

Monetary Liability for Breach of the Duty of Care?

Law Working Paper N° 300/2015

September 23, 2015

Holger Spamann

Harvard University and ECGI

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September 2, 2015

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1 Introduction

The charters of large US corporations routinely waive monetary liability for breach of the fiduciary duty of care by their directors.¹ Even if they did not do

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¹Section 102(b)(7) of the Delaware General Corporation Law (DGCL) and similar provisions in other states explicitly allow such a waiver.

so explicitly, the Business Judgment Rule (BJR) would achieve almost the same effect by default, and this default also covers non-director officers: directors and officers are not liable for bad business decisions except in the most egregious cases.² They risk liability only if they breach their duty of loyalty, i.e., if they take actions that put their interests in an especially sharp conflict with shareholders' interests. Various rules in other jurisdictions at least achieve the same result.³

This paper analyzes director and officer liability rigorously from first principles. It shows that the *complete* exclusion of liability for bad business decisions can only be justified by high litigation costs and not, as is commonly assumed, by a concern for skewed incentives. In the standard principal-agent model of corporate governance, properly calibrated *partial* liability would unambiguously improve the incentives of directors and managers. While judicial evaluations of their actions are subject to errors and manipulation, so are stock prices, accounting numbers, and other feasible inputs ("signals") to incentive schemes. When multiple imperfect signals are available, however, it is optimal to use all of them to maximize the signal-to-noise ratio. Biases can be offset through appropriate weights and adjustments. This so-called "informativeness principle" is a standard, robust result in contract theory (Holmström 1979; Shavell 1979; cf. Bolton and Dewatripont 2005, 137; Laffont and Martimort 2002, sect. 4.7). The appendix demonstrates this in a formal model of judicial review of directors' and managers' decisions. The bottom line is that the only possible reason not to use (partial) liability is administrative costs.

Motivating directors and managers to run the corporation for the benefits of shareholders rather than their own is the foundational problem of corporate governance.⁴ Contracts cannot specify most desirable actions *ex ante*. Instead, managers are incentivized to maximize shareholder value by performance pay tied to signals of desirable behavior, typically stock returns and accounting

²The BJR shields managers from liability, provided they were disinterested, reasonably informed, and acted in good faith (*Aronson v. Lewis*, 473 A.2d 805, 812 (Del 1984)). Cf. section 4.3 below for details. The additional protection of the charter waiver was authorized by the Delaware legislature and eagerly adapted by Delaware corporations when *Smith v. Van Gorkom* (488 A.2d 858 (Del. 1985)) temporarily put the strength of the BJR in question (Romano 1990, 1160-61). In more recent decisions, the Delaware Supreme Court goes to great lengths to emphasize that the BJR alone would be sufficient to protect even rather careless behavior, see in particular *In re Walt Disney Co. Derivative Litigation*, 906 A.2d 27 (Del. 2006). While there is some dispute whether the BJR also covers officers, the weight of authority seems in favor, see Hamermesh and Sparks (2005); cf. *Gantler v. Stephens*, 965 A.2d 695, 709 (Del 2009) ("explicitly" holding that "the fiduciary duties of officers are the same as those of directors," and mentioning only the applicability of DGCL 102(b)(7) as a difference in footnote 37).

³Other jurisdictions use different terminology and devices but reach the same result of no liability (cf. Cheffins and Black 2006; Kraakman et al. 2009, 79-81). In particular, procedural obstacles may achieve the same practical result as a bar on liability, and from directors' and managers' point of view insurance or indemnification achieve much the same result as well (cf. Black et al. 2006a).

⁴That directors and managers run the corporation for the benefit of the shareholders is the dominant shareholder-value model. The competing stakeholder model would replace "shareholders" by "stakeholders." Nothing in this article hinges on this distinction.

profits. Increasingly, directors receive equity awards as well. (Other governance mechanisms are discussed below.) Stock prices and accounting figures, however, depend not only on the decisions of directors and managers but also and perhaps mostly a host of other factors beyond their control. Moreover, directors and managers can (legally) manipulate these signals through discretionary disclosures and accounting choices, as well as (potentially wasteful) real actions such as accelerating sales or delaying R&D (e.g., Stein 1989; Oyer 1998; Bergstresser and Philippon 2006). These problems are severe enough to fuel a vehement and longstanding debate about corporate governance in general and executive compensation in particular. Consequently, there is room for improving incentives by tying payoffs also to an additional, fully or partially independent signal. There is hardly a more direct signal of the appropriateness of an action than an evaluation by a court (or other third party, for that matter). A regime of judicially administered liability (or rewards, for that matter) harnesses this signal and enhances its precision through litigation’s information-generating mechanisms, in particular discovery.

The optimal incentive scheme incorporates the judicial signal, but it does not hold directors or officers liable for the entire loss caused by a suboptimal action. In large corporations, the gains or losses from an action can easily run into billions of dollars. With full liability, even the most diligent and loyal decision would carry the risk of ruinous liability if courts make errors, as they surely do. Faced with this threat, directors and managers might simply refuse to serve (cf., e.g., Romano 1990; Allen et al. 2002, 449). Or if they did serve, they would demand a risk premium that would likely be much larger than any benefit that shareholders obtain from improved incentives. (On risk-taking incentives, see section 2.) This concern may explain the default BJR of no liability if one assumes that statutes or judges cannot determine the appropriate level of liability, perhaps because that level is firm-specific.⁵ But it cannot explain why corporate charters exclude all liability, rather than tailor it through contractual or quasi-contractual provisions. For example, a charter could provide – and employment contracts could confirm – that directors and managers shall be liable for a specified percentage of any damage caused by their suboptimal business decisions such as an ill-advised investment or a sloppily executed merger, as determined by a court. Such provisions should be valid under current law.⁶

The argument against liability thus boils down to a cost-benefit tradeoff. The administrative cost of liability – litigation – is high. By contrast, its (mar-

⁵But cf., e.g., Virginia Code § 13.1-692.1.A.2. (limiting directors’ and officers’ liability to the corporation and shareholders to the greater of \$100,000 or last year’s cash compensation, except in cases of willful misconduct or knowing violations of the law); and cf. ALI Principles of Corporate Governance § 7.19 (allowing charter clauses limiting liability to one annual salary).

⁶In as much as the clause caps and hence restricts liability, its legality should follow *a maiore ad minus* from DGCL 102(b)(7). (It is therefore not important that legal rules such as DGCL 146(b) may restrict indemnification or insurance.) In as much as the liability clause expands liability beyond the limits of the BJR, its legality presumes that the BJR is merely a default, not a mandatory rule. There is no explicit authority on the point, but no reason to think otherwise given the enabling nature of Delaware corporate law (cf. DGCL 102(b)(1)) and the fact that no non-contracting parties are harmed.

ginal) benefits are likely to be low in public corporations. Courts have difficulty evaluating business decisions, making for a noisy signal. A noisy signal adds little value when fairly precise signals are already available, in particular the stock price and accounting measures, and when governance mechanisms other than incentives limit the agency problem. At the same time, recognizing the cost-benefit tradeoff also points to areas where liability might be an appealing governance tool after all. In particular, the cost-benefit tradeoff is more favorable when the judicial signal is more precise or when the other signal is less precise, such as for unlisted entities or worse accounting regimes. The cost-benefit trade-off also becomes more favorable as the underlying agency conflict becomes more severe. In this perspective, stringent liability for “conflicted transactions” under the duty of loyalty or similar regimes is merely one end of a spectrum analyzed in this paper.

Details of the cost-benefit trade-off differ between outside directors and inside managers (who may or may not be directors as well). For the most part, this paper does not distinguish them, however, because the conceptual analysis arguably applies to both. Both directors and managers are supposed to exercise their corporate power for the benefit of shareholders, but both may be swayed by personal interests such as laziness, reputation, or pet projects instead. To be sure, it is possible that loyal boards already perform the sort of third-party evaluations of managers’ actions that this paper imagines courts to do. But there is pervasive concern that boards are captive to insiders, and in any event the board might have to allow judicial vetting (instead of discretionary bonuses) to commit itself to an incentive plan (cf. Cebon and Hermalin 2015).

The article assumes that directors and managers narrowly pursue their self-interest and hence must be motivated by financial incentives. This assumption is standard in corporate governance. Some argue that outside directors are or should be altruistically motivated (e.g., Stout 2002, 2003; cf. Bainbridge 2002, 264-7). If these critics are correct, the present article’s analysis does not apply to outside directors. The increasing prevalence of stock ownership guidelines for outside directors (e.g., Frederic W. Cook & Co. 2014) may be a sign, however, that financial incentives matter for outside directors as well.

The only other formal model of the appropriate liability standard for directors and managers is Engert and Goldlücke (2014), who show that full liability is sub-optimal under certain conditions but do not consider partial liability. Kraakman et al. (1994) model implementation problems with liability due to skewed incentives of potential shareholder plaintiffs (cf. subsection 3.1.2). In the informal literature, Fischel and Bradley (1986) and others anticipate many of the arguments in this paper, including the continuity of the duties of care and loyalty and the framing as a cost-benefit analysis. The present paper can add clarity, however, with the benefits of a formal model, three more decades of contract theory, and a more settled legal landscape.

The rest of this paper is structured as follows. Section 2 contains the basic argument why optimal incentive schemes would include liability if its administration were costless. The technical version of this argument is in the appendix. Section 3 turns to liability’s administrative costs, i.e., litigation costs. It is

plausible that these costs outweigh liability’s benefits in standard business scenarios in listed corporations. Section 4, however, identifies several areas where the cost-benefit tradeoff might shift, including worse-governed entities such as charities and trusts, more severe conflicts of interest such as takeovers, and situations that may be easier for courts to evaluate. Many exceptions from the BJR under existing law are arguably consistent with this analysis. Section 5 concludes.

