

Order with Some Law: Combining Formal and Informal Sanctions to Induce Cooperation

Scott Baker and Albert Choi¹

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Abstract

This paper examines the interaction between legal and reputational sanctions in the design of an optimal deterrence regime, particularly in a setting where two parties are engaged in a long-term relationship (a “relational contract” setting). The paper makes three claims. First, both legal and reputational sanctions are costly: legal sanctions require spending resources on litigation while reputational sanctions lead to inefficient failures to trade. An optimal deterrence regime must make a trade-off between these two types of costs. Second, in achieving optimal deterrence, the two sanctions function as both substitutes and complements. As substitutes, relying more on one type of sanction requires less of the other in reaching any desired level of deterrence. As complements, legal sanctions, through generation of relevant information, can facilitate reputational sanctions. Especially when fault-based standards (such as “best efforts,” “commercially reasonable efforts,” or “good faith”) are used, so long as the court’s decision produces information that correlates with the underlying behavior, the parties can use that information to better tailor reputational sanctions and improve efficiency. Third, notwithstanding the multi-layered relationship, the paper shows that legal sanctions can be more effective at deterrence than reputational sanctions. Increasing damages produces additional deterrence through two channels: by inducing more plaintiffs to file suit and by granting a larger recovery to existing plaintiffs. Increasing reputational sanctions lacks the second, infra-marginal effect. The paper also applies the predictions from the theory to various empirical findings, and considers how courts might use the findings to aid in interpreting phrases like “best efforts” and “good faith.”

¹ Professor of Law, Washington University in St. Louis School of Law, and Albert C. BeVier Research Professor of Law, University of Virginia School of Law, respectively. We would like to thank... Comments are welcome to sbaker@wulaw.wustl.edu and albert.choi@virginia.edu.

Introduction

How do we get contracting parties to do what they promised to do or deter them from engaging in undesirable behavior?² The literature has primarily focused on two different mechanisms. First, a party failing to meet its promises might have to pay damages, a formal or legal sanction. Second, the reneging party might suffer a loss of future business, an informal or reputational sanction. For the most part, the analysis of these two sanctions has proceeded independently. In searching for the efficient damage remedy, for example, contract scholars viewed the remedy as the only instrument influencing the behavior of the parties, setting reputational consequences to one side for convenience. In studying reputational sanctions, scholars look for places where the parties opt out of the legal regime altogether.³

In reality, for most transactions both formal and informal sanctions are in play. The vendor that cheats his long-time distributor runs the risk of a lawsuit and also the risk that the relationship will not continue. Consumers who buy cars with defective brakes can file lawsuits. At the same time, markets react as consumers learn about the defective automobile and buy from other, competing manufacturers. The puzzle—and the focus of this article—is why formal and informal sanctions often co-exist and how they interact with each other.⁴ At least in theory, either type of sanction might be sufficient to prevent, or equally effective in preventing, misbehavior. The work of Gary Becker, for example, teaches that the legal system can achieve deterrence through sufficiently high damages.⁵ Work by Robert Ellickson demonstrates that sometimes reputational sanctions alone can induce desirable behavior.⁶

The paper presents a framework for understanding the relationship between the two types of sanctions. The paper makes three points. First, both legal and reputational sanctions are costly and the optimal regime must trade off one cost with another. Legal sanctions require spending resources, including time, money, and opportunity cost, on litigation. Reputational

² Using a formal model, we develop many of the same themes in a technical article designed for economists. See Scott Baker & Albert Choi, *Managing Reputation with Litigation: Why Legal Sanctions Can Work Better than Market Sanctions*, Virginia Law and Economics Research Paper No. 2013-02, Washington University in St. Louis Legal Studies Research Paper No. 13-03-01.

³ The places are surprising and interesting. See Robert Ellickson, *Order Without Law: How Neighbors Settle Disputes* (1991) (Ranchers in Shasta County) (hereafter *Order*); Robert Ellickson, *A Hypothesis of Wealth Maximizing Norms: Evidence from the Whaling Industry*, 5 *J. Law, Econ. & Org.* 83, 94 (1989) (Whalers in New England); Lisa Bernstein, *Opting Out of the Legal System: Extra Legal Contractual Relations in the Diamond Industry*, 21 *J. Leg. Stud.* 115 (1992) (diamond merchants in New York); Barack D. Richman, *How Communities Create Economic Advantage: Jewish Diamond Merchants in New York*, 31 *Law & Social Inquiry* 383 (2006) (same); Lisa Bernstein, *Private Commercial Law in the Cotton Industry: Creating Cooperation Through Rules, Norms, and Institutions*, 99 *Mich. L. Rev.* 1724 (2001) (buyers and sellers in the cotton industry).

⁴ This is not the first study to examine how formal and informal sanctions can co-exist. Recently, Gilson, Sabel, and Scott have examined how two commercial contracting parties can “braid” formal and informal mechanisms to achieve desirable outcomes. Gilson, et. al. *Braiding: The Interaction of Formal and Informal Contracting in Theory, Practice, and Doctrine*, 110 *Colum. L. Rev.* 1377 (2010). Our objective is to formalize this interaction using repeated game theory and to examine other areas where both types of sanctions are in play, such as consumer contracts. This is also the first paper to highlight the importance of “infra-marginal” effect of legal sanctions and the implications of the interaction for the interpretation of best efforts and good faith.

⁵ Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 *J. Pol. Econ.* 169 (1968).

⁶ Ellickson, *Order*, supra note ____.

sanctions, on the other hand, involve failures or refusal to trade even when trade may be beneficial to the parties. Second, the two types of sanctions function as both substitutes and complements. In reaching a desired level of deterrence, relying more on legal sanctions requires less of the reputational sanctions, and vice versa. At the same time, the imposition of legal sanctions can produce information for the market participants to engage in better tailored reputational sanctions. In this way, legal sanctions can facilitate reputational sanctions.

With respect to information generation and facilitation of reputational sanctions, the content of the legal obligation matters. To define contractual duties, parties to relational contracts often will be better off using a vague clause like “best efforts.” Due to its vagueness, best efforts implicitly grants the court flexibility to look at multiple performance metrics or signals in determining liability. Under such a clause, a court might consider (1) whether spending on product promotion would have forced a distributor into bankruptcy;⁷ (2) whether a distributor had the capacity to promote the merchandise;⁸ or (3) the reasons why the seller’s effort produced less than expected.

Each metric, of course, will be imperfectly correlated with what actually transpired, e.g., whether the seller acted primarily for the benefit of himself at the expense of the buyer. Multiple noisy signals, however, provide more information about the underlying behavior than one noisy signal. As a result, resting liability on multiple signals increases the deterrence of the legal sanction.⁹ Since legal and reputational sanctions are substitutes, the increased deterrence from the legal sanction reduces the need to rely on reputational sanctions and lessens the efficiency loss. This reduction, we suspect, is particularly important in long term relationships where the suspension or disruption of trade imposes a large switching costs on the parties.

Finally, notwithstanding the multi-layered relationship, we argue that the legal sanctions can be more effective than reputational sanctions. The reason has to do with what we call an “infra-marginal” effect of increasing damages. An increase in damages creates more deterrence through two channels. First, some marginal plaintiff may now decide to file suit (a marginal effect). Second, larger damages give bigger recovery to the plaintiff who was already willing to file suit even without the increase in damages (an “infra-marginal” effect). An increase in reputational sanctions, creates more deterrence through the marginal effect but lacks the second, infra-marginal effect. For instance, an additional period of “punishment,” such as boycotts or suspension of trade, has no effect on the deterrence efficiency of the existing periods of punishment.

Let us illustrate these points with the help of a more concrete example. Take a vendor, say, a supplier of pool filters. The vendor wants its distributors to feel comfortable that the pool

⁷ See *Bloor v. Falstaff Brewing Corp.*, 601 F.2d 609 (2d Cir. 1979) (noting that the distributor was not required to spend itself into bankruptcy).

⁸ See *Bloor v. Falstaff Brewing Corp.*, 454 F. Supp. 259 (S.D.N.Y. 1978) (noting that the contract required the distributor to merchandise the product to the extent of its capacity).

⁹ This is known as the “informativeness principle” in contract theory literature. Usually, the principle is laid out in terms of likelihood ratios, the ratio of two probabilities conditional on certain events. In providing incentives, the players should utilize all noisy signals that are correlated with seller’s effort. See Bernard Salanie, *The Economics of Contracts* 139 (2d ed. 2005); Bengt Holmstrom, *Moral Hazard and Observability*, 10 *Bell Journal of Economics* 74 (1979).

filters will meet expectations: that the filters will be delivered on time and be of sufficient quality to please the distributors' customers. Why might the vendor deliver the promised quality? One reason is the contract itself: it promises, with the help of warranty or liquidated damages term, that the pool filters will meet a certain quality. A second reason is a fear of lost business—a reputational hit. If the vendor fails to deliver on her promise, distributors may not buy from her in the future. One might think of the contract sanction and reputation sanction as different commitment devices for the vendor. With either or both devices in place, the distributors understand that the vendor will suffer a loss if she cheats on quality.

Neither commitment device is perfect, however. To enforce the contract promise of a warranty or the liquidated damages provision, a disappointed distributor may need to initiate a formal proceeding, which can be expensive and time-consuming. The imposition of reputational penalties—a boycott of the vendor—involves the termination or suspension of an otherwise viable economic relationship and a costly search for an alternate vendor.¹⁰ In choosing between formal and informal sanctions, the vendor and the distributor must trade off litigation cost on one hand with cost of terminating (or suspending) the relationship on the other.

In making this trade-off, the two sanctions will often work as substitutes: the more legal liability the vendor takes on for poor performance, the less reputational capital can be at stake, and vice versa. Take the case where the vendor offers a robust promise as to quality, backed by a large liquidated damages penalty for breach. Given this legally enforceable promise, the distributor need not resort to the threats of discontinuing the relationship to get the vendor to act appropriately. Fear of the lawsuit and having to pay large damages will provide sufficient incentive.

Now take the opposite extreme—the vendor makes no legally enforceable promise as to quality. In that case, if the pool filters fail to meet expectations, the distributor lacks a legal cause of action. At the same time, precisely because legal sanctions are unavailable, the distributor must carry out his threat to end (or suspend) the relationship in order to create trust in the first place. As the parties rely more on the legally enforceable remedy, the less is required of the reputational sanction. In this way, legal sanctions “crowd out” the reputational sanctions.¹¹

What about a little of both types of sanctions? One example might be a promise backed by a moderate liquidated damages provision. As compared to the robust legal remedy, the moderate remedy produces less litigation and, as a result, lower litigation costs. It produces less

¹⁰ There may be two different reasons why a distributor may no longer deal with the vendor. When a distributor finds out that the supplied filters do not meet the qualifications, this may make her realize that the value of the filters is substantially less than what she had originally expected. Alternatively, a distributor may refuse deal with the vendor as a punishment mechanism. The first is an “information” story that lets distributors recognize that the surplus from trade is substantially lower or negative. The second is a “deterrence” story that allows the distributors to engage in a collective action to deter vendor misbehavior. While, in reality, both will often co-exist, we are more interested in the latter, deterrence story.

