate of this question. So instead of borrower and lender expending resources contracting over and monitoring covenants, they could instead agree on a prediction market design that would estimate the probability that the borrower would comply with the terms of the loan agreement—that is, that the bank will get its money back. We can imagine loan agreements that use prediction markets permitting lenders an increasing level of involvement in the management of the firm after the prediction market crossed various probabilities of default. For example, when the prediction market estimates a 25% chance of default, the lender may get authority for an inspection of financial records and the right to limit the firm from taking on additional debt; when the estimate reaches 50%, the lender

¹⁵¹ Agency costs of debt are potentially exacerbated by the recent growth in the credit derivatives market, which allows lenders to sell the risk of particular loans to third parties, such as hedge funds. As debt begins to look more diffuse like equity, lenders have less incentive to employ costly monitoring mechanisms. See David Skeel & Frank Partnoy, *The Promise and Peril of Credit Derivatives* (2006) (unpublished manuscript on file with author).

¹⁵² Yakov Amihud et al., *A New Governance Structure for Corporate Bonds*, 51 STAN. L. REV. 447 (1999).

¹⁵³ See Skeel & Partnoy, *supra* note 151.

may get authority to restructure the debt, take a board seat, or demand approval over major expenditures; and so on.

A final use of prediction markets would be to permit firms to more efficiently consider the interests of lenders when evaluating project choice or making other important corporate decisions. This would allow borrowers to precommit to take into account the interest of creditors in their decisionmaking, thereby enabling firms to lower their overall cost of capital. Under current law, there is currently an unresolved debate about if, when, and how firms have an obligation to take the interests of creditors into account in corporate decisionmaking. At one extreme—firms in the “zone of insolvency”—some courts find a firm obligation to consider the joint interests of shareholders and creditors or even to act as de facto trustees for creditors.¹⁵⁴ At all times before then, creditor interests are protected primarily through the contractual and monitoring mechanisms described above. Deploying prediction markets (either when the debt agreement is signed or after some milestones are reached) to estimate overall corporate value or specific value for creditors, would enable firms to credibly precommit with simple contract terms to limit their own actions in ways that will lower the risk for lenders.

2. *Labor*

Similar benefits are possible with regard to a firm’s other important constituencies as well. Some corporate law theorists have argued that the board of directors should be viewed as an implicit contract among a corporation’s various constituencies. On this theory, the board’s virtue is not that it will maximize shareholder wealth at every turn, but that it will mediate among constituencies. The board’s facilitation of “team production” in the long run is to the shareholders’ advantage, because the creation of the board allows shareholders to commit to constituencies such as labor that the shareholders will not take advantage of them later. For example, a board may be unlikely to effect a broad layoff when doing so would increase profitability only slightly. Such a commitment makes it easier for a firm to recruit workers, thus increasing shareholder welfare ex ante even if it prevents shareholder wealth maximization ex post.

Prediction markets can facilitate explicit contracts that may make this function of a board less necessary. For example, a collective bargaining agreement might provide protection against layoffs, except in cases in which the layoffs are expected to have dramatically positive benefits for stock price. A more elaborate approach might create a prediction market that would forecast the effect of possible decisions on the welfare of current workers, for example represented by the average salaries of those workers a decade later, whether or not the workers are with the firm. The firm might then contract to considering possible strategic changes to maximizing the joint welfare of shareholders and labor, as determined by some weighting of this prediction market with another market forecasting stock price. Less dramatically, the firm might contract to avoiding strategic changes that would greatly harm workers and only slightly benefit the firm.

¹⁵⁴ See, e.g., *Geren v. Quantum Chem. Corp.*, 99 F.3d 401 (Table), 1995 WL 737512 (2nd Cir. Dec. 13, 1995) (“Under New York law, directors of a corporation may become trustees of the creditors when the corporation is insolvent.”); see also *Jewel Recovery, L.P. v. Gordon*, 196 B.R. 348, 354 (N.D. Tex. 1996) (“Delaware law recognizes that when a corporation becomes insolvent, the assets of the corporation become a trust for the benefit of the corporation's creditors.”).

Implicit contracts are crude devices. Explicit contracts can reduce the danger of opportunistic behavior and the need for overbroad protections against such behavior, thus increasing the potential gains from contracting. Without prediction markets, however, there would be no objective gauge of policy effects. If explicit contracting relied on vague standards, it might lead to expensive and unpredictable litigation. Alternatively, explicit contracting might rely on detailed rules, and indeed labor contracts often do reflect this strategy, making these contracts analogous to the elaborate covenants we have seen between firms and debtholders. But as in other legal contexts, rules can be expensive to draft and may be both overinclusive and underinclusive. At least in some cases, prediction markets provide an escape from this dilemma, avoiding the need for both vague standards and detailed rules.

Prediction markets can facilitate explicit contracting not only with broad constituencies such as labor, but also with particular contracting customers, such as a customer or a particular manager. An executive might not agree to join a corporation that uses prediction markets to fire executives as soon as it is in the firm's interest, in which case prediction markets might counsel against the use of prediction markets for dismissal. But an executive might agree to a contract that allows the executive to be fired only if the dismissal will benefit the firm by a large amount. Such contracts can protect managers and other key employees from arbitrary or opportunistic dismissal, while allowing the firm to remove particularly bad performers.

V. CONCLUSION

Ronald Coase explained that firms look like they do because the benefits of hierarchy and command-and-control exceed the sum of agency and transaction costs.¹⁵⁵ Coase imagined that the boundaries, and even existence, of firms would change as the costs of various organizational approaches changed. Prediction markets have the potential to profoundly reduce the costs of hierarchy while simultaneously reducing the costs of more decentralized organization approaches. It is, of course, impossible to predict the impact these markets will have, but it is possible that we will see a greater heterogeneity of governance models across firms or industries since prediction markets provide added flexibility of model choice through reduced costs. More fundamentally, the standard model—the Berle and Means firm beset by large agency costs—may be in doubt as prediction markets deploy the power of market information processing to reduce agency costs within and outside of the firm.

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¹⁵⁵ Ronald H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937).

CORPORATE PREDICTION MARKETS
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