2 Liability’s Benefits

This section shows why (partial) liability would be beneficial for directors’ and managers’ incentives if its administration were costless. The exposition is rigorous but informal. The appendix provides a formal model derived from Holmström (1979) and Holmström & Milgrom (1991).

Subsection 2.1 describes partial liability as one incentive mechanism among others in the corporate context. Subsection 2.2 explains why, if there were no administrative costs, it would always be optimal to combine these mechanisms rather than choose one at the exclusion of others (informativeness principle). Subsection 2.3 separately addresses widespread concerns that liability would detrimentally affect risk-taking, pointing out that these concerns vanish with appropriate tailoring of incentives.

The focus of this section is the existence of liability’s benefits. Plausible magnitudes will be mentioned, but a full discussion is deferred until the next section.

2.1 Liability in the Corporate Principal-Agent Relationship

2.1.1 Corporate Governance’s Foundational Agency Problem

The basic problem of corporate governance is to ensure that directors and managers act in the interests of the shareholders (e.g., Becht et al. 2007). This so-called agency problem arises because the interests of directors and managers often diverge from shareholders’, yet optimal actions cannot be directly contracted upon: optimal actions cannot be described *ex ante* in a way that is easily observable *ex post*.⁷ For example, shareholders do not suffer the aggravation of closing an old plant or the stress of opening a new one (cf. Bertrand and Mullainathan 2003), nor do they get to enjoy the comfort of corporate jets (cf. Yermack 2006) or the thrill of appearing on television (cf. Malmendier and Tate 2009). Directors and managers may thus want less business changes and more jets and television appearances than shareholders, or more to the point, more than directors and managers themselves would want if they were to internalize

⁷In this view, the “conflicts of interest” addressed by corporate law’s duty of loyalty are just a more extreme version of a conflict of interest that is omnipresent in relationship between boards and shareholders.

all the costs and benefits of their actions. At the same time, some business stability, jets, and television appearances are optimal. The conditions for optimality may be easy to specify abstractly, but they are hard to observe in any given case.

In corporations, directors' and managers' equity ownership alleviates the conflict of interest with shareholders. The median US CEO now effectively owns around 0.4% of her corporation's equity (Murphy 2013, 235). Outside directors receive and are required to hold much smaller but still considerable amounts of stock (Frederic W. Cook & Co 2014). In the limit, the conflict of interest with shareholders and hence the agency problem would disappear if directors and managers held 100% of the equity.⁸ By definition, however, public corporations and especially widely-held corporations do not pursue this solution of the agency problem. One reason may be that directors and managers are not sufficiently wealthy to buy out the shareholders. But another reason is that equity ownership has offsetting disadvantages. The more equity directors and managers own, the more of their wealth is exposed to random fluctuations in the fortunes of the corporation, which reduces welfare if they are risk averse. Diversified shareholders, too, might prefer directors and managers to own less equity because higher equity ownership will make undiversified risk averse directors and managers choose less risky over more profitable strategies (e.g., Hirshleifer and Suh 1992).⁹ In other words, the solution to one agency problem (effort provision) may create another one (inefficient strategy choice). Equity ownership alleviates, but does not solve, agency problems in corporate governance.

The legal response to this agency problem are fiduciary duties. In corporate law, fiduciary duties divide into the duty of care and the duty of loyalty.¹⁰ The latter requires directors and managers to exercise their powers for the interests of the shareholders, while the former demands due care in this exercise. These duties may alleviate the agency problem by mere exhortation. As explained in the introduction, however, this paper assumes at least for the sake of argument that the duties have behavioral effects only if they influence financial payoffs. In this economic perspective, the relevant question is what behavior, if any, should trigger monetary liability under the duty of care.

The generic economic solution to agency problems is to incentivize the "agent" (directors, managers) with rewards (or punishments) that depend on signals indicating that the agent took an action that favored the "principal" (shareholders). Equity ownership performs this function in as much as stock prices are likely to be higher when the board and managers act to maximize shareholder value. The risk conflict sketched two paragraphs above can be addressed with option awards, as options become more valuable when the cor-

⁸Agency problems between directors and managers themselves as well as with respect to other stakeholders, such as creditors, would remain.

⁹These considerations must have some force, as witnessed by the fact that most managers and directors do in fact have very substantial wealth that is not invested in the corporation.

¹⁰Cf. *Stone v. Ritter*, 911 A.2d 362, 370 (Del 2006) (holding that corporate fiduciary duties comprise only the duties of care and loyalty, not a separate duty of good faith).

poration takes greater risks (e.g., Hirshleifer and Suh 1992; cf. Ross 2004). Accounting profits are another signal that is routinely used in corporate incentive pay arrangements. These signals are imperfect, however, because stock prices and accounting figures depend on much more than directors' and managers' actions: companies may fail or flourish by bad or good luck, respectively, and directors and managers can manipulate appearances (see next subsection). These imperfections are widely believed to be large, as witnessed by persistent debates about induced short-termism and other problems of executive compensation. If the signals were not imperfect, much more drastic incentives could be provided. For example, managers could promise to give up all their wealth if profits or the stock price fell below certain thresholds, or accept to work for free unless ambitious performance targets are hit. With noisy signals and risk-averse managers and/or manipulable risk profiles, these are not generally workable arrangements.

2.1.2 Liability as an Incentive Mechanism

Since the currently used signals are imperfect, there is room for improvement using other, fully or partially uncorrelated signals. Judicial evaluations are a potent signal of directors' and managers' actions. For example, a court could directly examine whether performing an acquisition, rejecting a takeover bid, or opening a new plant maximized expected equity value, given the confidential internal projections available at the time. Indeed, there is arguably no more direct signal of directors' and managers' actions than a judicial (or other third-party) evaluation. After all, the evaluation aims directly to establish whether directors and managers did the right thing. This compares favorably to stock prices or accounting profits, which are primarily indicators of the corporation's future and past profits, respectively, and reflect directors' and managers' actions only indirectly. Continuing the examples above, stock prices do not reflect confidential internal projections, but do reflect various developments such as market changes that could not be foreseen at the time of the decision and/or may have nothing to do with it at all (e.g., changes in another business segment). Liability tied to judicial evaluations is thus attractive as an incentive mechanism.

It is true but besides the point that liability is imperfect, because that is also true of all other feasible incentive mechanisms. Judges will often err in assessing the quality of a board's actions. In particular, directors and managers may be able to manipulate judicial evaluations by window-dressing or catering to judicial biases for or against certain actions. But stock prices and accounting profits are also noisy and manipulable, and perhaps more so. Stock prices and profits depend on many environmental factors beyond the control of directors and managers, and will therefore be only weakly correlated with their decisions. They can also be (legally) manipulated through discretionary disclosures and accounting choices, as well as (potentially wasteful) real actions such as accelerating sales or delaying R&D (e.g., Stein 1989; Oyer 1998; Bergstresser and Philippon 2006; cf. Hamdani and Kraakman 2007).

When judicial evaluations are viewed as a mere ingredient in an agent's

incentive scheme, it is intuitively clear that they need not and probably should not entail full liability. The well-known result that an optimal (strict) liability rule imposes full liability to make the injurer internalize all the losses assumes risk-neutrality in injurers (or insurable losses) (Shavell 1982a). It does not apply when injurers are risk averse, and is inapposite when full liability would exceed the injurer’s wealth – precisely the conditions that prevent a full solution of the agency problem (agent sole ownership) in the first place.

Rather, added incentives must be balanced against the additional risk imposed on the agent (which hurts the principal indirectly by raising the level of compensation that the agent will demand), and also and perhaps especially against the danger that the agent manipulates the signal in a wasteful manner. This requires tailoring the liability incentives to the circumstances of the corporation, its board and its managers, and in particular to the biases of judges. For example, the CEO’s liability might be set at only 1% of the losses determined by the court (be it through caps, indemnification, or insurance). Directors might be liable for only one tenth of this amount, and certain actions might be safe-harbored (see subsection 2.3 below). This may sound complicated, but it is really not different from calibrating other incentive mechanisms. In particular, standard equity- or accounting-based incentives must also be tailored to characteristics of the firm, markets, and individual directors and managers, including such hard-to-observe factors as managerial risk aversion or the value-impact of boards’ actions.¹¹

Judicially imposed liability is not the only additional incentive scheme worth considering. From an incentive point of view, court signals could also be used to trigger rewards, i.e., increases in monetary payments, as proposed by Hamdani and Kraakman (2007). (As shown in the example below, such schemes can lead to identical payoffs as liability with increased base compensation.) Litigation might be replaced by confidential arbitration, especially if releasing the relevant information in a trial would harm the competitive position of the firm. Inversely, if confidentiality is not important to the corporate strategy, one might consider a simple public audit by a court, which might suffice if reputation and other governance mechanisms are strong concerns for directors and managers (cf. Miller 2010). Liability’s advantage over an audit is that liability incentives can be fine-tuned by adjusting the amount of damages. Liability also does not require a novel procedure for gathering and evaluating information, i.e., to generate a reliable signal. Litigation, particularly US-style litigation, is a formidable information-generating device. In particular, discovery reveals many aspects of internal decision-making such as internal agendas and projections, unveiling an uncensored picture of available alternatives.