¹¹ The phrase “crowding out” is used most often in the law and society literature to represent a phenomenon where a use of formal mechanism undermines informal relationships or makes them less effective. See Ellickson and others. Our use of “crowding out” has a slightly different meaning, in that as more formal sanctions are used, because more deterrence is being provided through formal sanctions, less informal sanctions are “necessary.”

litigation because some distributors, given the prospect of only a modest potential recovery, won't bother filing suit.

At the same time, as compared to no legal remedy, the moderate remedy requires fewer lost future sales to bond the vendor to keep its promise. With the combination approach, upon the delivery of low quality, the vendor pays some damages for breach and also loses some future sales. The combination approach is likely to be the most efficient option when litigation costs are spread out among the distributors: when some distributors end up having a low cost of litigation while others end up facing a high cost of litigation. In that case, the cap on damages ensures that the distributor with high litigation costs won't find it worthwhile to file suit. This, in turn, prevents the accumulation of the hefty litigation costs. At the same time, by providing a more limited remedy, the vendor still exposes itself to some threat of litigation from the distributor type with a low cost of litigation. And, given that formal sanctions and reputational sanction work as substitutes, preserving this litigation threat means that reputational penalty can be less severe.

While working as substitutes, legal sanctions can also facilitate reputational sanctions. For a group of distributors to effectively impose reputational sanctions on the vendor, they must somehow share the information on the history of their respective relationship, for instance, whether the vendor broke its promise or delivered a shoddy product to a distributor. As the number of distributors gets large and as they become more geographically separated, the sharing of information becomes more difficult, reducing the effectiveness of reputational sanctions. Using legal sanctions can help the dispersed distributors overcome the informational hurdle. Litigation, in particular, often generates publicly observable information, such as filing or dismissal of a lawsuit or the determination of the vendor's liability. To the extent that such information correlates with the vendor's true behavior, distributors can use this information to coordinate their efforts in imposing reputational sanctions. The coordinating function becomes particularly more effective when the court's finding generates information that did not previously exist in the market, for instance, through its determination of negligence. Through information production, legal sanctions thus can facilitate or "crowd in" reputational sanctions.

Notwithstanding the multifaceted relationship between legal and reputational sanctions, legal sanctions have an important advantage that the reputational sanctions lack: the presence of an infra-marginal effect. Suppose we start with positive amounts of both legal and reputational sanctions. With moderate amount of damages, upon detection of vendor misbehavior or receipt of substandard product, some distributors (those with low litigation costs) will find it worthwhile to bring suit; others (those with high litigation costs) will not. At the same time, any shortfall in deterrence can be made up through a threat of a temporary suspension of trade. Suppose, due to some exogenous change in the relationship, the vendor's incentive to shirk gets stronger and, as a result, more deterrence is needed. How should the parties address this new challenge?

On the one hand, the vendor could increase the amount of damages it promises to pay upon delivery of low quality. On the other hand, distributors could increase the number of periods they suspend trade after receiving low quality. In comparing these two approaches, suppose a boost in the damages remedy costs the parties the same amount in extra litigation costs as the additional periods of suspended trade cost in terms of lost trading opportunities. In this

way, we can fix the cost-side of the ledger. Consider now the benefits side. At the margin, both options create more deterrence: the former by inducing more distributors to file suit, and the latter through a threat of a longer number of periods without trade.

In addition to its marginal effect on deterrence, increasing damages brings an extra deterrence bang: distributors who were already filing suit get a larger recovery. To the extent that the existing lawsuits were deterring vendor misbehavior, the larger recovery creates more deterrence. By contrast, there is no comparable benefit from additional periods of boycott, since longer reputational punishment does not alter the effectiveness of existing reputational punishment. This “infra-marginal” effect makes legal sanctions operating through damages a more effective deterrent than reputational sanctions. In achieving optimal deterrence, therefore, the parties may want to rely more on legal, rather than reputational, sanctions. Indeed, under certain circumstances, the vendor and the distributors may wish to rely entirely on legal sanctions. In others, they may want to rely on both.

Finally, imagine that the parties include a best efforts clause in the contract. As evidence of best effort, the court looks to (a) the quality of the output and (b) how much of her workforce the vendor dedicated to the production of the distributor’s pool filters. Both these metrics correlate with the actual effort of the vendor. Had the vendor tried hard to satisfy the needs of the distributor, she would have been more likely to produce high quality filters. Likewise, she would have been more apt to dedicate a sufficient fraction of her workforce to the production of the filters. Neither of these metrics is a perfect indicator of the seller’s actual effort. Combined, however, they provide a better portrait of the seller’s actual effort than either metric standing alone. Basing liability on this better portrait strengthens the deterrence of the legal sanction. Sure, any litigation might now be more expensive to litigate since the court is asked to consider more variables in the litigation.

This cost must be traded off against two benefits. First, the parties can deploy weaker reputational penalties because the legal sanction is more effective. Second, the parties fire the reputation penalty less frequently, saving on the cost of the informal sanction. Without a best efforts clause, reputational sanctions arise whenever quality is low. With a best efforts clause, reputational sanctions arise only when (1) quality is low and (2) the court determines that the seller misallocated its workforce, a less common event.

After laying out the basic theoretical points, the paper shows that the predictions of the framework are consistent with empirical evidence and descriptive accounts drawn from a variety of areas. In each area, a combination of reputational and legal sanctions attaches to a failure to perform as expected. Many times, the publicity associated with a pending legal sanction triggers the reputational sanction. In each area, the legal sanction is costly and the policy debates involve a push to limit the legal remedy to control litigation costs. Yet, despite the cost of formal sanctions and ability of markets to punish bad behavior, some limited legal sanctions remains. Why? The infra-marginal benefit provides a rationale for preserving a limited legal remedy even when markets are able on their own to deter misconduct. Finally, our discussion of best efforts shows why this concept plays such a substantial role in long-term relational contracts.

The paper is organized as follows. Section 1 presents a numerical example, based on a repeated game model, to demonstrate the tradeoffs between legal and reputational sanctions in the context of two long-run parties. Section 2 extends the example to consider “best efforts” as a clause in the long term agreement. Section 3 shifts to consumer contracts, places where one seller is facing a dispersed set of consumers. Section 4 pivots from theory to applications. Drawing from existing empirical scholarship, the section discusses situations where a combination of formal and informal sanctions is used to control misconduct. The last section concludes.

I. Optimal Relational Contracting

To better understand the tradeoffs between legal and reputational sanctions, we present a numerical example that relies on the tools of repeated game theory.¹² Our goal is to lay out the main ideas while keeping the example as simple as possible. We first present the basic ingredients of the model, show some benchmark results, and then proceed to the main analysis. The example highlights how legal and reputational sanctions can be used together to create an optimal deterrence regime, and also the conditions under which the deterrence regime may want to rely on one or the other, or both.

A. The Basic Setup

Imagine a buyer and a seller engaged in a long-term, repeated relationship.¹³ They can transact in periods 1, 2, 3, and on. In any period, the relationship can terminate with some positive probability (due, for instance, to an unforeseen dissolution or liquidation of one of the parties). In addition, the parties value present dollars more than future dollars (the time value of money). Both of these effects can be captured by assuming the parties discount future earnings by a factor of 0.9. This means, for instance, that \$100 in period 3 is worth $(0.9)*\$100$ or \$90 in period 2 or worth $(0.9)*(0.9)*100$ or \$81 in period 1.

Each period the buyer approaches the seller and inquires about purchasing a single unit of good. To keep the analysis simple, let’s assume that the seller, in response, makes the buyer a take-it-or-leave-it offer, which the buyer accepts or rejects.¹⁴ In addition to the description of the

¹² A few papers in the law literature have more expressly used repeated game theory in analyzing the issues of reputation. See, e.g., Robert Scott, *Conflict and Cooperation in Long-Term Contracts*, 75 Cal. L. Rev. 2005 (1987); Eric Posner, *Law and Social Norms* (2000); and Paul Mahoney and Chris Sanchirico, *Norms, Repeated Games, and the Law*, 91 Cal. L. Rev. 1281 (2003).

¹³ The buyers and sellers could be any two commercial parties interacting repeatedly, for instance, a vendor and a distributor, a movie studio and talent agency, a building company and a supplier of raw materials. There are (at least) two ways of thinking about the long-term relationship. The parties could be interacting in a spot transaction in each period, with the (implicit) understanding that they will continue their relationship in the future. In the other, they could have signed a long-term requirements contract (that is renewable), which gives the buyer the discretion of ordering zero from the seller.

¹⁴ Allowing the seller to make a take-it-or-leave-it offer to the buyer makes the seller the residual claimant of the transaction. This convenient assumption allows us to compare the efficiency of different sanctioning regime by simply looking at the seller’s long-run profit. If the buyer and the seller were to split the surplus, although the basic analysis will remain the same, efficiency comparison will become more cumbersome. We will also have to use slightly different sanctioning mechanism (for instance, longer reputational punishment) to provide the requisite incentive.

good, the seller's offer contains two important elements: price (p) and liquidated damages term (d). As described in more detail later, the liquidated damages term is what the seller promises to pay in the event the product turns out to be low quality (or when the good does not meet the specifications or fails to function as requested). If the buyer rejects the offer, both parties get a payoff of zero for that period, which also represents their outside reservation values, i.e., the value derived from the next best alternative.

If the buyer accepts, the buyer pays the price. The seller, then, can exert costly effort that affects the quality of the delivered good. She might, for example, decide how much time to spend ensuring that the good produced for the order meets the buyer's specifications. Both the seller's effort and the quality delivered can be either high or low. While the seller's effort is unobservable to the buyer or to any third party, both parties observe the actual quality delivered. Low effort—or “defection” in the language of the prisoner's dilemma—costs the seller \$20. Notably, low effort doesn't inevitably lead to low quality. The seller can still get lucky and deliver a high quality item even with low effort. To capture this possibility, we let low effort generate a twenty-five percent (25%) chance of producing high quality. On the other hand, high effort or “cooperation” costs the seller \$40 but carries a seventy-five percent (75%) chance of producing high quality.

The buyer values high quality more than low quality. Assume that the buyer values high quality at \$100 and low quality at \$0. Given these numbers, it is easy to see that it is efficient for the seller to choose high, rather than low, effort. With high effort, the expected surplus from the transaction is \$35.¹⁵ By contrast, with low effort, the expected surplus from the transaction is only \$5.¹⁶ The following table summarizes the parameters of the relationship.

	Probability of High Quality	Expected Value	Cost of Effort	Net Surplus
High Effort (Cooperate)	75%	\$75	\$40	\$35
Low Effort (Defect)	25%	\$25	\$20	\$5

Table 1: Transactional Technology

After the seller exerts effort, the seller produces and delivers the good, and both parties observe the quality realized. Even though it is efficient for the seller put in high effort (“cooperate”), absent any sanctions, such an outcome is not obtainable.¹⁷ The reason stems from

¹⁵ With high effort, 75% of the time, the buyer reaps a return of \$100 and 25% of the time, the buyers reaps a return of \$0, for an expected value to the buyer of \$75. From this value, a deduction of the seller's \$40 cost of effort yields \$35 surplus from the transaction.

¹⁶ With low effort, 25% of the time, the buyer reaps a return of \$100 and 75% of the time, she reaps a return of \$0, for an expected value to the buyer of \$25. From this, a deduction of the seller's \$20 cost of effort yields \$5 of surplus from the transaction. We can also assume that, with low effort, the net surplus is negative. In that scenario, without a successful deterrence mechanism, the parties will never trade: the market will fall apart.

¹⁷ This is a classic example of one-sided moral hazard, most often used in principal-agent settings. By assumption, the seller is the only party that chooses unobservable input. We use one-sided moral hazard example to demonstrate the main ideas without too much complication. In many commercial settings, of course, one would expect both

the fact that the seller's effort choice is not observable and cannot be contracted upon. Conditional on any price, because high effort costs more than low effort, the seller has no incentive to exert high effort. Suppose the buyer pays \$75 for the product, having faith that the seller will put in high effort. If the seller were to put in high effort ("cooperate"), at a cost of \$40, she reaps a profit of \$75-\$40 or \$35. Low effort, in contrast, costs only \$20 and leads to a profit of \$75-\$20 or \$55. In a very simple way, these numbers reveal the presence of a moral hazard or commitment problem. Since the payment is independent of effort and effort is costly, our seller acts like a fully insured party in the classic discussions of moral hazard.¹⁸

The buyer, of course, understands the seller's incentives and will adjust her expectations in accordance. When the seller exerts low effort, the expected value of the good is \$25 $(=(0.25)*(\$100)+(0.75)*(\$0))$. That number thus represents the maximum the buyer will be willing to pay for the contract. In equilibrium, given her power to make a take-it-or-leave-it offer to the buyer, the seller will offer slightly less than \$25 for the contract; the buyer will accept the offer and expect that the seller will put in low effort. This expectation will then be confirmed as the seller chooses low effort. The end result is low prices and low seller effort. Due to the problem of moral hazard, even though it is efficient for the seller to put in high effort, without any formal or informal sanctions, the buyer and seller cannot achieve this outcome. So, they end up realizing a much lower expected surplus from their relationship. The following table presents the parties' strategies and outcomes.

	High Effort (Cooperate)	Low Effort (Defect)
Not Purchase (Reject)	(\$0, \$0)	(\$0, \$0)
Purchase (Accept)	(\$75-p, p-\$40)	(\$25-p, p-\$20)

Table 2: Stage Game Payoffs

The left most column delineates the buyer's choices. She can either accept or reject the seller's offer (or approach or not approach the seller about possible trade). The first row represents the seller's possible actions. She can put in high or low effort (cooperate or defect). If the buyer rejects the offer (or does not approach the seller), both parties get a payoff of \$0, which is represented in the second row. The efficient outcome is for the buyer to purchase and

parties to engage in behavior (some of which may be unobservable) that affects the value of the relationship. That type of relationship can be represented by two-sided moral hazard, prisoners' dilemma type models. Our results can be easily extended to such settings.

We also do not allow the seller to be of different "types" so as to shy away from the issues of adverse selection. When different seller types have different costs of effort, some may have an incentive to mimic others and that pooling can lead to inefficiency. When the buyer's learning is "unbounded," however, i.e., the buyer has knowledge of outcomes from all past transactions, the seller types will eventually be separated, and the adverse selection issue will disappear, leaving only the per period moral hazard concerns.

¹⁸ See Steven Shavell, On Moral Hazard and Insurance, 4 Quart. J. of Econ. 541 (1979) (articulating a model of insurance and moral hazard). The critical element here is the unobservability and non-verifiability of the seller's effort. Timing of the payment is less important. Even if the buyer were to pay the price at the same time as the seller choosing effort, the same result will hold.

the seller to put in high effort (Purchase, High Effort). Such combination generates respective profits of $\$75-p$ for the buyer and $p-\$40$ for the seller. However, conditional on the buyer's acceptance of the seller's offer, it is strictly in the seller's interest to choose low, rather than high effort. The reason is that, conditional on buyer's purchasing the product, the payoff from low effort ($p-\$20$) is always larger than the payoff from high effort ($p-\$40$). And that's true regardless of what the price is. In game theory terms, low effort is the seller's (weakly) dominant strategy.¹⁹ Hence, the buyer and seller end up in the cell corresponding to (Purchase, Low Effort). The respective profits are $\$25-p$ and $p-\$20$, which, as argued above, is inefficient.

B. When Enforcement is Costless

Let's consider two primary methods of solving the moral hazard problem: litigation and reputation. The legal sanction takes the form of payment of liquidated damages while the reputational sanction involves a suspension or termination of relationship.²⁰ Either will be triggered when the buyer observes an undesirable outcome, such as low quality product or the seller shirking (i.e., putting in low effort). Both will function as an incentive for the seller to choose cooperate and select high effort. Furthermore, when legal and reputational sanctions are costless to impose, the parties can achieve the first best outcome with no loss of surplus.

Consider the legal sanctions. Suppose that the buyer can bring a lawsuit against the seller to collect liquidated damages (d) when the realized quality is low. As a benchmark, assume that the lawsuit imposes no cost on either party and the court perfectly verifies the realized quality. Without any litigation cost, by promising sufficiently high damages, the parties can achieve the first best. For example, suppose the seller promises to pay damages (d) of \$100 if she delivers low quality.²¹ After collecting the price (p) from the buyer, the seller needs to decide whether to put in high or low effort, to cooperate or deviate.

Compared to before, because the seller's effort choice affects the expected damages payment, the seller's calculus is different. With the damages of \$100, if the seller were to put in high effort, her expected profit is $p-(0.25)*(\$100)-\$40=p-\$65$. The term $(0.25)*(\$100)$ reflects the fact that, even with high effort, there is a 25% chance the seller will deliver low quality and have to pay \$100 in damages when sued by the buyer and found liable. If instead the seller were to choose low effort, her expected profit is $p-(0.75)*(\$100)-\$20=p-\$95$. Compared to high effort, the middle term in this profit expression has gone up because the probability of having to pay \$100 of damages is now 75% instead of 25%. The last term, by contrast, falls from \$40 to \$20 to reflect the lower cost of effort.

¹⁹ The parenthetical "(weakly)" is there because the seller is indifferent between the two levels of effort when the buyer does not purchase from her, i.e., she only weakly prefers low effort conditional on no purchase. In prisoner's dilemma setting, numbers are set up such that "defection" is a strictly dominant strategy for each player.

²⁰ Legal sanctions, in the form of damages, can be thought of as a "stick" mechanism against misbehavior, while reputational sanctions, by allowing the seller to preserve the long-term relationship, can be thought of as a "carrot" mechanism. So, the main issue can be recast as a problem of whether the parties should utilize more of the stick or the carrot mechanisms.

²¹ Throughout the analysis, we assume that the court accurately determines whether the product is low quality or not. Thus, the buyer can't falsely claim a high quality good is low quality and recover under the liquidated damage provision. This assumption takes nuisance or frivolous lawsuits off the table.

Since $p = \$65$ is larger than $p = \$95$, the \$100 liquidated damages award provides the seller with an incentive to exert high effort. In fact, the commitment problem will be solved with any liquidated damages larger than (or equal to) \$40. Notice that, with high effort, the seller faces a lower expected damages award, but a higher cost of effort. Given that litigation is costless, the seller can set the damage award as high as needed to ensure the cost-savings from a lower expected award more than offsets the higher cost of effort.²² More important, with costless litigation, the seller's commitment to pay high damages solves the incentive problem without entailing any loss in transactional surplus whatsoever.²³

Next consider the reputational sanctions. Suppose, in a departure from the initial assumptions, the buyer actually observes the seller's choice of effort and litigation is not available. Let's think about the harshest possible reputational sanctions: whenever the buyer observes low effort ("deviation") by the seller, the buyer never purchases from the seller again (using the "grim trigger" punishment strategy).²⁴ Compared to the legal sanctions case, the

²² We are assuming away the anti-penalty doctrine in contract law that limits the amount of liquidate damages that the parties can post. When such limitations exist, the parties' ability in providing necessary deterrence may be limited. We are also assuming away that the parties, the seller, in particular, are judgment-proof. With judgment-proof seller, the damages may not be bigger than the price the buyer pays the seller.

²³ This is an example of the court costlessly verifying the realized quality. Using price and damages is tantamount to setting up an incentive pay system. We have implicitly assumed that both parties are risk-neutral and neither are judgment-proof. If one or both of the assumptions do not hold, even with perfect verification by court, because quality realization only imperfectly translates to seller's effort, imposing an incentive system can generate some deadweight loss, either in the form of imposing risk onto a risk-averse party and leaving some surplus to a judgment-proof party.

²⁴ Any reputational sanctions based on suspension or termination of trade will be subject to the problem of renegotiation. That is, when the buyer is supposed to impose punishment, given that there is a positive surplus from trade, the players have an incentive to "renegotiate" out of the punishment phase and trade. Such renegotiation will, of course, undermine the punishment strategy. Furthermore, in our scheme, reputational sanctions will also be subject to the problems of subgame perfection. When the punishment is to start, the seller may be able to unilaterally evade punishment by promising high enough damages. When damages are sufficiently high, the buyer should (correctly) believe that the commitment problem has been solved and should be willing to purchase from the seller. To the extent that such high damages still provides some profit to the seller, it will be in the seller's interest to bypass reputational punishment (which gives her zero profit) through damages.

The renegotiation-proofness issue and the subgame perfection issue can be addressed as follows. To impose an efficient punishment, the parties should not rely on any legal sanctions, since they produce deadweight loss through the cost of litigation. Also, the players should make sure that, even in punishment stage, the seller will have an incentive to exert high effort (cooperate). The efficient (renegotiation-proof and subgame perfect) punishment strategy will involve: (1) the seller posting a high price during cooperation stage; (2) in punishment stage, the buyer still purchases but at a lower price; (3) while in the punishment stage, when high quality realizes, the players revert back (the seller gets "rehabilitated") to the cooperation phase (with high price) with some positive probability; and (4) the low price in the punishment phase is high enough to guarantee the seller the profit she would have gotten had she posted high enough damages to solve the commitment problem using only legal sanctions. The third factor, positive probability of reversion back to the cooperation phase, is there to ensure the seller will have an incentive to exert high effort even in the punishment phase.

This efficient punishment strategy has two important limitations. First, because the players have to allow the seller to revert back to the cooperation phase from punishment phase, this will impose a limit on how strong the reputational punishment can be. A strong punishment, such as grim-trigger punishment strategy, will simply not be possible since, once in punishment phase, the seller will not have any incentive to exert high effort. Second, punishment is also limited because the seller has to make some positive profit even during punishment. Otherwise, the seller will bypass the punishment stage by offering high damages. These limitations imply that for the efficient

analysis is slightly more involved but still straightforward. If the seller cooperates and puts in high effort each period, the seller will make a profit of $p - \$40$ in each period. With the discount factor of 0.9, the discounted value of the stream of payoffs equals $(p - \$40)/(0.1)$.²⁵ If the seller deviates and puts in low effort, on the other hand, she obtains the one-time cost-savings associated with shirking, but the seller will never be able to sell to the buyer again. The seller's payoff to low effort is thus $p - \$20$.