¹¹This is true even of Edmans’s and Gabaix’s (2011) “detail-independent” incentive contract, which requires, e.g., the risk aversion parameter to calculate the level of compensation. The concern of Black et al. (2006b, pp. 18-19) that appropriately compensating some directors for the liability risk will create rents for others seems to be predicated on ruinous full liability, which would clearly be suboptimal (see *supra*, text accompanying footnotes 5 and 6). If liability is partial, then it is not clear why tailoring it to individual directors’ wealth and utility functions would be more difficult than tailoring standard pay.

2.2 The Informativeness Principle

This subsection explains why the optimal incentive scheme would use judicial evaluations alongside stock prices and accounting numbers. The argument is a special case of a standard result in contract theory. If a second signal of the agent’s action can be drawn at no additional cost, the optimal incentive scheme uses both signals (Holmström 1979; Shavell 1979; Bolton and Dewatripont 2005, 137; Laffont and Martimort 2002, sect. 4.7). Simply put, more information is better when monitoring behavior. The argument is very general and robust to various infirmities of the information-generating process.¹² In particular, it is often optimal to draw a costly second signal only if the first is sufficiently negative, as happens in “opportunistic” litigation.

2.2.1 Intuitive Argument

There are several powerful intuitions for this so-called informativeness principle. Abstractly, the second informative signal adds a degree of freedom to the optimization problem, which must weakly improve the solution. Constructively, the intuition can be seen in two ways. One is diversification. Tying payoffs to a portfolio of two signals diversifies the risk inherent in each. Analogous to optimal portfolio choice, noisier signals optimally receive lower but not zero weight (i.e., the noisier the judicial evaluation, the lower damages should be). Equivalently, one may think in terms of increasing precision. Using the average of two signals is a more precise statistic for the mean (the action) than either one alone. Again, the optimally weighted average underweights the more noisy signal but does not exclude it entirely. These two rationales are really two sides of the same coin. Combining two sources of information preserves the information content while reducing the noise, which partially cancels out. This improvement in information reduces the agency problem, which is a “problem” only because and to the extent the agent’s actions are unobservable.

To understand these intuitions practically, it is important to realize that incentives from the second signal (liability) are not just added to a fixed pre-existing incentive mechanism. Specifically, liability does not just add downside risk to an existing compensation package. Rather, the optimal combination of both mechanisms adjusts the sensitivity of the pre-existing one. In particular, it may be optimal to reduce the stock-price sensitivity of compensation relative to its stand-alone optimum because the remaining incentives will be provided by liability. Liability thus allows reducing directors’ and managers’ exposure

¹²As Chaigneau et al. (2015, p. 2) write, “the informativeness principle is believed to be the most robust result from the moral hazard literature.” To be sure, Chaigneau et al. (2014) show that the informativeness principle may not hold with limited liability if and because the optimal contract with only one signal is a corner solution (i.e., the agent receives everything or nothing). Clearly, however, these conditions do not describe the corporate governance context (directors and managers never have to surrender their entire wealth under existing contracts, nor do they receive the entire firm as a reward). Chaigneau et al. (2015) show that signals are only valuable if they are informative about an action that the agent would actually consider an immediately relevant alternative. As the examples in this paper demonstrate, judicial evaluations are informative about many such actions.

to firm value alone, making deeper cuts in their compensation dependent on a drop in firm value *and* a judicial determination of fault. For a given level of incentives, the optimal combination of liability and incentive compensation – or more to the point, the use of two complementary signals – therefore exposes directors and managers to *less risk* than optimal incentive compensation alone. Alternatively, the combination allows stronger incentives for a given level of risk. Shareholders might even find it worthwhile to expose directors and managers to more risk than before (in exchange for higher levels of compensation) because the incentive-risk trade-off is more favorable when both signals can be used.

Consider the following example of an improvement using liability. Imagine that when the only available signal was the stock price, the optimal incentive scheme was to give each risk-averse director 0.1% of the company’s stock. This exposed each director to 0.1% of any swings in the corporation’s value, even completely unrelated to the board’s decisions. Now replace the stock by its cash value, at-the-money call options on such stock, and the threat of damages equal to 0.1% of any drop in market capitalization *if* a court finds that the board was responsible. (Equivalently, the original equity package could be complemented with a judicial *reward* offsetting any drop in the value of the director’s stock if the court finds that the board was *not* responsible.) If the court were completely hindsight-biased and always held against directors when the stock price drops, this scheme would be economically equivalent to the original.

If the court is occasionally able to differentiate when the board was not at fault, however, then directors can be absolved from liability in those cases (or equivalently, the court will find liability only in the other cases). This absolution has two immediate effects. First, a well-behaved director’s expected payoff – and shareholders’ expected cost – in case of stock price drops rises. Neutralize this by increasing liability (from 0.1% of the drop in market capitalization to, say, 0.105%). Second, directors now have additional incentives to take actions that are value-increasing *ex ante* in order to avoid liability *ex post*.¹³ To offset this, decrease directors’ payoffs on the upside, i.e., reduce the number of stock options that they receive (from options on 0.1% of the stock to, say, 0.09%). Reducing the option grant reduces directors’ overall expected payoff, but one can compensate this by raising their base cash compensation until directors’ expected utility is back to where it was in the original scheme. Crucially, the cash compensation will cost shareholders less dollars than the options in expectation because risk-averse directors value riskless cash more than risky options. The bottom line is that liability in this example preserves incentives and directors’ expected utility, but saves money for shareholders.

2.2.2 Rigorous Marginal Argument

The details of the preceding example depend on context-specific factors such as director risk aversion. The percentages were given for expositional clarity only and may not actually be optimal. Even a verbal argument, however, can

¹³Once the additional expected payoff when the stock price drops has been neutralized, the incentives to avoid drops are the same as before.

rigorously establish that a *marginal* improvement of the type just sketched is always possible, and hence that (appropriately) using costless liability always strictly improves the joint welfare of shareholders and directors/managers. Take any incentive scheme that is optimal with a given risk-averse agent if only some signal(s) such as the stock price and/or accounting numbers are available. It is in the nature of the agency problem that there will be signal realizations (e.g., a particular low stock price) that are more likely if the agent does not work hard etc. but that can also result from sheer bad luck.

Liability can help if there is at least one such realization – e.g., one low stock price – that a court can further illuminate, i.e., if given the realization (stock price etc.), the court is less likely to find that the agent breached her duty the better the agent behaved (e.g., the harder the agent worked or the more diligently she chose between risky investments, etc.).

For this signal realization (e.g., stock price), consider marginal adjustments of pay upwards if the court does not find fault (i.e., an increase in standard pay) and downwards if the court does find fault (i.e., liability). If we choose the size of these marginal adjustments in inverse proportion to their relative odds of occurring under the original incentive scheme, then they do not change the expected monetary payouts from shareholders to the agent as long as the agent continues to behave as under the original scheme. By the same token, marginal adjustments of this relative size will leave the agent's expected utility unaffected.¹⁴ The adjustments will, however, increase the agent's incentive to work hard etc. because doing so now has the additional benefit of avoiding liability if this particular stock price is realized.¹⁵ To restore the original incentives (such that the agent will indeed behave as before), marginally reduce compensation for the highest realization(s) of the original signal in an appropriate amount and spread it across all original signal realizations in an incentive-neutral manner. This spread reduces the compensation risk for the agent and hence increases her expected utility. At the same time, incentives (and thus the agent's action) and shareholders' expected monetary payouts are unaffected by construction. Consequently, the series of marginal adjustments has increased the joint welfare of shareholders and the agent (if desired, the surplus can be reallocated to the shareholders by a further marginal downward change to the agent's pay). This is true even though liability only kicks in if the other signal (e.g., the stock price) is already low, and hence liability might be called "biased."

These or analogous arguments apply regardless of the source of the (residual) agency problem. For example, liability also helps if the residual agency problem results from the agent's ability to manipulate the original signal, such as the stock price.¹⁶ The relevant liability is not liability for accounting and securities

¹⁴Recall that the *marginal* utility change per dollar change is the same in either direction even if the agent is risk-averse.

¹⁵There is no additional incentive to avoid or achieve this stock price because the expected utility conditional on reaching this stock price is held constant by the way we constructed the adjustment.

¹⁶Manipulation creates a residual agency problem if and because it makes incentives more expensive. If the agent can manipulate the signal, then increasing the sensitivity of pay to

fraud, even though such fraud liability undoubtedly facilitates contracting on accounting and equity signals. Rather, the point is that some business decisions may be taken with “deceptive” intent yet not be fraudulent under existing law, and that liability for bad business decisions per se can temper incentives to engage in such behavior. For example, managers may cut efficient R&D to boost accounting profits, or engage in inefficient R&D to boost the stock price (if and because the market misperceives the R&D as profitable innovation) (e.g., Stein 1989). Liability can directly offset such incentives if courts may find a breach of the duty of care precisely because managers chose R&D sub-optimally. Unlike contemporaneous stock traders, courts examining the issue in hindsight will have access to internal memos and testimony that can bring these issues to light. To be sure, courts may have their own biases in assessing R&D, and liability will create an incentive for managers to inefficiently cater to these biases. But the incentive for such catering is in turn tempered by equity and accounting based pay, which such catering will reduce.

2.3 Risk-Taking

Among modern commentators, the chief concern about liability for breach of the duty of care is that it would deter efficient risk-taking.¹⁷ In principle, risk-

the signal will induce more costly manipulation. In equilibrium, nobody will be fooled, but the manipulation consumes resources.

¹⁷For example, three former or sitting high-ranking Delaware judges (Allen et al. 2002, 449) justify the lenient “gross negligence” standard of review under the BJR as follows:

If law-trained judges are permitted to make after-the-fact judgments that businesspersons have made “unreasonable” or “negligent” business decisions for which they must respond in monetary damages, directors may, in the future, avoid committing their companies to potentially valuable corporate opportunities that have some risk of failure. Highly qualified directors may also avoid service if they face liability risks that are disproportionate to the benefits of service.