Given that the buyer is willing to pay up to \$75 for the good when the seller exerts high effort and the seller makes a take-it-or-leave-it offer to the buyer, the seller will offer $p = \$75$. Now, the seller's long-run, discounted profit from exerting high effort (every period) is $(\$75 - \$40)/(0.1) = \$350$. In contrast, if the seller deviates (once), she makes $\$75 - \$20 = \$55$. The reputational loss (i.e., the loss of all future sales) is clearly larger than the seller's one-time gain from deviation.²⁶ As a result, the threat of this loss provides sufficient incentive for the seller to put in high effort. Furthermore, the parties can fully capture the surplus from trade without any loss. Because the buyer observes the seller's effort choice and, in equilibrium, the seller chooses high effort, the buyer never carries out the reputational sanctions, regardless of the realized quality. With perfect observability, reputational sanctions will also be able to achieve the first best.

C. Enforcement Costs

In reality, litigation is costly and players rarely observe other players' behavior with perfect accuracy. With respect to the latter, let's return to the initial assumption that the buyer does not observe the seller's effort choice and only observes the realized quality. With respect to the former, let's assume that, to bring a lawsuit, the buyer must incur a litigation cost. The litigation cost is uncertain *ex ante* and gets realized after the quality of the good has been determined. Like effort and quality, litigation cost can be either high or low, but with equal probability (50% chance for each). If the cost is high, the buyer must pay \$60 to go to court. If the cost is low, she must pay \$10. Although litigation is costly for the buyer, for the sake of simplicity, we assume that the seller does not incur any litigation cost and, as before, the court does not make any mistake in verifying the realized quality.²⁷

punishment strategy to work, the players have to be very patient. See Baker and Choi, *Managing Reputation with Litigation: Why Legal Sanctions Can Work Better than Market Sanctions* (2013), for a more detailed analysis of these issues.

²⁵ The seller discounted stream of payoffs is $(p - \$40) \cdot (1 + 0.9 + 0.9^2 + 0.9^3 + \dots)$. The infinite sum in the second parentheses reduces to $1/0.1$.

²⁶ Grim-trigger punishment strategy is clearly an over-kill, here. In fact, the buyer needs to suspend the relationship for only 0.4 periods, which requires the buyer to suspend the relationship next period with 40% probability (a mixed strategy), after observing low effort by the seller to induce the seller to cooperate. The number 0.4 can be found as follows. Under cooperation, with $p = \$75$, the seller's long-run discount profit is $\$350 (= (\$75 - \$40)/(0.1))$. Suppose that, if the seller were to deviate, the buyer suspends trade for T periods. When the seller deviates, the seller's long-run discount profit becomes $(\$75 - \$20) + (0.9)^{T+1} \times (\$350)$. When we set this expression equal to $\$350$ and solve for T , we get about 0.4.

²⁷ The assumptions that the seller doesn't bear any litigation cost and the court does not make any mistake on verifying realized quality are done for simplification. With respect to the former, in addition to reducing the total surplus from trade, litigation cost on the seller will have an effect of producing additional deterrence. This is because the seller is more likely to face litigation and incur litigation cost when she deviates. Litigation cost on the seller, therefore, will make reliance on legal sanctions more attractive. Second, no court error but positive litigation cost is

Adding the litigation cost slightly changes the timing of the game in each period. The sequence now runs as follows:

- (1) The seller makes a take-it-or-leave-it offer containing a price and liquidated damages terms (p, d) ;
- (2) If the buyer accepts the offer, the buyer pays the price (p) and the seller chooses between exerting high and low unobservable effort;
- (3) The seller produces and delivers the good;
- (4) The quality of the good (high or low) is realized;
- (5) The buyer's litigation cost (high or low) is realized;
- (6) The buyer may bring a lawsuit against the seller, incurring the litigation cost; and
- (7) The court accurately determines the realized quality and, if low, the court grants the buyer the liquidated damages (d) initially promised.

In addition, following the outcome of the game in each period, the buyer can, in future periods, impose reputational sanctions against the seller by suspending or terminating the relationship.

Not surprisingly, once we take away costless litigation and perfect observability, efficiency can no longer be obtained. To provide necessary incentive with formal sanctions, the buyer will have to incur litigation cost, which reduces the surplus from trade. With reputational sanctions, because suspension (or termination) of relationship is conditioned on observables, such as realized quality, rather than the seller's effort, a danger exists that the buyer will impose reputational sanctions even when the seller has put in high effort. If the buyer suspends the relationship after receiving low quality, the parties will be unable to reap any surplus from trade while they are in the punishment stage. In devising the optimal sanctioning mechanism, therefore, the parties will have to trade off between the cost of litigation against the cost of misfiring reputational sanctions.

1. Legal Sanctions Only

What is the optimal mix of sanctions? To answer this question, let's first examine two polar cases: using legal sanctions only and using reputational sanctions only. First, take legal sanctions. For the parties to solve the commitment problem with only legal sanctions, damages have to be at least \$60. If the damages are set below \$10, given the possible litigation costs of \$10 or \$60, the buyer will never sue the seller and the seller will have no incentive to exert high effort.

an example of costly but perfect verification. Unlike before, now the parties need to incur verification cost to receive a court judgment. If the court can make an error in its quality determination, it can lead the buyer to file suit (a "frivolous" suit) against the seller even when the realized quality is high, particularly when damages are sufficiently large. Allowing for such possibilities will make reliance on legal sanctions less desirable but will not change the main conclusions of the example. See Choi and Triantis, Completing Contracts in the Shadow of Costly Verification, 37 J. Legal Stud. 503 (2008) for a more general treatment of verification cost; and Baker and Choi, Managing Reputation with Litigation: Why Legal Sanctions Can Work Better than Market Sanctions (2013) for allowing frivolous litigation.

If the damages are set between \$10 and \$60, the seller will still have insufficient incentive for effort. To see why, suppose that the seller selects high effort. Her expected profit is $p-(0.25)*(0.5)*d-\$40$. The second term is the expected damage payment, given high effort. With damages set between \$10 and \$60, if the buyer draws a high cost of litigation (\$60) she doesn't sue the seller even when the seller delivers low quality. Thus, given the seller exerts high effort, the probability the buyer both realizes low quality and finds a lawsuit worthwhile is $(0.5)*(0.25)$.

If the seller deviates to low effort, her expected profit is $p-(0.75)*(0.5)*d-\$20$. With low effort, damages are paid with probability $(0.5)*(0.75)$. In words, with low effort, the seller delivers low quality 75% of the time and in half those sales she faces a lawsuit from the buyer. For the seller to have the incentive for high effort, we need $p-\$40-(0.25)*(0.5)*d$ to be larger than $p-\$20-(0.75)*(0.5)*d$. But that requires damages to be at least \$80. This is a contradiction since we have confined the damages to between \$10 and \$60.

To solve the incentive problem with only legal sanctions, therefore, the damages have to be larger than \$60. Suppose the seller sets the damages at \$61, large enough to cover even the high litigation cost. Now, the buyer will sue the seller to collect damages whenever quality is low. With 100% chance of litigation in case of low quality, the seller's expected profit, if she exerts high effort, is $p-(0.25)*d-\$40$. Comparable profit under low effort is $p-(0.75)*d-\$20$. In order to provide the necessary incentive, we need $p-(0.25)*d-\$40$ to be (weakly) larger than $p-(0.75)*d-\$20$, which is equivalent to damages (d) being larger than \$40. At $d=\$61$, this condition is satisfied.

Although using only the legal sanctions (with damages set at \$61) can solve the incentive problem, the parties incur lots of litigation costs in equilibrium. Whenever quality is low, the buyer incurs an expected litigation cost of \$35.²⁸ Given 25% chance of receiving low quality with high effort, this translates to the expected loss of surplus of \$8.75 $(=(0.25)*(\$35))$. The total surplus from trade, without litigation, was \$35. Frequent litigation brings the per-period surplus down to about \$26.3 and the long-run, discounted surplus down to about \$263.²⁹ Compared to the first best long-run surplus of \$350, the parties face a steep reduction in gains from trade when they solve the incentive problem using only the legal sanctions.

2. Reputational Sanctions Only

What if the parties were to rely only on reputational sanctions? Imagine that the seller brings the liquidated damages down to \$0. Even without any legal sanctions in play, if the buyer imposes reputational sanctions through suspension of trade after receiving low quality, the parties can still solve the incentive problem. The seller would want to avoid this reputational punishment as much as she can, and the fact that exerting low effort is more likely to trigger the reputational punishment will provide the necessary motivation for the seller. At the same time,

²⁸ Half the time, the litigation cost is \$10; half the time it is \$60, for an expected litigation cost of $(0.5)*(\$10)+(0.5)*(\$60)$, or \$35.

²⁹ The \$26.3 surplus is realized every period. Its discounted value is thus $\$26.3*(1+.9+.9^2+.9^3+\dots)$, which reduces to $\$26.3/.1$ or \$263. The first best surplus in each period is \$35. When realized every period, the long-run discounted first best surplus is $\$35/.1$ or \$350.

because high effort can still lead to low quality, reputational sanctions triggered by low quality will engender some loss of surplus.

To make this point more concrete, suppose the buyer stops purchasing from the seller for two (2) periods after receiving low quality. After the two period suspension, the buyer resumes the purchase as before. The analysis is a little involved, but it can be shown that this suspension threat is sufficient to induce the seller to exert high effort.³⁰ Recall that the buyer is willing to pay up to \$75 for the product when the seller exerts high effort. With her power to make take-it-or-leave-it offers, the seller will offer (slightly below) \$75 to the buyer. With \$40 of effort cost, the seller's profit in each period is (slightly less than) \$35. Conditional on purchase, the seller's per period profit is higher when it relies exclusively on informal sanctions rather than exclusively on formal sanctions. The reason is that, by setting the damages to zero, the seller eliminates the litigation costs.

At the same time—and unlike the case of relying only on legal sanctions—the seller is not guaranteed a purchase from the buyer every period. Instead, even when the seller puts in high effort, she still faces a 25% chance of producing low quality and losing sales for the next two periods. During the suspension period, the seller reaps zero profit. When the buyer employs the two period reputational sanctions upon receiving low quality and when the seller charges \$75 for the product, we can show that the seller's discounted long-run, discounted profit is \$245 ($\approx \$35/0.1428$).³¹ Compared to the case of using only legal sanctions, the effect of reputational sanctions shows up as a bigger discount rate (0.1428 versus 0.1). This is intuitive since, with reputational sanctions, the parties face a larger chance of temporary termination of their relationship. But, even with only two periods of suspension, because the chances of triggering that reputational punishment is sufficiently large (25%), as compared to the first best outcome, the parties face a steep reduction in long-run surplus (\$350 versus \$245).

3. Using Both Legal and Reputational Sanctions

Can the buyer and the seller somehow improve the outcome by using both legal and reputational sanctions? The problem with relying only on legal sanctions is that the parties incur too much litigation cost in equilibrium. The litigation cost, as deadweight loss, reduces the

³⁰ Let V be the discounted profit in the event the seller produced high quality last period. The seller's long-run profit from high effort can be written recursively as $V = (P - \$40) + (0.75) * \delta^3 V + (0.25) * \delta V$. The δ^3 term stands for the fact that the seller suffers a two period gap with no sales following the realization of a low quality good. The seller's payoff from low effort is $(P - \$20) + (0.25) * \delta V + (0.75) * \delta^3 V$. The seller prefers high effort if the payoff from high effort exceeds the payoff from low effort: $(0.75 - 0.25) * \delta * (1 - \delta^3) V \geq \$40 - \$20$.

From $V = (P - \$40) + (0.75) * \delta^3 V + (0.25) * \delta V$, when we solve for V , we get $V = (P - \$40) / ((1 - (0.75) * \delta) - (0.25) * \delta^3)$, which is also equal to $V = (P - \$40) / ((1 - \delta) + (0.25) * \delta * (1 - \delta^2))$. Given no formal sanctions, there are no litigation costs. That means that, conditional on high effort, the buyer is willing to pay up to \$75. Plug this value into for price gives a discounted payoff of $V = (\$75 - \$40) / ((1 - \delta) + (0.25) * \delta * (1 - \delta^2))$.

Now, we can check that, under these conditions, the seller indeed wishes to exert high effort. Plugging the value of V into expression $(0.75 - 0.25) * \delta * (1 - \delta^3) V \geq \$40 - \$20$, we get $(0.75 - 0.25) \delta (1 - \delta^3) * (\$75 - \$40) / ((1 - \delta) + (0.25) * \delta * (1 - \delta^2)) \geq \$40 - \$20$. When $\delta = 0.9$, the inequality is strictly satisfied.

³¹ From the previous footnote, the seller's long-run, discounted profit was given by $V = (\$75 - \$40) / ((1 - \delta) + (0.25) * \delta * (1 - \delta^2))$. When we solve for V with $\delta = 0.9$, we get $V = \$35 / ((0.1) + (0.25) * (0.9) * (1 - (0.9)^2)) = \$35 / 0.1428$.

transactional surplus. Similarly, when reputational sanctions alone are used, the parties too frequently forego potential surplus from trade. Given these two problems, it is not surprising that the optimal approach for the parties to combine both types of sanctions. They can do so by setting moderately sized damages (d), which discourages the high litigation cost buyer from filing suit. The parties can then make up the sanctions shortfall with moderate amount of reputational sanctions.

Suppose that the seller sets the damages award at \$59. As noted above, the buyer's litigation costs are \$10 or \$60 with equal probability. A liquidated damage award of \$59, therefore, makes suits unattractive for the buyer with the \$60 litigation cost. But some threat of a lawsuit remains. Specifically, the buyer drawing the litigation cost of \$10 will still file suit upon receipt of low quality. However, as we saw previously, when the seller is sued only half the time when quality is low, with \$59 liquidated damages, the seller has insufficient incentive to exert high effort from only formal sanctions.³² Simply stated, with the moderately sized liquidated damages, the shirking seller's liability exposure is not large enough to offset the cost-saving associated with shirking.

In order to provide sufficient incentive to the seller, therefore, the parties have to supplement the formal sanction with reputational sanctions. Suppose they combine the \$59 penalty with a one-period boycott. Such a layered approach discourages the seller from shirking. Although the analysis is more involved, the intuition is easy to see. Through the modest liquidated damages, the seller faces some higher chance of legal liability if she exerts low effort. The increase in liability isn't enough to completely solve the commitment problem, but it goes some way to achieving the goal. The one period boycott is also more likely if the seller puts in low effort. The seller's incentive for high effort then comes from attempting to avoid two costly sanctions: the modest damage award and the one-period boycott.

Unlike with exclusive reliance on reputational sanctions, the boycott need not be two periods to deter seller misconduct. The seller is already being partially deterred by the threat of the damages award. The one-period boycott just fills in the deterrence gap. Now, let's think about the seller's long-run, discounted profit with this combination approach. Assuming that the incentive problem is solved, when the seller puts in high effort each period, with 25% chance of producing low quality and 50% chance of being sued conditional on low quality (when litigation cost is \$10), the buyer is willing to pay about \$81.³³ With the power to make take-it-or-leave-it offer, the seller will set $p = \$81$ and earn about \$33.75 each period.³⁴ If the seller is also subject to

³² The seller's payoff from high effort is $p - \$40 - (0.25) * (0.5) * (\$59) = p - \$47.35$. The first term is the price. The second term is the cost of effort. The third term is the expected damage award. The seller pays this award if two events transpire: (1) the seller delivers a low quality product and (2) the consumer draws a low litigation cost and therefore sues. Given high effort, the first event occurs with probability 0.25. Since the consumer is equally likely to draw high or low litigation costs, the second event arises with probability 0.5. On the other hand, the seller's payoff from low effort is $p - \$20 - (0.75) * (0.5) * (\$59) = p - \$42.125$, which is strictly higher.

³³ The buyer's expected surplus given the seller exerts high effort is \$75. From this, the buyer deducts his expected litigation cost of $(0.25) * (0.5) * (\$10)$. At the same time, the buyer adds to his willingness to pay his anticipation of the expected damage pay, $(0.25) * (0.5) * (\$59)$. Taking these three together produces the buyer's willingness to pay of \$81.

³⁴ The seller charges \$81. To get the seller's per period payoff conditional on a sale deduct both the effort cost of \$40 and the seller's expected damage payment of $(0.25) * (0.5) * (\$59)$.

one period suspension of relationship, the seller's long run, discounted profit becomes \$275 ($\approx \$33.75/0.1225$).³⁵

Notice that the seller's payoff from combining both types of sanctions is higher than using either sanction on its own. To see why, first consider the seller's per period profit in the event of sale (\$33.75). The combination approach carries a higher per period profit than when the seller relies exclusively on formal sanctions. At the same time, the combination approach carries a lower per period profit than with exclusive reliance on informal sanctions.

Each sale with the modest damage award carries some risk of litigation. And this risk of litigation is factored into the seller's per period profit. The litigation exposure is less with the modest award than with the large award since the modest award induces fewer and less costly lawsuits. That is why the firm's per period profit is higher with the modest award than the large damage award. Meanwhile, the inclusion of any litigation risk means that the per period profit is lower with the modest damage award than when the parties exclusively rely on informal sanctions.

Despite the fact that exclusive reliance on informal sanctions creates a higher per period profit, our numbers reveal that they seller still prefers the combination approach. Puzzling, perhaps, but easy to explain. With exclusive reliance on informal sanctions, every time the seller delivers low quality it suffers two periods of zero profits. With the combination approach, every time the seller delivers low quality it suffers one period of zero profits, a shorter boycott. The benefit of the shorter boycott under the combination approach is captured by discounting the per-period profits by a higher number when the seller exclusively relies on informal sanctions than when it uses the combination approach. The following table compares the outcomes from three different sanctions regimes.

Incentive Mechanism	Long-run Discounted Surplus
The First Best (No Deadweight Loss)	\$350
Legal Sanctions Only ($d=\$61$)	\$263
Reputational Sanctions Only (2 period suspension)	\$245
Legal and Reputational Sanctions ($d=\$59$ and 1 period suspension)	\$275

Table 3: Comparison of Different Incentive Mechanisms

D. Advantage of Legal Sanctions: the Infra-Marginal Effect

³⁵ The price the buyer is willing to pay consists of his expected benefit less the expected litigation costs plus the expected damage award. Formally, we have $p = \$75 + (0.25) * (0.5) * (\$59 - \$10) = \83.625 . The per period profit is just this price minus the cost of high effort minus the expected damage award. Again, the damage award simply drops out of the expression.

The fact that the parties would use legal sanctions, and to the maximum extent possible (\$59, slightly below the high litigation cost), supports an important advantage that legal sanctions possess over reputational sanctions. The advantage stems from the presence of an “infra-marginal” effect of increasing damages. Increasing damages creates additional deterrence through two channels: (1) more lawsuits being filed by marginal litigants and (2) granting larger recovery to the existing lawsuits, lawsuits that would have been filed even without the increase in damages.³⁶ An increase in reputational sanctions, by contrast, has the first, marginal effect on deterrence but lacks the second, infra-marginal effect: lengthening the punishment period has no effect on the effectiveness of the existing reputational punishment.

To make this point more concretely, imagine we start with some amounts of both legal and reputational sanctions, say, \$20 of damages and 3 periods of reputational punishment. Suppose we want to create additional deterrence and are given two choices: either increase the damages by \$10 or increase the reputational punishment by 1 more period. Let’s say that both are equally costly: additional \$10 of damages will engender an equal amount of deadweight loss (through additional litigation) as one extra period of punishment (longer suspension of trade). Although the marginal benefits and costs of these two options are the same, the infra-marginal effects are not. While the increase in reputational punishment has no effect on the efficacy of the existing (3 periods of) reputational punishment, increase in damages by \$10 will actually make the existing legal sanctions stronger, simply because the infra-marginal litigants (those who were already filing lawsuits) will be recovering more. Hence, even when the marginal benefits and costs are the same, the presence of the infra-marginal benefit tips the balance in favor of relying more on legal sanctions.

The infra-marginal advantage gets particularly strong when raising damages does not attract (or attracts little) additional litigation. In our example, raising damages from \$10 to anywhere but up to \$60, produced more deterrence at no additional litigation cost. The infra-marginal litigant (with \$10 litigation cost) makes a bigger recovery and this produced additional deterrence, while there is no downside of extra litigation cost. A similar result obtains when the spread of the litigation cost gets higher. Suppose the high litigation cost is not \$60 but \$90. Now, the parties can solve the incentive problem by using only legal sanctions. They can promise sufficiently high damages while keeping the high cost litigants from filing suit. If the seller were to set liquidated damages at \$80, even though the seller will face a lawsuit only half the time when quality is low, the damages are high enough to solve the incentive problem. And, \$80 of damages is too small to make a lawsuit worthwhile for the high cost litigant. The bigger the spread in litigation costs, the greater the seller can make the damage award without attracting high cost litigation and the more deterrence can be had by granting a bigger recovery to the low cost litigant.

³⁶ This statement is subject to two important caveats. First, when the court’s judgment is subject to error, larger damages can lead to more frivolous litigation, e.g., suing to recover damages even when the buyer knows for certain that the quality is high. Second, we have not modeled how the amount of litigation cost can vary with the size of damages. If litigants spend more resources without improving the accuracy of court judgment, this will reduce the ex ante expected surplus from the trade. Both of these effects, at the margin, will reduce the effectiveness of increasing damages, by working as a counter-weight against the infra-marginal benefits.

When everything else, such as the additional deadweight loss or the increase in deterrence from increase in sanctions, is the same, the presence of the infra-marginal effect should induce the parties to favor legal sanctions over reputational sanctions. This also can explain why the optimal regime, in the example, was to rely on both legal and reputational sanctions, as opposed to legal sanctions alone. Recall that the benefits from shirking was given by \$20 ($=\$40-\20), the difference in costs. When the damages were set at \$59, the size of formal deterrence is about \$15, which is the difference in the expected damages payment under low versus high effort, i.e., $((0.75)-(0.25))*(0.5)*\$59$. This meant that there was a deterrence shortfall of \$5. Now, consider raising damages to \$61 and allowing the high cost litigants to bring suit when quality is low. The additional deterrence benefit the parties will receive is \$5. At the same time, the additional expected litigation cost is \$7.5 ($=(0.5)*(0.25)*(\$60)$). Clearly, the parties will be incurring too much litigation cost to achieve the extra deterrence.