Similarly, according to the leading US casebook (Allen et al. 2012, 219), the rationale of the BJR is that

corporate directors and officers invest other people’s money. They bear the full costs of any personal liability, but they receive only a small fraction of the gains from a risky decision. Liability under a negligence standard therefore would predictably discourage officers and directors from undertaking valuable but risky projects.

A leading modern treatise on corporate law and economics (Bainbridge 2002, 261) opines that

if judicial decisionmaking could flawlessly sort out sound decisions with unfortunate outcomes from poor decisions ..., the case for the business judgment rule would be substantially weaker. As long as there is some nonzero probability of erroneous second-guessing by judges, however, the threat of liability will skew director decisionmaking away from optimal risk-taking.

For other, similar statements cf., e.g., American Law Institute Principles of Corporate Governance 4.01, introductory comment d (arguing that the BJR exists “to protect directors and officers from the risks inherent in hindsight reviews of their unsuccessful decisions, and to avoid the risk of stifling innovation and venturesome business activity”), and comment c to 4.01(c) (“For efficiency reasons, corporate decisionmakers should be permitted to act decisively and with relative freedom from a judge’s or jury’s subsequent second-guessing. It is desirable to encourage directors and officers to enter new markets, develop new products, innovate, and

taking is an action like any other.¹⁸ The general argument for liability given above thus applies to risk-taking as well. Nevertheless, the special concern warrants special attention. Explicitly considering risk-taking also brings into view the multi-dimensionality of board and managerial actions, such as effort *and* project choice, i.e., working hard and deciding what to work on in the first place. Multi-dimensionality entails certain well-known problems for the provision of incentives (Holmström and Milgrom 1991). But multi-dimensionality cannot explain the absence of corporate duty of care liability, for reasons given in the closing subsection.

2.3.1 Doctrine

As a doctrinal matter, liability for breach of the duty of care supports rather than opposes efficient risk-taking. Liability for breach of the duty does not attach to low profits or stock prices per se. Liability for breach is a form of negligence liability, not strict liability. The underlying standard of care requires that boards (and managers) maximize the value of the corporation's stock in the long term.¹⁹ To comply with this standard, directors and managers must take efficient risks.²⁰ In pure form, duty of care liability thus penalizes directors and managers for *not* taking efficient risks, rather than the inverse.

Distortions thus presuppose misapplication of the doctrine. Two types of misapplication are possible. First, courts' interpretation of due care might be biased against risk. To wit, courts might have a tendency to fault directors and managers for taking risks regardless of their expected profitability. Second, even random (i.e., unbiased) court errors disfavor risky strategies because damages are one-sided and are calculated relative to some fixed baseline. Strategies with a higher variability of outcomes (i.e., risky strategies) thus generate higher damages in expectation. Either type of misapplication would incentivize rational directors and managers to take less risk in anticipation. As the following paragraphs explain, however, both can be addressed with appropriate calibration of the overall incentive scheme.

2.3.2 Random Judicial Errors

Random judicial errors disfavor risk-taking because liability is one-sided.²¹ Erroneous liability randomly forces directors and managers to pay money; it never entitles them to receive money. Directors and managers cannot avoid these

take other business risks.”). Also see Black et al. (2006b, 17-18).

¹⁸To be more precise, risk-taking is an action like any other from the perspective of liability. For equity incentives, risk-taking *is* special because risk-taking affects not only the mean but also the variance of the stock-price signal.

¹⁹See, e.g., *In re Rural Metro Corp. Stockholders Litigation (I)*, 88 A.3d 54, 80 (Del. Ch. 2014).

²⁰Cf. the quotes in footnote 17 stressing the importance of risk taking in the context of the duty of care.

²¹Accordingly, the problem discussed in this paragraph could also be addressed through the addition of judicial rewards. Cf. Kraakman and Hamdani (2007).

payments (they are random), but they can control their size. The size of damages should be calculated as the difference between the the ultimate outcome (stock price or profit) and the expected value under the optimal strategy, or some fraction of this difference if liability is partial. (In practice, the baseline may be the status quo ante.) The higher risk the corporation takes, the more likely and/or lower low outcomes become. Directors and managers thus minimize the expected size of liability payments by minimizing risk. This harms the shareholders if the risk would have been an efficient one to take, i.e., if the possible downside was more than outweighed by the possible upside. But random liability imposes on directors and managers a part of the downside without the compensating upside, driving a wedge between what is good for them and what is good for the shareholders.

The foregoing analysis is correct on its own terms, but seriously incomplete and thus ultimately misleading. The main concern of typical incentive schemes is not risk taking but other dimensions of directors' and managers' behavior, such as effort. If encouraging risk taking were the only objective, typical linear equity and profit based awards would be counterproductive, as they incentivize naturally risk averse directors and managers to reduce the corporation's risk. For other dimensions of behavior like effort, however, liability improves incentives notwithstanding its one-sidedness and random errors. Subsection 2.2 established this point. This means that there is at least a trade-off between liability's detriment to risk-taking and benefits for other dimensions of behavior.

Moreover, the non-random part of liability exerts a countervailing force against the risk avoidance incentives created by the random part. To the extent courts apply the doctrine correctly, they will hold directors and managers liable for not taking or even exploring efficient risks. With bench trials in business-savvy courts such as Delaware's, it is reasonable to assume that the net effect would be to encourage efficient risk-taking. Even if this were not already the case, however, the balance could be shifted in risk-taking's favor by contractual tweaking (see next subsection).

2.3.3 Judicial (Hindsight) Bias

Of course, the first concern mentioned above was precisely that courts will be biased against risk-taking, i.e., that they will penalize directors and managers for efficient risks with unlucky results but not for not taking risks in the first place. In particular, the concern is that in the standard playbook, suits will be filed only after bad results, i.e., if a risk materialized, and hindsight bias will then lead courts to conclude that the risk was inefficiently high even if it actually was not (e.g., Rachlinski 1998).

It would be surprising if judges were free from hindsight bias. At the same time, it is far from clear that this hindsight bias is strong enough to outweigh due care's doctrinal commitment to risk (see 2.3.1 above). Experimental evidence on judicial hindsight bias in general is mixed (Guthrie et al. 2007). There appears to be no evidence of hindsight bias specifically in the corporate context.

In fact, the decision most commonly cited as an example of liability's prob-

lems, *Smith v. Van Gorkom*, faulted directors for not taking enough risk, if it was concerned with risk-taking at all. The Delaware Supreme Court held that the defendant directors breached their duty of care because they were not adequately informed when they accepted a takeover offer. On its face, the decision was thus only concerned with process. The court could only impose liability, however, if the breach resulted in damages. Concretely, the court would have had to conclude that the safe option of accepting the offer was worth less in expectation than the risky options of holding out for a better offer or continuing as a stand-alone company (the case settled before the court assessed damages) (cf. McChesney 2002). In further deviation from the ostensibly standard playbook sketched above, plaintiffs in *Smith v. Van Gorkom* brought suit not after the stock price plunged but after it jumped up (due to a large takeover premium).

That being said, *Smith v. Van Gorkom* arguably did penalize the board for starting a sales process in the first place. If the board had not entered into any transaction, it is very likely that no suit would ever have been brought and no liability could have been imposed. If this were a general pattern, liability would exert a chilling effect on actions that change the status quo. The existence of the pattern is an open empirical question, however, as counter-examples are easy to come by.²² Moreover, if it does exist, the pattern is unlikely to be limited to duty of care claims, and hence requires a broader analysis and response. For example, the Delaware Chancery Court recently found two directors liable on facts very similar to *Smith v. Van Gorkom* but under the non-exculpable duty of loyalty.²³

In any event, if either bias existed, it could be neutralized by appropriate design of the liability regime. In particular, courts could be instructed only to penalize excessive prudence or inaction, not excessive risk-taking or actions. Liability incentives may be more important in this direction anyway because the natural tendency of risk- and effort-averse directors and managers is to take too little risk and actions (cf. Bertrand and Mullainathan 2003). Standard incentive pay based on stock prices and accounting profits only reinforces this tendency because taking risks entails higher volatility of stock prices and profits.²⁴

²²See, e.g., *In re Citigroup Inc Shareholder Derivative Litigation*, 964 A.2d 106 (Del Ch 2009) (discussed below in footnote 36).

²³*In re Rural/Metro Corporation Stockholders Litigation (II)*, 102 A.3d 205, 255-59 (Del Ch 2014). The culpable directors did not actually have to pay damages because they had settled before the court made this finding in the suit against another defendant. The main difference between the two cases is that one of the directors liable in *Rural/Metro*, Shackleton, faced a stronger conflict of interest than any of the defendant directors in *Smith v. Van Gorkom*. At the same time, the *Rural/Metro* court strongly insinuated that it would have found a third director, Davis, conflicted and liable on facts reminiscent of Van Gorkom's role in *Smith* if only Davis had testified at trial (which he did not, presumably because of the settlement). Davis's "conflict" was that he wanted to exit his directorship by a nearby date. Similarly, the *Smith* court (at 866) had remarked that "[i]t is noteworthy in this connection that [Van Gorkom] was then approaching 65 years of age and mandatory retirement."

²⁴This is the best economic reason to use options instead, whose convex payoffs counteract risk aversion (Murphy 2013), at least under certain conditions (Ross 2004). Many common modifications of equity incentives also create convexity, for example "re-loading" after low returns, i.e., if they come with downside protection.

2.3.4 Why Certain Standard Arguments Against Incentives Do Not Apply

In general, a peculiarity of corporate governance insulates it from well-known pathologies of incentives in multi-dimensional settings.