II. Best Efforts and Other Fault-Based Standards

Up to this point, the analysis made two assumptions. First, the contract specified that the buyer could sue only if the seller delivered low quality. Second, the court could perfectly detect whether the seller breached. This section relaxes the assumption that seller's obligations are defined solely in terms of the quality of the delivered product. What if the seller also made a promise to use "best efforts" or all "commercially reasonable efforts"? In the context of our numerical example, we can reasonably equate such a promise with the promise of putting in high effort. What if the court can only make a noisy, but probative, determination on whether the seller breached that promise?

Before proceeding to the analysis, notice that the best effort clauses and similar fault-based clauses are common to contracts involving buyers and sellers, particularly those anticipating a long term relationship. For example, in exclusive dealing arrangements, the UCC implies a duty of best efforts for the buyer and the seller.³⁷ In a percentage lease agreement, a landowner leases his property in return for a fraction of the gross receipts the lessee obtains from use of the land. Absent a contractual provision to the contrary, courts imply that the lessee use best efforts to generate gross receipts.³⁸ In franchise contracts, the franchisor often requires that the franchisee promise to use his best efforts to make the venture succeed.³⁹ At the same time, franchise contracts allow the franchisor (and franchisee) to terminate (or not renew) the contract.

While the exact meaning of "best efforts" may be impossible to discern, one recent court defined best efforts as

"To be enforceable, a best efforts contract must set some kind of goal or guideline against which best efforts may be measured." The [prior] court concluded that when sufficient guidelines exist, a party that performs within the guidelines fulfills the contract regardless of the quality of its efforts. Only when a

³⁷ See U.C.C. 2-306(2).

³⁸ *Seggebruch v. Stosor*, 33 N.E.2d 159 (Ill. App. 1941).

³⁹ See Robert E. Scott & George Triantis, *Anticipating Litigation in Contract Design*, 115 Yale L. J. 814, 853 (2006) (noting that [franchise and distributorship contracts typically provide that the agent both satisfy specific requirements and generally exercise best efforts).

party misses the guidelines would a court measure the quality of its efforts “by the circumstances of the case ... and by comparing the party's performance with that of an average, prudent, comparable operator.”⁴⁰

Translating the best efforts standard into the model is straightforward. To prevail, suppose now the buyer must provide evidence that (1) the seller delivered low quality and (2) the seller's effort fell short of a comparable seller. The first piece of evidence concerns the seller's output, the quality of the product. The second piece of evidence concerns the seller's input, the amount of effort she put forth in manufacturing the product. To be consistent with the original numerical example, we will maintain the assumption that court can perfectly detect whether the seller, in fact, delivered low quality. Judicial inquiries into effort, however, are much more difficult and prone to error. To capture mistakes in the judicial process, suppose that if the seller put in high effort the court will mistakenly determine that she put in low effort with 45% probability. Likewise, if the seller puts in low effort, the court will mistakenly determine she put in high effort with 45% probability.

It is fairly straightforward, albeit a bit involved, to see that inclusion of such a fault-based standard will improve the outcome. Notice first that the inclusion of the best efforts clause influences the buyer willingness to sue. To prevail under the contract with a best efforts clause, the buyer must prove (1) that the delivered good was of low quality and (2) the seller failed to provide best efforts. Assuming that, in equilibrium, the seller puts in high effort, the buyer's expected payoff from suing upon receipt of a low quality good is 0.45 times the promised liquidated damage payment of d . The 45% probability captures that, before the buyer can recover, the court must mistakenly conclude that the seller puts forth low effort. In light of this diminished prospect of recovery, to induce a buyer with litigation costs of \$10 to sue requires that the seller promise to pay more than \$10 if found liable. Indeed, the seller must promise to pay about \$22 upon breach to motivate the low cost litigant to sue. Similarly, to induce the high cost litigant to sue, the seller must promise to pay much more than \$60, she has to promise to pay about \$133.

Given the infra-marginal effect, the seller will want to set damages just below what is necessary to attract the high cost litigant—at an amount of, say, \$ 132. First, consider the deterrence kick from the formal sanction under the best efforts clause. If the seller puts in high effort, the following three events must occur before she is required to pay damages of \$132.

- (1) The seller delivers low quality (with 25% probability);
- (2) The buyer sues (with 50% probability); and
- (3) The court determines that the seller failed to supply best efforts (with 45% probability).

To compute how often the seller pays the formal penalties if she exerts high effort, we multiply together the probability of each of these events. The expected damage payment, then, is this probability (0.056) times the promised damage award of \$132. Doing the calculation, the seller expects to pay about \$7.425 in damages if she exerts high effort.

⁴⁰ DaimlerChrysler Motors Co., LLC v. Manuel, 362 S.W.3d 160, 171 -173 (Tex.App.–Fort Worth 2012)

If the seller instead puts in low effort, the same three events must transpire before she pays the damage award. The difference with low effort is that the seller is both more likely to deliver low quality and more likely to be found as failing to supply best efforts. The relevant probabilities with low effort are

- (1) The seller delivers low quality (with 75% probability);
- (2) The buyer sues (with 50% probability); and
- (3) The court determines that the seller failed to supply best efforts (with 55% probability).

Contingent on low effort, the seller expects to pay damages with 20% probability. The expected sanction from the formal sanction is thus $0.20 \times \$132$, or \$27.225. The difference between the expected damage payment with low effort and the expected damage payment with high effort defines the deterrence kick from the legal sanction. In this example, the kicker is about \$19. Given that the seller gains \$20 from shirking, the prospect of the higher formal sanction alone is not enough to induce high effort. It falls \$1 short.

The lower deterrence shortfall, in turn, implies that the parties can reduce the deadweight loss from reputational sanctions. Suppose, to make the relatively small deterrence gap left by the formal sanction, the buyer suspends trade for one period upon a judicial finding of liability.⁴¹ Like in our original numerical example, the parties decide to combine the formal and the informal sanction. Notably, the informal sanction takes the same form as before: a one period suspension. Yet, the suspension occurs less frequently, making it less costly to the parties. The suspension occurs only if (1) the seller delivers low quality; (2) the buyer sues; and (3) the court determines that the seller failed to provide best efforts.⁴² Despite its reduced frequency, the threat of losing the business is enough to make the seller prefer high effort. But since the threat materializes less frequently, the seller is strictly better off. A simple calculation relegated to the footnote shows that the seller's long run payoff is about \$321.⁴³ This figure remains less than first best, but better than if the parties failed to incorporate the best effort clause.

In closing this section, a few caveats and a comment are in order. First, we assumed that the cost of litigating best efforts was the same as litigating over quality only. Given that litigation over best efforts involves two issues and litigation over quality involves one, the assumption seems hard to justify. Obviously, incorporating additional litigation expenses makes best efforts a less attractive option contracting option. The benefit of better formal sanctions and

⁴¹ Given that the deterrence shortfall is only \$1, the optimal reputational sanctions will be less than one period. We can assume that the buyer uses mixed strategy (on suspension) to achieve that outcome.

⁴² Although the buyer can still engage in reputational punishment against the seller whenever low quality is delivered (regardless of the litigation outcome), conditioning reputational sanctions on court's judgment is actually better because this produces more bang-for-the-buck. That is, the state represented by both (low quality) and (breach of best efforts) is more informative of the seller's misbehavior than any other state.

⁴³ In this example, the buyer is willing to pay $P = 75 + (.25 \times .5 \times .45) \times 132 - (.25 \times .5)10$. The second term is the buyer's expected damage payment. The third term is the buyer's expected litigation costs. The seller's per period profit is $P - 40 - (.25 \times .5 \times .45) \times 132$, or 33.75. Following the notation in the previous footnote, the seller's discounted stream of payoffs can be represented as $V = 33.75 + .9(1 - (.25 \times .5 \times .45))V + .9^2(.25 \times .5 \times .45)V$. Solving the expression for V gives $33.75 / [1 - (.9(1 - (.25 \times .5 \times .45)) - .9^2(.25 \times .5 \times .45))]$, which equals 321.

less frequent informal sanctions remain, however. The analysis would then entail trading off these additional benefits against the higher cost of litigation.

Second, the example shows that the parties are better able to tailor the informal sanction by conditioning the suspension of trade on the judicial finding of liability. Yet, in reality, most cases settle. The parties don't wait for the judge to determine what best efforts means. The point is well-taken, but shouldn't be overstated. Any signal from the judge about the effort will be useful. The parties might suspend trade in response to the denial of the seller's summary judgment motion or to the denial of the seller's motion to dismiss. All that matters is that the judicial signal contains some noisy information about the seller's actual effort. It does not have to be a final judgment. By incorporating best efforts into the contract language, the parties force the judge's hand. The judge must make findings about both effort and quality. The additional signal on effort will always be helpful to the parties in tailoring the reputational sanction.

Third, in long term agreements, any suspension of trade may be quite costly because the parties may need to find new trading partners. Consider a franchisor forced to find a new franchisee after discontinuing his relationship with one of his original franchisees. The franchisor must locate a new franchisee. He must train the new franchisee on maintaining the brand. Such switching costs could be substantial. Some of these costs are incurred each time the reputation penalty is unleashed. A best efforts clause in the original agreement ensures that these switching costs are incurred less often precisely because the reputation penalty occurs less frequently. This also leads us to predict that a best efforts term (or other fault-based standards) is more likely to be found in a contract where the parties bear large costs from discontinuation of the relationship. Exclusive dealerships and franchisee/franchisor contracts are two examples of such contracts.

III. Consumer Contracts and the Informational Role of Legal Sanctions

The numerical example above assumed two long-lived players, exemplary of the business to business relationship appearing in the relational contracting literature. The analysis easily extends to consumer contracts, where a business interacts with a series of different customers over time. Think of a car manufacturer, a toy producer or a producer of lawn-mowers selling products to individual buyers who purchase infrequently. When the seller manufactures low quality or defective product, the seller will be subject to both legal and reputational sanctions. Compared to the previous example, however, there are two important differences. First, for the reputational punishment to work, future consumers must somehow learn what has happened in the past. Without that information, consumers will not be able to engage in reputational sanctions. Second, unlike business-to-business dealings, the parties' ability to set their own legal regime, for instance, the remedy or the liability standard may be more limited. This will be especially true when products liability issues are concerned.

A. Overcoming Informational Challenges

In our relational contract setting, delivery of a low quality product (or combined with court's finding of violation of "best efforts" clause) triggered a suspension of trade. There, since the same buyer purchased repeatedly, she knew whether the delivered product was, in fact, low

quality and therefore justified halting trade. With consumer contracts, by contrast, delivery of a low quality product to one consumer might not be revealed to another consumer, who can then avoid buying the firm's products going forward. The lack of information transmission from one consumer to another can pose a significant hurdle in generating reputational sanctions. In practice, there are a few different channels that attempt to mitigate this informational problem.⁴⁴

First is through businesses or practices ("information intermediaries") that collect and disseminate information for market participants. A consumer thinking about hiring a plumber can consult Angie's List.⁴⁵ A patron thinking of going to a new restaurant can click on Yelp.com.⁴⁶ Ebay collects and posts reputational feedback scores about its sellers.⁴⁷ WebMD.com collects information about the quality of doctor practices.⁴⁸ Given the wealth of information in the marketplace, a firm that mistreats a customer has a fair chance of being found out by its future consumers. When information about product failures is transmitted through such information intermediaries, fear of lost future sales will serve as a deterrent for misbehavior.⁴⁹

Second is the set of more formal channels, and litigation can play an important role here. Like in the relational contracting setting, the same seller misconduct that gives rise to a loss of future business can also lead to a lawsuit. A customer can bring a contract suit against the plumber who installs sub-standard pipe. A customer can sue if the television set fails to perform as promised. Even if future consumers do not directly observe what has happened in the past, outcomes from litigation can be a valuable source of information for them to engage in reputational punishment. In that sense, litigation can play an important, facilitating role for reputational sanctions. Legal sanctions, rather than crowding out, can complement reputational sanctions.

Finally, government entities can also play an important informational role. Agencies, such as Food and Drug Administration (FDA), Federal Trade Commission (FTC), Federal Aviation Administration (FAA), National Highway Traffic Safety Administration (NHTSA), and Consumer Product Safety Commission (CPSC), not only provide information to the consumers about safety of various products and (potential) manufacturer misbehavior but also bring their own lawsuit against manufacturers. One important shortcoming of relying on consumer-driven litigation as source of information is that through different mechanisms, such as non-public arbitration and secret settlements out of court, the sellers can attempt to suppress the production

⁴⁴ When none of the channels effectively offer information to consumers, legal sanctions become even more important. When the market poorly transmits information about product quality, we should observe even more reliance on legal sanctions.

⁴⁵ www.angieslist.com.

⁴⁶ www.yelp.com.

⁴⁷ <http://pages.ebay.com/help/feedback/scores-reputation> (detailing the features of Ebay's reputational scoring system).

⁴⁸ www.webmd.com.

⁴⁹ Information aggregated through such intermediaries may not be entirely accurate. Some may be biased, while others are just noisy or irrelevant. Some intermediaries may be much better at providing useful, relevant information than others. So long as the aggregated information provides additional information about the entity's behavior, consumers can use that information to impose reputational sanctions. Also, as the aggregated information becomes less accurate, it will make relying on legal sanctions more attractive.

of information so as to avoid any reputational damage.⁵⁰ Government-initiated legal actions, by contrast, may be much more immune from such information suppression. Once consumers learn more about firm misbehavior (or product defect/mal-functions) from such sources, they can more effectively engage in reputational sanctions.

B. Strict Liability versus Negligence

As we saw in the discussion of the best efforts clause, the informational (complementary) role played by legal sanctions can be particularly strong when the court produces more information about the player's behavior. Strict liability is akin to making liability turn solely on the delivered quality. Negligence makes liability turn on both quality and some measure of the producer's effort. As with best efforts (and other fault-based standards), the latter legal regime can reduce the deadweight loss that stems from faulty reputational sanctions and provide a more effective deterrence.

The informational role played by legal sanctions leads us to point out another advantage of the negligence over the strict liability regime. The traditional law and economics analysis on the issue has focused mostly on the concerns over the activity level (e.g., when accident probability is also influenced by how much driving is done) or over double moral hazard problem (e.g., when both the injurer and the victim must take care to lower accident probability).⁵¹ When we think about this problem from the perspective of legal versus reputational sanctions, adopting the negligence standard provides an advantage of allowing better coordination among market participants. The additional, informational benefit of a negligence regime, of course, will have to be compared against additional cost of litigation. Perhaps the comparison can offer an explanation over why some firms adopt fault-based remedy while others use no-fault regime.

C. Mandatory Damages and Liability Standard

Greater informational challenges are not the only difference between business to business contracts and business to consumer contracts. Another important difference arises out of the parties' freedom in designing their legal system. The discussion thus far has assumed that the seller has the complete freedom to set the terms for damages resulting from poor or shoddy performance of a product. That freedom disappears when product defects cause physical injury—the classic case of products liability.⁵² The question, then, is whether our theory extends

⁵⁰ Seller's ability to control the amount of litigation in consumer contracts also has important consequences in the context of consumer contracts. The seller can offer a robust warranty, a limited warranty, or no warranty whatsoever. The seller can limit consequential damages. Subject to the unconscionability checks, the seller can impose favorable terms for arbitration via contract. In all these ways, the seller controls the amount of its formal liability. And so, the predictions of table 4 provide a way to think about consumer contracts too. When litigation costs are spread in the consumer population, we should observe damage caps, limits on consequential damages, and limited warranties. In these ways, the seller controls – but does not eliminate – legal exposure. Where seller effort can be observable and easily transmitted to other future consumers, the seller should rely almost entirely on informal sanctions. Where even a low-level of litigation is likely to be costly, reliance on informal sanctions is also most desirable.

⁵¹ Cite some literature here.

⁵² To see the difference between contract and products liability, consider two examples. Suppose first that a refrigerator fails to keep ice cream cold. In that case, the consumer has an action in contract. Absent defenses like fraud or unconscionability, this action will be governed by the terms of the agreement, including any limitations on

to products liability, where mandatory rules set by either the state legislature or courts are in play.⁵³ Irrespective of which institutional player decides on the mandatory rule, the choice presents the same tradeoffs identified in our example. The difference is that the policy maker steps into the shoes of our seller. For example, advocates for damage caps argue that they control litigation costs.⁵⁴ Like our seller, in considering damage caps, the policymaker wants to achieve deterrence at the lowest total cost, recognizing that both formal and informal sanction entail costs. Akin to a limited warranty, a damage cap for tort claims controls litigation costs, but forces the seller to rely more on reputation. We will return to consider products liability in more detail below. For now, it is sufficient to note that the tradeoffs revealed in the numerical example are of sufficient generality to include both a seller choice of a warranty provision and a policy-maker choice as to rules for products liability.

D. Predictions

Having done the heavy lifting of the numerical exercise, it makes sense to pause and summarize four predictions that flow from it. The next section investigates whether these predictions are consistent with existing empirical evidence and sociological accounts about the deployment of formal and informal sanctions. The first prediction is about the informational linkage. It may be roughly stated as that the filing or disposition of formal proceedings will trigger market or reputational sanctions. Further, the same event—the delivery of poor quality—can generate both litigation and reputation sanctions. We note in passing that the conventional contract theory, which relies on a strict dichotomy between verifiable and non-verifiable states,

the consumer's ability to recover. Suppose instead, the refrigerator malfunctions, catches fire and injures the consumer in the blaze. In this case, the consumer action sounds in tort. Any express warranty won't play a role. In addition, under UCC 2-318, the consumer can always sue if the breach of the warranty caused the injury. Finally, the seller in almost all cases cannot limit its liability for consequential damages that result in injury to a person. See U.C.C. 2-719(3) ("Limitation of consequential damages for injury to the person in the case of consumer goods is prima facie unconscionable.").

⁵³ The egg-shell skull rule, for example, is a judicially created rule stating that seller must pay all damages arising out of the accident, whether foreseeable or not. See *Vaughn v. Nissan Motor Corporation in U.S.A., Inc.*, 77 F.3d 736, 738 (4th Cir. 1996) ("The tortfeasor's duty of care is measured by the ordinary person, but the plaintiff's injuries may not be. In short, if [defendant] breached its objective duty of care, it must take the victim as it finds her."); see also Restatement (Second) Torts 402(A). Judicially created rules specify whether liability attaches from a negligent act by the seller or instead is a strict liability cause of action. Manufacturing defects are governed by a strict liability standard. See *Welge v. Planters Lifesavings Co.*, 17 F.3d 209, 212 (1994) ("The strict-liability element in modern products liability law comes precisely from the fact that a seller subject to that law is liable for defects in his product even if those defects were introduced, without the slightest fault of his own for failing to discover them, at some anterior stage of production."). Design defects are governed by a risk/utility calculation which comes close to mirroring a negligence standard. See Restatement of Products Liability § 2(b); Dan B. Dodds, *The Law of Torts* 980-81(2000) ("When the risk utility test is applied, the courts seem to be requiring negligence or at least some specifics of fault."). Judges decide what counts as a product misuse and thus what acts by the consumer truncate the seller's liability. See, for example, *Burkett v. Loma Mach. Mfg., Inc.*, 552 So.2d 134 (1989) (finding summary judgment for the manufacturer given substantial alteration of a saw.).

Other times the mandatory rules of tort are promulgated from the legislature. Some state legislatures have specified caps for non-economic damages for tort claims. See F. Patrick Hubbard, *The Nature and Impact of the Tort Reform Movement*, 35 *Hofstra L. Rev.* 437, 496-498 (summarizing state legislative efforts at damage caps). Others have restricted the reach of joint and several liability. See *id.* at 489-491 (summarizing state efforts to replace joint and several liability).

⁵⁴ Our framework does not extend to tort situations involving strangers. The lack of a transaction means that the parties cannot allocate the cost of litigation or the cost of effort via the price term.

cannot fully explain how both formal and informal sanctions (or incentives) can be triggered from the same event.

Second, the analysis also suggests a benefit of formal sanctions that informal sanctions lack: the infra-marginal effect. The presence of infra-marginal effect implies that formal sanctions, in many contexts, will be quite useful in designing the optimal deterrence regime. In other words, a complete elimination of legal liability should not be too prevalent. Sure, damage caps will be ubiquitous, useful for policing and controlling litigation expenses. But a modest amount of legal liability is needed both to generate information of misconduct to the marketplace and because legal liability carries with it the infra-marginal deterrence benefit. So, some mild legal sanctions should be present even when the market can and does effectively sanction misconduct.

Third, our analysis posits that parties in long-term relationship should instruct the courts to examine multiple noisy signals of respective parties' behavior to determine breach. This "instruction" can take the form of vague commands like best efforts, obligations to perform in a reasonable time and references to good faith. In consumer contracts, the prediction suggests that markets should be more reactive to a legal finding rooted in negligence than to a legal finding rooted in strict liability. The reason is now familiar: the negligence finding rests on two probative signals (harm and a judicial determination of fault) rather than one. As a result, breach of an obligation sounding in negligence provides more information to the market about seller's underlying conduct. Perhaps this can also explain, from the law and economics perspective, how the products liability has moved towards the negligence standard.

IV. Reconciling Theory with Practice

In this part, we take the numerical example developed in part II, with its attendant predictions, and compare it with the real-world practice. The purpose is not to argue that the model provides the only explanations but to show how the model can be consistent (or be reconciled) with certain observed behavior. We focus, in particular, on four sets of stylized empirics: (1) long-term contracts that often rely on fault-based standards; (2) consumer contracts that use both legal and market sanctioning mechanisms; (3) the classic, celebrated account of New York diamond merchants and cotton traders; and (4) securities litigation where both private and public enforcements are at play.