If the principal wants to motivate the agent on several dimensions at once, incentives can be counter-productive (Holmström & Milgrom 1991). The most famous example involves teaching to the test. Incentivizing teachers to improve test scores may lead to a neglect of other, unobservable skills. The result may be worse than without explicit incentives. In general, the problem arises if and because some relevant dimension is not at all observable or at least contractible.

This problem is absent in corporate governance, however, because the ultimate outcome of interest (the stock price) is observable. This means that at least a composite signal of all relevant dimensions is always available. This composite signal is noisy and manipulable, as discussed above. But the key point is that any activity that influences the stock price is already incentivized by equity incentives. Consequently, corporate governance need not rely on intrinsic motivation on any dimension, and liability on one dimension would not overpower the agent's motivation on another as long as liability is sufficiently small. In corporate governance, liability therefore always improves incentives, at least marginally.

3 Cost-Benefit Analysis of Liability

What then are the problems with liability under the duty of care? Ultimately, the argument against liability is a cost-benefit argument. The discussion above and the model in the appendix show that the benefits of a second signal (litigation) depend critically on three factors: the precision of the second signal, the precision of the first signal (e.g., stock prices), and the extent of the agency problem (and hence the quality of other governance tools). Judicial evaluations of standard business decisions are likely to be noisy, while equity-based performance pay and other governance mechanisms already eliminate most of the agency cost in publicly traded corporations. Consequently, the benefits of litigation are likely to be limited and will not outweigh corporate litigation's substantial cost.

This sketch of the cost-benefit analysis makes no claim that all details of current arrangements strike the optimal balance. This is ultimately an empirical question. To be sure, the ubiquity of the liability waiver in IPO charters may suggest that liability is inefficient, or else the affected sophisticated parties would not voluntarily reject it. However, the contractarian model cannot explain much of corporate governance practice (Klausner 2006; 2013). In particular, researchers have identified other features of executive pay arrangements, including lack of indexation and other omissions of *prima facie* valuable information, that do not seem to result from optimal contracting but rather managerial rent-seeking (Bebchuk and Fried 2004). It remains controversial whether refinements of the basic model can explain these features and omissions (Edmans and Gabaix,

forthcoming).

3.1 The (High) Costs of Litigation

Litigation costs are likely to be high, in part because they will not be focused on the cases that are most relevant for incentives.

3.1.1 The High Amount of Expenditures

The cost of litigation fall into two categories.

The most obvious but less important category are out-of-pocket costs for lawyers and other service providers. Empirically, the few board liability suits that do go to trial tend to be mega-trials. For example, the trial lasted 37 days in the derivative litigation regarding ostensibly excessive compensation for Disney's one-time President Michael Ovitz.²⁵ Out-of-pocket costs in such litigation can exceed \$10m, and are thus far from negligible. That being said, they seem small relative to the stakes involved in improving incentives, at least in large firms. A mere 1% chance of improving the deal price by \$1bn is worth \$10m. And improving the value of a \$50bn firm by 1% is worth much more.

But the opportunity cost of directors and managers for participating in the lawsuit do scale with firm size. For example, directors and managers may have to endure depositions in discovery, testify at trial, and manage the litigation. The costs in terms of time and attention may be very large. For example, if one week of the CEO's full attention improves firm value by, say, a mere 0.1% relative to a rudder-less corporation, then blocking a large company's CEO's schedule with depositions etc. for a week is much more costly than \$10m out-of-pocket costs.

3.1.2 The Imprecise Targeting of Expenditures

An additional problem is that litigation expenses are likely to be misallocated away from the most important cases to the most lucrative ones. This is a manifestation of "the fundamental divergence between the private and the social motive to use the legal system" (Shavell 1997; cf. Shavell 1982b; Kraakman et al. 1994). The social welfare role of corporate litigation is to deter inefficient board actions. That is, the social role of litigation is to set the right incentives. But the private motive to sue is to recover money. That is, the private motive is distributional. The two will rarely if ever exactly coincide. In particular, private individuals do not internalize the benefit of improved deterrence from bringing suit. At the same time, at least under the American rule for costs, they also do not internalize the costs to the other party and the court. Consequently, private individuals may bring too few or too many suits.

In fact, to get any suits at all, it might be necessary to accompany tailored liability rules with tailored fee rules. In the US, liability would commonly be enforced in a derivative action brought by a plaintiff law firm in the name of a

²⁵In *re The Walt Disney Company Derivative Litigation*, 906 A.2d 27, 35 (Del. 2006).

nominal shareholder plaintiff. The plaintiff lawyers hope to be rewarded with attorney fees if they win a favorable settlement or if they win at trial. Delaware courts are certainly ready to award high attorney fees.²⁶ Under the default common fund doctrine, however, such awards come out of the amount recovered from the defendants. If liability is only partial, such amount may be low. To provide proper incentives, high fee awards might thus have to be promised and paid directly by the corporation. At the same time, it would be imperative to ensure that such awards can only be paid if the defendant directors or officers also make a payment. If settlements imposed payments only on the corporation, as they now tend to do, then they would obviously not create good incentives for directors and officers, except perhaps through reputational channels (cf. Coffee 1985; Romano 1991).²⁷

3.2 The (Low) Added Benefit of Liability Incentives

3.2.1 The (Low) Precision of Judicial Evaluations

While the costs of obtaining the judicial signal are thus likely to be high, its quality is likely to be low. Commentators such as Fischel (1985) and the courts themselves have long emphasized that “judges are not business experts” (*Dodge v. Ford*, 170 Nw. 668, 684 (Mich. 1919)), without, however, clearly articulating why judges are worse at business than, e.g., medicine (e.g., Bainbridge 2002).

As before, it is important to keep in mind that courts always make mistakes. Judges may not understand business, but presumably they do not understand medicine and other fields either. They judge managers in hindsight, but they also judge doctors and other professionals in hindsight (Rachlinski 1998). From this perspective, they are prone to misjudge decisions of doctors and others just as much as those of managers. In particular, hindsight bias – the fallacy of overestimating a risk just because the risk did materialize – will affect any negligence suit.

There appears to be a difference, however, in the degree of standardization. Business decisions seem more idiosyncratic than the vast majority of, e.g., medical decisions.²⁸ This is particularly true for the largest businesses – there are

²⁶See, e.g., the award of \$304 million in attorneys’ fees in *Americas Mining Corp. v. Theriault* (Del. 2012).

²⁷It might still be the case, however, that the existing litigation has beneficial incentive effects if and because the *threat* of litigation generates the good incentives, and going through litigation is necessary to verify that the defendants behaved correctly, which they do in equilibrium. At least in the related area of securities class actions, however, Klausner (2009) shows that defendant officers do not make payments into the settlement even when they are held liable in parallel SEC enforcement actions, i.e., when there is a strong inference of actual wrongdoing on their part.

²⁸Cf. Bayless Manning’s statement (Conference Panel Discussion 1984, 649): “The fundamental reason these concepts [of liability] work in other areas-let us take the example of the surgeon, just mentioned-is that we have a general common way of assessing, describing the accepted notion of what the surgeon is supposed to do, and how he is supposed to act in a particular instance. We also have tools-such as testimony of other surgeons and literature-to tell us what they’re supposed to do. But in the case of corporate directors, both of these elements are missing. We have no accepted notions of what directors do as a flow of process,

not many companies facing the same strategic choices as, say, Google. And even if there are hundreds doing the same thing (e.g., an acquisition), there are usually thousands doing something else, and the reasons for doing one or the other are at best poorly understood. More to the point, the reasons are not understood in the abstract, but believed to be partially accessible to decision-makers on the ground (usually after very extensive preparation), which may not be easily communicated in court. In part, this is because much success in business requires innovation, for which by definition there is no suitable comparison. As a consequence, business expert witnesses cannot support judicial evaluations nearly as well as medical expert witnesses.

3.2.2 The (High) Precision of Stock Prices

The value of an additional signal depends on the quality of the existing signal. If the incentive scheme already conditions on high quality information, the remaining agency problem and hence the benefit of conditioning on additional information is small (cf. the formula in appendix section C).

For publicly traded corporations, the stock price provides a relatively good signal of the quality of board's and managers' decisions (Fischel and Bradley 1986, 267-8). This information is free from the perspective of incentive design, however many resources the stock market may consume.

To be sure, the stock price is not perfect, and a large literature explores possible problems with existing stock-based incentive pay (Murphy 2013). Among other things, the stock price is subject to manipulation and random fluctuations, both idiosyncratic and systematic (e.g., Hamdani and Kraakman 2007, sec. I). As shown above, liability would improve upon standard incentive pay. However, liability's marginal benefit is much reduced once stock prices are available.

3.2.3 Alternative Governance Mechanisms

Equity-based pay is just one of several mechanisms that bind boards to shareholders. The most important other mechanisms are engagement, elections, and takeovers, assisted by devices such as auditors and disclosure. In particular, these governance mechanisms are potent tools to avert harm from long-term decisions, such as the refusal to sell the firm, divest a division, or expand into a new line of business. Shareholders can lobby management or displace it in an election. The problem of corporate shareholders is thus very different from, say, the potential victim of reckless driving.

The argument is subject to important limitations. Shareholders have great difficulties exercising their power due to collective action problems and a serious information disadvantage. Shareholders have less information than the board and hence cannot judge in real time whether managers are doing the right thing. Even if the information becomes public eventually, it may be too late

or what they should do in a particular instance. Our current law says, in substance, 'we do not know what directors are supposed to do-but by George, they are supposed to do it carefully!'"

for shareholders to intervene. Directors and managers may suffer a reputational penalty, but that penalty may be insufficient deterrence.

4 Exceptions: Where Liability’s Benefits May Outweigh Its Costs

In certain settings, the costs are lower or the benefits larger. Liability may become desirable where other governance mechanisms are weaker, particularly if stock prices or other reliable public signals are not available; where courts have superior insight; or as the agency conflict becomes more severe.

4.1 Worse Governance Alternatives

Many entities face a larger governance gap than publicly traded corporations. Private corporations cannot use the stock price as a signal of board action. Governance devices such as elections are lacking in many non-corporate entities like foundations or trusts. Even in closely-held corporations, such governance mechanisms are *de facto* lacking; in particular, minority stockholders cannot oust an incompetent board. The larger the remaining agency problem, however, the larger the potential benefit of liability.

Externalities on non-corporate constituencies represent an extreme case of worse governance: no governance. Naturally, one cannot rely on equity-based performance incentives to induce socially optimal behavior if the stock price does not incorporate all elements of social welfare. This happens if the corporation generates externalities, i.e., if rules protecting other constituencies, including contracts, do not force the corporation to internalize all of its effects on these constituencies, perhaps because equity is protected by limited liability (cf. Hansmann and Kraakman 1992). This may explain liability of executives to non-corporate plaintiffs for environmental harm, and undergirds proposals for extensions of liability to shareholders (as private attorney-generals) in other areas such as bank risk-taking (Armour and Gordon 2014). At the same time, the mere presence of negative externalities is only the beginning of an argument for liability. The full analysis requires a cost-benefit analysis given alternative incentive mechanisms. For example, bank risk-taking might also be addressed by tweaking executive compensation (Bebchuk and Spamann 2010). The framework of this article also suggests that the optimal liability is unlikely to be full liability, and that it may be zero when court signals get too noisy, as might be the case for questions such as whether bank managers took excessive risks.

4.2 More Severe Conflicts of Interest

The stronger the conflict of interest – the more personal interests directors and managers have at stake –, the larger will be the (residual) agency conflict, and hence the more attractive liability becomes (cf. Fischel and Bradley 1986, 270). This paper emphasized that conflicts of interest about effort, risk choice, etc.

are an unavoidable part of any principal-agent relationship. But some conflicts of interests are worse than others, in particular those that the law labels as such. At least in rough form, existing law tracks this argument.

Most importantly, Delaware courts already review “conflicted transactions” under the duty of loyalty and its very stringent “entire fairness” standard, which makes it a very real liability threat.²⁹ Conflicted transactions are mostly, but not exclusively, those involving a direct financial conflict of interest.³⁰ Moreover, Delaware courts recognize an “enhanced duty” and an intermediate standard of review in takeover cases, where the directors and managers stand to lose their positions.³¹ Arguably, Delaware courts implicitly differentiate even further (cf. Smith 2015). In particular, recent decisions of the Delaware Chancery Court have viewed boards’ choices “more skeptically ... where undisclosed conflicts of interest exist,” even if those conflicts did not give rise to a duty of loyalty claim.³² Such a gradual approach is congenial to this paper’s analysis, which emphasizes that there is merely a difference in degree between the situations that the law calls “conflicted” and all or most other decisions of directors and managers.

Nominally, Delaware law deviates from this paper’s analysis in that liability for breach of the duty of loyalty is always full liability. In practice, however, Delaware courts have considerable leeway in their determination of damages or the related concept of “fair price.” For example, *In re Trados* (73 A.3d 17 (Del Ch 2013)) could deny liability by entirely omitting the common stock’s option value from the calculation of its “fair price.” It remains to be seen if the courts use this flexibility to arrive at partial liability *sub rosa*.

4.3 Better Judicial Determinations

The better the courts ability to assess directors’ and managers’ actions, the stronger the case for liability. This may be the rationale for certain exceptions to the BJR.

4.3.1 Process

Implicit in the legal doctrine seems to be the belief that courts are better at evaluating the process than the substance of a decision. Plaintiffs can over-

²⁹In theory, one might want to distinguish violations of the duty of loyalty not by the extent of the conflict but by the state of mind of the offender (“bad faith” etc.). But the state of mind is rarely observable, so that the distinction is blurry at best in practice. Cf. *Allen v. Encore Energy Partners, L.P.*, 72 A.3d 93, 106-7 (2013): “Despite their expertise, the members of the Court of Chancery cannot peer into the ‘hearts and souls of directors’ to determine their subjective intent with certainty. ... Therefore, objective factors may inform an analysis of a defendant’s subjective belief” (internal footnotes omitted).

³⁰For an example not involving a direct financial conflict, cf. the discussion of Davis in footnote 23 above.

³¹See *Unocal Corp. v. Mesa Petroleum Co.*, 493 A. 2d 946, 970 (Del 1985). Takeovers also deserve special attention under the preceding section’s perspective: Takeovers are endgame scenarios in which many of the usual governance mechanisms such as elections lose their force.

³²See *In re Rural Metro Shareholders Litigation (I)*, 88 A.3d 54, 91 (Del Ch 2014).

come the BJR by showing that defendant directors or officers did not “inform themselves, prior to making a business decision, of all material information reasonably available to them” (*Aronson v. Lewis*, 473 A.2d 805, 812 (Del 1984)). At the same time, courts disclaim any interference in the decision’s substance. In the words of the Delaware Supreme Court, “[d]ue care in the decisionmaking context is *process* due care only.”³³

Well-established though this doctrine is, it is far from clear that courts are actually better at evaluating process. It is exceedingly difficult to reconstruct a decision-making context with all its conflicting demands on directors’ and managers’ time and attention. Of the countless bits of information that directors and managers receive, which ones should they question? When can they rely on prior knowledge and/or intuition, and when must they investigate further? What may seem like a careless shortcut in hindsight may have been the only reasonable way of simultaneously handling many tasks that at the time seemed equally important (e.g., Fischel 1985). Moreover, scrutinizing process multiplies the chances of erroneous liability because each of process’s many elements can form the basis for liability (cf. Spamann 2004, sect. V.B).

To be sure, certain elements of process appear standardized, which would facilitate judicial review (cf. section 3.2.1 above). For example, target boards solicit investment bankers’ fairness opinions as a matter of course, and not doing so might be considered grounds for liability. On closer examination, however, this argument is circular, and the erection of standardized information protocols may be exactly the sort of misjudgment that the BJR is supposed to protect against. The problem is that the standardized behavior may have emerged only because the courts required it, or appeared to require it. Fairness opinions are a prime example (cf. Fischel 1985, 1453) and the laughing stock of many commentators (cf. Bebchuk and Kahan 1989).

Another problem with process liability is that it leads to full liability (as in *Smith*). The analysis of this paper generally leads at most to partial liability. As stated already in the paper’s introduction, ruinous full liability is generally counterproductive. The sole exception may be extreme cases, as discussed in 4.3.3 below. Process liability thus conforms with this paper’s analysis only if in practice courts use the applicable gross negligence standard of review to restrict liability to extreme cases. *Smith* did not do so, but more recent decisions may.³⁴

4.3.2 Standardized Behavior: Oversight Liability?

In general, standardized actions, if they exist, would be more suitable for judicial evaluation (cf. section 3.2.1 above). For example, it seems that all companies of a certain size need standard monitoring mechanisms like accounting, controlling, monitoring, and compliance. This would provide a rationale for stricter “oversight liability” standards, as discussed in *Caremark* and many follow-up de-

³³ *Brehm v. Eisner*, 746 A.2d 244, 264 (Del 2000) (emphasis in the original).

³⁴ For example, *In re The Walt Disney Company Derivative Litigation*, 906 A.2d 27 (Del. 2006).

cisions.³⁵ That being said, it may be the case that the details of the appropriate monitoring mechanisms vary from firm to firm, such that only the total absence of any monitoring mechanism would be a reliable signal of board error. This is indeed the position of the Delaware Supreme Court.³⁶

4.3.3 “Egregious” Cases

Finally, courts may be able to spot misbehavior in extreme cases. At least in theory, the law recognizes that “in rare cases a transaction may be so egregious on its face that board approval cannot meet the test of business judgment, and a substantial likelihood of director liability therefore exists” (*Aronson v. Lewis*, 473 A.2d 805, 815 (Del 1984)). It is conceivable that a particular constellation of evidence cannot possibly arise if the board or managers act loyally, or at least that its likelihood is vanishingly lower than in the case of disloyal behavior. If this were so, it would not only be optimal to impose liability, but to impose extreme liability (cf. Mirrlees 1975). The reason is that such liability would strongly deter disloyalty while having no (perceptible) effect on loyal agents.

That being said, courts may also err in their perception of what evidence may or may not arise from loyal behavior. In particular, it would be dangerous to treat any expression of self-interest as proof of disloyal behavior. Such self-interest is assumed to be ubiquitous not only by economic theory but also existing incentive compensation arrangements. Explicit admissions of self-interest are thus more a sign of unusual rhetorical imprudence than unusually selfish behavior.

³⁵In *In re Caremark International Inc. Derivative Litigation*, 698 A.2d 959, 970 (Del. Ch. 1996), then-Chancellor Allen opined that “it would ... be a mistake to conclude ... that corporate boards may satisfy their obligation to be reasonably informed concerning the corporation, without assuring themselves that information and reporting systems exist in the organization that are reasonably designed to provide to senior management and to the board itself timely, accurate information sufficient to allow management and the board, each within its scope, to reach informed judgments concerning both the corporation’s compliance with law and its business performance.”

³⁶*Stone v. Ritter*, 911 A.2d 362, 370 (Del 2006) clarified “the necessary conditions predicate for director oversight liability: (a) the directors utterly failed to implement any reporting or information system or controls; or (b) having implemented such a system or controls, consciously failed to monitor or oversee its operations thus disabling themselves from being informed of risks or problems requiring their attention. In either case, imposition of liability requires a showing that the directors knew that they were not discharging their fiduciary obligations.” After *Stone*, it seems doubtful that the Delaware courts would be more inclined to find liability for the absence of a particular monitoring mechanism than for any other board failure.

In any event, the mere framing of an action as “oversight” does not make it standardized. For example, Citigroup’s board’s failure to detect problems in the bank’s subprime business before the financial crisis of 2007/08 was not a deviation from a standard template. While shareholder plaintiffs portrayed this event as a failure of “oversight,” it is precisely the sort of activity without a playbook that courts are ill-suited to evaluate ex post (but see Armour and Gordon 2014, footnote 51, for a different view). The Delaware Chancery Court thus properly resisted plaintiffs’ attempts to judge it more strictly than other board actions. *In re Citigroup Inc Shareholder Derivative Litigation*, 964 A 2d 106 (Del Ch 2009).

4.3.4 Specialized Judges, Intensive Fact-Finding

The details of all of the foregoing depend on the quality of the courts. The better the courts are at evaluating business decisions, the higher the benefit from judicial intervention.³⁷ In particular, bench trials in a highly specialized and highly qualified court like the Delaware Chancery Court would be much more useful than litigation in a generalist, less qualified court and especially a jury trial. In other words, if liability determinations are not desirable in Delaware, then they are surely not desirable elsewhere, everything else being equal.

Relative to non-American courts, Delaware courts are also distinguished by the very extensive discovery available to the parties (cf. Gorga and Halberstam 2014). Unlike court specialization and quality, however, discovery's effect on liability's cost-benefit tradeoff is ambiguous. On the one hand, discovery increases the amount of raw information available, which reduces noise and thus increases the benefit of litigation. On the other hand, discovery is very costly both in monetary terms and in executives' time.

5 Conclusion

Using standard models from contract theory, this paper has shown that incorporating judicial evaluations of their actions would in principle improve the incentives of corporate directors and managers. That is, if litigation were costless, it would be optimal to expose directors and managers to (limited) liability risk. In particular, such liability could be tailored and combined with incentive pay to encourage, not deter, efficient risk-taking even by risk-averse directors and managers. In reality, litigation is not costless. Moreover, the beneficial incentive effect from litigation, while real, may be small. Courts have difficulty evaluating business decisions, and equity pay and other governance mechanisms already do a reasonable job at controlling agency cost. A cost-benefit analysis therefore tends to disfavor liability. This rationale, however, also suggests that liability might be useful in worse-governed entities, for more standardized decisions, and in situations where the conflict of interest is larger. Existing law tracks some but not all of those exceptions from non-liability, and may overshoot with full liability where it does. The argument against liability is contingent and subtle.

³⁷Cf. Black and Kraakman's (1996, 1973) discussion of the optimal corporate law for Russia during its 1990s transition: "[W]e close off the narrow American recklessness/gross negligence exception to the business judgment rule because we have no confidence that Russian courts can decide when conduct is sufficiently outrageous to warrant imposing (often ruinous) personal liability on directors."

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Appendix: Formal Model

This appendix analyzes the effects of liability formally. The model is a translation of Holmström (1979) and Holmström & Milgrom (1991), whose proofs will be referred to extensively. The model rigorously establishes that judicial evaluations can improve incentives regardless of their noisiness or even bias under fairly general conditions. This result continues to hold when judicial evaluations are used only in a liability scheme, i.e., if judges only intervene after low stock returns etc. and impose liability discontinuously around a negligence threshold. Other refinements considered in the main text (especially section 2.3) are omitted for brevity's sake. To facilitate understanding, most of the exposition focuses on a special parametric case in which the benefits of judicial evaluations can be explicitly calculated, but this parametrization is not necessary for the main results. The model's references to “manager” and “shareholders” could be replaced by “directors” and “stakeholders.”

A The model

A.1 Basic setup

Shareholders entrust a manager to choose an action $a \in A \subseteq \Re_+$ that affects expected firm value $V(a)$: higher a increases V but also the personal cost $C(a)$ to the manager. The action a is not publicly observed, so the contract cannot condition on the action itself. There is, however, a public signal $s = S(a) + \epsilon$, where ϵ is a disturbance term as explained in subsections A.2 and A.3 below. The manager receives a contractual payment $p(s)$. Embodying standard assumptions of decreasing returns, S and V are concave and C is strictly convex. An important feature of the model is that there may be multiple actions as well as signals and corresponding noise terms, i.e., a , s , and ϵ may be vector-valued. It is presumed that it is not efficient for the manager to buy out the shareholders, which would eliminate the contracting problem, either because the manager is risk averse or because the manager does not have sufficient wealth.

This formulation is very general. The signal s could be the stock price (such that $S(a) = V(a)$), but it could also be information from an audit etc. The payment p could be equity-based incentive pay, but it could also be a damage payment that the manager must make under the contract (in which case p could be negative). The action a could be effort, such as time spent planning an acquisition or talking to the auditors. But a could also be a parameter indexing project choice, particularly risk (or safety, for that matter). For example, one interpretation of the model is that the manager would like to take less risk a than the level that maximizes firm value, perhaps because the manager is afraid of the personal reputational consequences in case the firm fails.

The model does not assume that more is always better, or that the manager and the shareholders are always in conflict. For example, if a represents risk choice, the manager herself might wish to take *some* risk, but less than the value-

maximizing amount. In that case, the shareholders' problem is to motivate the manager to take more risk; they need not worry that the manager takes less risk or overshoots beyond the value-maximizing risk. The model captures this scenario by letting $A = [0, \arg \max_a V(a)]$ after normalizing the manager's preferred risk to zero.

A.2 Exogenous noise with a risk-averse manager

One practically relevant interpretation of the model thus far, and the standard one in the literature, is that ϵ is an exogenous noise term. That is, for technological reasons, $S(a)$ cannot be observed without error. For example, if s is the stock price, it is a function not only of the manager's action but also of circumstances beyond the manager's control.

Holmström (1979) derives the main results in section C in the general setting described up to here. It greatly facilitates the exposition, however, to make more specific assumptions about the utility function and the noise distribution. Concretely, the model will assume that the noise ϵ is normally distributed with variance Σ and that the manager's utility function is of the Constant Absolute Risk Aversion (CARA) type with risk aversion parameter r .³⁸ Under these assumptions, the best possible contract is the simple linear contract $p(s) = \alpha s + \beta$ (Holmström & Milgrom 1987),³⁹ and the "certainty equivalent" form of the manager's utility is then simply $CE = \alpha S(a) + \beta - C(a) - \frac{r}{2} \alpha' \Sigma \alpha$.⁴⁰

The manager will choose a to maximize CE . Ignoring corner solutions, a is determined by the first-order condition $\alpha S'(a) - C'(a) = 0$.⁴¹ Since β can be used to redistribute joint surplus costlessly, any Pareto-optimal contract must maximize joint surplus subject to the manager's endogenous choice of a , i.e.,

$$\begin{aligned} \max_{\alpha} \quad & V(a) - C(a) - \frac{r}{2} \alpha' \Sigma \alpha \\ \text{s.t.} \quad & \alpha S'(a) - C'(a) = 0. \end{aligned}$$

Two important features of this formulation deserve emphasis. First, the linearity of the contract is not imposed as an artificial restriction but arises endogenously as the optimal incentive scheme given the other assumptions of the model. That is, the deck is not stacked in favor of court intervention by artificially restricting the form of other incentives. Second, the transfer payment β addresses the concern that a manager may not be willing to serve under a certain incentive scheme, in particular a high liability risk. That is, β will be

³⁸Formally, the manager's utility is assumed to be $-\exp\{-r[w_0 + p(s) - C(a)]\}$, where w_0 is the manager's outside (initial) wealth.

³⁹Technically, a further assumption required for this result is that a is not literally a one-off choice but the summary of a sequence of actions taken over time. This is realistic.

⁴⁰The first two terms are the expected contractual payments from choosing a , the third term is the personal cost of choosing a , and the last term is the disutility of bearing risk, which rises with payment-performance sensitivity α .

⁴¹The first-order condition is necessary and because of concavity also sufficient for a putative solution $a \in A$.

set to compensate the manager ex ante for any liability risk etc. she may have to bear ex post.

A.3 Alternative interpretation: Endogenous manipulation

An alternative interpretation of the model setup is that the manager manipulates the signal by choosing ϵ (cf. Stein 1989).⁴² Manipulation is an unproductive activity that nevertheless improves the manager's payoff by affecting the outcome measure. In this case, the manager can be risk neutral with utility simply equal to $p(s) - C(a)$.

Concretely, let $\epsilon = \Sigma^{\frac{1}{2}}m$, where m is (possibly vector-valued) manipulation that the manager implements at personal cost $\frac{m'm}{2r}$, where $\Sigma^{\frac{1}{2}} \geq 0$ is the effectiveness of the manipulation and $1/r > 0$ its "price." Faced with a linear incentive contract $p(s) = \alpha's + \beta$, the manager will choose m to maximize $\alpha'\Sigma^{\frac{1}{2}}m - \frac{m'm}{2r}$, i.e., she will choose $m = r\Sigma^{\frac{1}{2}}\alpha$ at a cost $\frac{r}{2}\alpha'\Sigma\alpha$. Of course, in equilibrium nobody is fooled, and the contract will anticipate the manipulation. As long as the manager cannot commit not to manipulate, however, she will because doing so is ex post optimal. The result is that the shareholders and the manager collectively sustain a deadweight loss equal to the manipulation cost $\frac{r}{2}\alpha'\Sigma\alpha$. Assume for now that this cost is borne by the manager, which is without loss of generality because β will be set to redistribute as necessary. Netting out anticipated manipulation, one can again write $CE = \alpha S(a) + \beta - C(a) - \frac{r}{2}\alpha'\Sigma\alpha$, and proceed as before.

B Benchmark: No Judicial Evaluation (single action)

As a benchmark, consider the standard principal-agent model where the manager chooses only one action (usually effort) generating only one signal (usually the stock price). Assume that V and C are such that the optimal a^* is positive, as in all practically relevant settings.

A standard, particularly convenient parametrization of such a problem is $V(a) = va$, $S(a) = a$ and $C(a) = \frac{c}{2}a^2$, where $v, c > 0$.⁴³ In that case, the well-known, straightforward solution to the constrained maximization problem is

$$\bar{a} = \frac{v}{1 + cr\Sigma}.$$

Optimal performance incentives $\bar{a}$ increase in the action's value-relevance v (which could be firm size) and decrease in action cost c , risk-aversion r , and noise Σ .

⁴²This possibility is alluded to, but not spelled out, in Holmström & Milgrom (1991, n. 7).

⁴³Scaling V but not S by the parameter v captures the idea that the manager's actions have greater value implications in large firms, even though stock returns remain equally informative (because the noise also scales with firm size). An alternative reading of this parametrization is simply that some firms have more informative signals relative to the value impact than others.

C Gains from Judicial Evaluations (single action)

This section shows that adding a second signal, here interpreted to be a judicial evaluation, always improves incentives. As repeatedly mentioned, Holmström (1979) shows that using all signals is optimal under very general conditions. For illustrative purposes, however, consider a simple extension of the preceding parametrization with two signals instead of one. Let s_1 be the stock price, as before, and s_2 a judicial determination of a . Initially, the model will counterfactually assume that court signals can and will be (optimally) used just as any other signal. Later remarks consider realistic liability rules.

Now α , s , S , and ϵ are vectors of length 2, and Σ is a 2x2 matrix. Everything else is as before, including $s = S(a) + \epsilon = \begin{pmatrix} a & a \end{pmatrix}' + \epsilon$. Denote the elements of vectors and matrices by subscripts (e.g., the first and second elements of α are α_1 and α_2 , and the variances and covariance are Σ_{11} , Σ_{22} , and Σ_{12} , respectively). Then the problem becomes

$$\begin{aligned} \max_{\alpha, a \in A} \quad & va - \frac{c}{2}a^2 - \frac{r}{2}\alpha'\Sigma\alpha \\ \text{s.t.} \quad & \alpha_1 + \alpha_2 - ca = 0. \end{aligned}$$

Continuing to assume that $a^* > 0$, the optimum is characterized by the first-order conditions, which can be combined to yield

$$\frac{\alpha_1^*}{\alpha_2^*} = \frac{\Sigma_{22} - \Sigma_{12}}{\Sigma_{11} - \Sigma_{12}}.$$

That is, the optimal ratio of the pay sensitivities to the two signals is the inverse of their noises' variances, with adjustments for the covariance between the two. It immediately follows that the optimal incentive scheme uses any signal with finite variance (informativeness principle), which surely includes judicial evaluations.⁴⁴

Focusing on uncorrelated signals for simplicity and rearranging the first-order conditions, the optimal sensitivity for signal $i \in \{1, 2\}$ and $j \neq i$ is

$$\alpha_i^* = \frac{v}{1 + cr\Sigma_{ii} + \frac{\Sigma_{ii}}{\Sigma_{jj}}} \leq \bar{\alpha}.$$

This is the same as in the single-signal case, but with an extra term in the denominator, namely the ratio of the signal's variances. Consequently, the sensitivity to any single signal decreases with the precision of the other signal, and is strictly less than if the signal were used on its own (again excepting

⁴⁴This remains true even if the noise terms are perfectly correlated, unless they also have equal variance. As long as the variance differs, the two signals and their signal-to-noise ratios are different, and putting negative weight on the more noisy one offsets some of the noise in the less noisy one. This insurance effect and hence the negative weight is actually stronger with more correlated signals. As an exception to the general rule, the weight on the more noisy signal becomes zero when the covariance exactly equals the variance of the less noisy signal.

the case of infinite variance of the other “signal”). Equity pay thus optimally becomes less risky when liability is available. The more precise the judicial evaluations, the more the equity incentives are attenuated. Inversely, the less noisy is the stock price as a signal of the manager’s actions, the less the judicial evaluation should impact the manager’s payoffs.

To calculate the benefit of judicial evaluations, one can exploit the fact that having only a single signal is the same as having a second signal with infinite variance (where α_2 would consequently be zero). Using the envelope theorem, the benefit of a second signal with finite variance Σ_{22} is therefore equal to

$$\begin{aligned} & \int_{-\infty}^{\Sigma_{22}} \frac{d \max_{\alpha} v a(\alpha) - \frac{c}{2} a(\alpha)^2 - \frac{r}{2} \alpha' \hat{\Sigma} \alpha}{d \hat{\Sigma}_{22}} d \hat{\Sigma}_{22} \\ &= \int_{-\infty}^{\Sigma_{22}} -\frac{r}{2} (\alpha_2^*)^2 d \hat{\Sigma}_{22} \\ &= \frac{v^2}{2 \left(c + \frac{1}{r \Sigma_{11}} \right) \left(\frac{1}{r} + c \Sigma_{22} + \frac{\Sigma_{22}}{r \Sigma_{11}} \right)} . \end{aligned}$$

The benefit of the judicial evaluation is decreasing in judicial error Σ_{22} and the manager’s action cost c , and increasing in the variability of stock returns beyond the manager’s control (Σ_{11}), the value impact of the manager’s action v , and the contracting difficulty r (i.e., the agent’s risk-aversion or the ease of manipulation, depending on the interpretation). While the details of the benefit formula depend on the parametrization of the problem, the qualitative result presumably holds in the general model as well.

Remarks on the realism of the model

- A critical feature of the environment modelled here is that the sensitivity to the signal can be adjusted to its precision (i.e., the inverse of its variance). If judicial evaluations could only be used to impose, say, massive damages, then the proof above and the refinements below would not hold. It is critical that liability can be partial.
- Legal liability is often not continuous in the signal, but discontinuous at a threshold, particularly negligence. As Holmström (1979, 86) shows in a much more general setting, such discontinuous use of the second signal is still valuable. Intuitively, improved incentives are provided by the differential probability of falling into the liability region of the signal; these improved incentives then allow reducing sensitivity to the first signal.
- Another characteristic feature of legal liability is that usually the second signal is only sought - that is, litigation only occurs - if the first signal is sufficiently damning - e.g., the stock price drops. Again Holmström (1979, 87) shows in a much more general setting that the second signal remains valuable, and in fact that this selective use of the second signal may be optimal if generating it is costly.
- Recall that one interpretation of the model is that the manager can manipulate the performance signals in ways that are filtered out in equilibrium

but costly. In particular, the manager might engage in costly “window-dressing,” for example by soliciting costly reports to support a decision that has already been made (and courts then expect such reports, for only a deviant manager would not be able to procure them). The result here shows that the judicial evaluation should be used even if it is subject to such manipulation.

D More on Manipulation and Risk-Taking (multiple actions)

A more serious type of “manipulation” is that to avoid liability, the manager will substitute activity away from a dimension that is not observed by the court to one that is. For example, the manager might sacrifice some high-level planning in favor of more meticulous execution if and because courts only scrutinize the latter.

In general, such concerns can lead to the recommendation that incentives not be used at all in multi-dimensional agency problems (Holmström & Milgrom 1991). As explained in section 2.3.4 of the main text, however, the availability of the stock price signal insulates corporate governance from this issue.

To see this formally, consider the canonical corporate governance problem in which the manager takes two actions, say e for effort and π for project choice. The two actions generate expected firm value $f(\pi; e)$ at cost to the manager of $g(\pi; e)$. f is strictly increasing and concave, and g is strictly increasing and convex. The problem for incentivizing both actions might be that one of the two actions, say project choice π , is not separately observable, in particular not by a court. We can reformulate the problem in terms of the two observable (with noise) “actions” e and $\phi \equiv f(\pi; e)$, however, such that $a = (e \ \phi)'$ and $V(a) = \phi$. In other words, rather than considering incentives predicated on the unobservable project choice π , we consider incentives based on $S(a) = (e \ \phi)' = a$. As long as $f(\pi; e)$ is strictly increasing in its first argument, $f(\pi; e)$ is invertible with respect to its first argument for any given e , and the cost function of the reformulated problem $C(a) = g(f^{-1}(\phi; e); e)$ can be shown to be again strictly convex in a . Assuming that effort is important, both elements of a will be positive at the optimum. Under these conditions, Holmström & Milgrom (1991,32) show that the optimal contract has

$$\begin{aligned} \alpha &= (I + rC_{aa}\Sigma)^{-1} V' \\ &= (I + rC_{aa}\Sigma)^{-1} \begin{pmatrix} 0 \\ 1 \end{pmatrix}, \end{aligned}$$

where C_{aa} denotes the Hessian matrix of C , i.e., the matrix of second derivatives of C , with respect to a . That is, the optimal incentive scheme puts weight on both firm value (stock price) and the direct signal of effort, such as might be generated in litigation. Even though one “ingredient” of the manager’s “pro-

duction function” is not observed, the optimal incentive scheme does condition on the ingredient that is observed, together with the overall outcome.

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