A. Long-Term Contracts, Vague Contract Language, and Good Faith

This first section deals with the prediction from our analysis as applied to transactions involving long term contracts. We start with some evidence on information linkage. In a study of venture capitalists, Vladimir Atanasov, Kate Litvak, and Vladimir Ivanov find that "litigated [venture capitalists] suffer declines in future business relative to carefully selected peers."⁵⁵ The key empirical move made by these scholars was to benchmark litigated VC against a group of VCs, which was similar in almost all respects except that VCs in that group did not face litigation. The finding that litigated VC suffered a decline in future business relative to the

⁵⁵ Vladimir Atanasov, Vladimir Ivanov, & Kate Litvak, Does Reputation Limit Opportunistic Behavior in the VC Industry? Evidence from Litigation against VCs, 67 J. of Fin. 2215, 2215 (2012).

benchmark group provides evidence that the same event—a lawsuit—can result in formal sanctions and reputational harm. A second study considered whether franchisors who faced litigation experienced declines in future growth.⁵⁶ The authors found that “franchisor litigiousness is associated with lower levels of expansion goals.” Again, the empirics suggest an information linkage between litigation and subsequent dealings.⁵⁷

Turning to the content of law prediction, as previously mentioned, most exclusive dealing and franchise contracts include a “best efforts” clause. Other clauses serve a similar role and can be found across lots of long term agreements. A clause in a lending agreement might, for example, allow the lender to accelerate payment on the loan if it believes, in “good faith,” that the borrower is unlikely to pay. A clause in a franchise agreement might require that the franchisor provide “reasonable notice” before termination or provide the franchisee with a “reasonable time” to recoup its investment in the franchise. Occasionally, even in the absence of an express obligation, courts read in such “reasonableness” obligations into the interpretation of the contract.⁵⁸ The analysis above suggests why these standard-like terms are so common. They allow—indeed encourage—the court to consider multiple noisy signals of effort to determine breach, saving the parties the cost of invoking reputational penalties too often.

In addition, through a vague clause, the parties delegate to the court the choice about which signals (or which extrinsic or other relevant evidence) to consider. Contracting parties might wish to delegate because, at the time of the drafting, they don’t know what signals will be available or their relative strength. That said, as noted, any delegation under a standard likely creates additional litigation costs, as the court feels enabled to look at multiple signals to find breach. Fearing the litigation cost but wishing to preserve the benefit of partial delegation, parties might attempt to demarcate what signals are out of bounds and can’t be used to interpret best efforts. The practice of listing several explicit clauses alongside a best efforts clause accomplishes this feat. It is also a practice common in exclusive dealing and franchise contracts.⁵⁹

Moving from the descriptive to the normative, the analysis also provides a way to flesh out the meaning of good faith in contractual arrangements. Under UCC Article 2, good faith is defined as “the observance of reasonable commercial standards of fair dealing in the trade.”⁶⁰ Judge Easterbrook has put a gloss on this phrase, stating that good faith referred to two situations:

“First, an effort to wring some advantage from the fact that the party who performs first sinks costs, which the other party may hold hostage by demanding greater compensation in exchange for its own performance....Second, there is an

⁵⁶ Kersi D. Antia , Xu (Vivian) Zheng , and Gary L. Frazier, Conflict Management and Outcomes in Franchise Relationships: The Role of Regulation, 50 J. Marketing Research 577 (2013).

⁵⁷ One might explain the results in both these studies through an adverse selection story. It runs like this: The litigation reveals that the firm is a bad type, one prone to litigation. Future partners learn as much and, as a result, are unwilling to deal with a firm involved in prior litigation. The data is also consistent with the moral hazard model we set forth. In the real world, we suspect, both adverse selection and moral hazard are in play.

⁵⁸ E. Allan Farnsworth, Contracts § 7.17 (4th ed. 2004)

⁵⁹ See Scott & Triantis, *supra* note __, at __.

⁶⁰ UCC §2-103.

effort to take advantage of one's contracting partner "in a way that could not have been contemplated at the time of drafting, and which therefore was not resolved explicitly by the parties."⁶¹

Our analysis adds an additional level to this well-known analysis. As the numerical example shows, contracting parties can be made better if the judge considers many noisy signals correlated with effort. One could view the obligation of good faith as a general delegation to the court to look for these noisy signals. At the same time, the analysis allows us to define what good faith is not. Good faith should not involve consideration of signals of performance that are, in a statistical sense, uninformative about the seller's effort. Conditioning liability on uninformative signals fails to provide anything in the way of incentives. It also does not reduce the cost of using reputational sanctions to complement the legal sanctions.⁶² One implication, perhaps, is this: in conducting a good faith analysis, a court should be less concerned with the fairness of the transaction and more concerned with whether what is being offered as evidence of bad faith relates closely to the actual effort of one of the parties.

B. Consumer Product And Automobile Safety

Two different formal mechanisms govern the safety of consumer products and automobiles. As a matter of regulation, the Consumer Product Safety Commission (CPSC) is charged with protecting the public from "unreasonable risks of injuries associated with consumer products." Governing over 15,000 different kinds of products, the CPSC has the power to impose civil fines and demand the recall of unsafe products. The failure to comply with a recall notice results in substantial penalties. Consumer product recalls can either be voluntary or triggered by a lawsuit filed by the CPSC. The National Highway Traffic Safety Administration (NHTSA) similarly regulates the safety of automobile safety. Like the CPSC, the NHTSA has the power to force a manufacturer to recall defective automobiles.

Second, products liability is a private cause of action brought by consumers injured by defective products. Damages are compensatory with punitive damage potentially available. Punitive damages are not related to the harm suffered by a victim, and in theory, can be quite large. In practice, however, punitive damages are capped in many states. In addition, any punitive award cannot be so unreasonably large as to amount to a violation of due process.

With respect to consumer product and automobile safety, consider first the information prediction. The evidence suggests that markets react to legal sanctions in the form of recalls and private lawsuits.⁶³ For example, Friedman et al. examined the response of consumers to a 2007

⁶¹ *Industrial Representatives v. CP Clare Corp.*, 73 F.3d 128, 129-130 (7th Cir. 1996).

⁶² To be precise, the court should consider all sufficient statistics for effort. If the additional signal does not contain more information than the signals already gathered, it should be ignored.

⁶³ See Ting-Heng Chu & Che-Chun Lin, An Extension of Security Price Reactions Product Recall Announcements, 44 *Quart. J. of Bus. & Econ.* 33 (2005) (examining "269 non-automotive product recall announcements that were published in the Wall Street Journal Index between January 1984 and December 2003" and finding "[c]onsistent with previous research, we find statistically significant negative, abnormal returns on, and one day prior to the announcement date."); other cites here.

recalls of toys and other children's products.⁶⁴ They found that "the types of toys that were involved in recalls in 2007 experienced above average losses in Christmas season sales."⁶⁵ Rhee and Haunschild similarly found significant changes in market values for companies experiencing extensive recalls.⁶⁶

Next consider the infra-marginal prediction. As noted, it suggests that the extent of formal sanctions should be capped with the prospect of some legal liability remaining. And that is what the landscape of products liability looks like. Damage caps are rampant.⁶⁷ But no state has gone so far as to eliminate products liability altogether. Our theory justifies the middling position many states takes with respect to punitive damages and products liability, more generally. Limitations on the reach of formal sanctions can be beneficial because they control litigation costs. Elimination may be an overkill, however, not only because it implies that more of the deterrence must come from informal sanctions, which are also costly, but also because formal sanctions, as empirical evidence supports, often provide beneficial coordinating function for the informal sanctions.

Finally take the content of obligation prediction. As originally conceived in the courts, products liability was a strict liability cause of action. Over time, the strict liability component has dwindled. Under the Third Restatement of Torts, strict liability only applies to manufacturer defect cases. Design defects and failure to warn cases are governed by a de facto negligence standard. Given that both formal and informal sanctions are in play with products liability, we view a push toward negligence as a positive development. The reason: a negligence finding by the court is more informative to the marketplace and saves on the cost of reputational sanctions.

Empirical support for the content of obligation prediction comes from a study of airline crashes conducted by Mark Mitchell and Michael Maloney. They found that when the Federal Aviation Administration finds that an airplane crash was due to a pilot error, the airline company suffers a larger drop in market valuation.⁶⁸

C. Diamond Merchants and Cotton Traders

⁶⁴ Seth M. Freedman et al., Product Recalls, Imperfect Information, and Spillover Effects: Lessons from the Consumer Response to the 2007 Toy Recalls, NBER working paper No. 15183 (2009).

⁶⁵ *Id.* at 1.

⁶⁶ Moowoon Rhee & Pamela R. Haunschild, The Liability of Good Reputation: A Study of Product Recalls in the U.S. Automobile Industry, 17 *Organization Science* 101 (2006). For older evidence of the same effect, see Robert R. Reilly and George Hoffer, Will Retarding the Information Flow on Automobile Recalls Affect Consumer Demand, 21 *Econ. Inq.* 444, 444 (1983) ("It was found that over the 1977-81 period, severe recalls adversely affected the demand for the model recalled, while benefiting substitutes of other manufacturers."). There is also a literature documenting stock price reactions to automobile recalls. See Peltzman studies here.

⁶⁷ After reviewing the empirical literature, Professors Polinsky and Shavell report that "for each dollar that an accident victim receives in a settlement or judgment, it is reasonable to assume that a dollar of legal and administrative expenses is incurred." Steven Shavell and A. Mitch Polinsky, The Uneasy Case for Products Liability, 123 *Harv. L. Rev.* 1436 (2010).

⁶⁸ Mark Mitchell and Michael Maloney, Crisis in the Cockpit? The Role of Market Forces in Promoting Air Travel Safety, 32 *J. L. & Econ.* 329 (1989).

Professor Bernstein documents that buyers and sellers in the diamond industry in New York have opted out of public enforcement of contracts.⁶⁹ Instead, for formal sanctions, they use a private arbitration system operated through the New York Diamond Dealers club. Details of any arbitration are kept secret. The club's bylaws, however, provide "[a]ll decisions of arbitration panels including floor committee arbitrations which are not complied with within 10 working days, together with the picture of the non-complying member shall be posted in a conspicuous place in the Club rooms." Unlike a state court, the arbitration panel lacks the ability to enforce the judgment on its own. It can't order, say, foreclosure of property or garnish the wages of parties who breach contracts.

Consider first the information prediction as applied to this market. Buyers and sellers form a close-knit community. Despite this fact, buyers and sellers don't rely exclusively on word of mouth for the transmission of information about deviant behavior. Some information comes through the arbitration panel, which serves to rat out those that don't comply with its rulings. The arbitration board also responds to misinformation. As found by Professor Richman, the board "can punish any party responsible for spreading inaccurate information about another reputation."⁷⁰ Here, the imposition of the informal sanctions is triggered by the formal sanction.

Second, take the infra-marginal prediction. Both formal and informal sanctions attach to opportunistic conduct. Jilted sellers and frustrated buyers can file a grievance with the arbitration panel. They can also refuse to deal with opportunistic counterparty going forward. Reliance on any formal sanction whatsoever is surprising in this market. After all, the buyers and sellers all know each other; they run in the same social and business circles. Informal sanctions can include preclusion from future social and business transactions. Given the potential power of informal sanctions, why go to the trouble of forming an arbitration panel? The infra-marginal deterrence benefit provides one rationale for why this close knit community still relies partly on formal sanctions.

One final observation is that the arbitration panel has the ability to ratchet up any award to include punitive damages. At first blush, this practice appears puzzling, since the parties may want to limit damages and rely more on informal sanctions when litigation is costly. Notably, the diamond industry draws arbitrators from industry insiders. As experts, they can perhaps balance the tradeoffs between formal and informal sanctions appropriately if the parties fail to do so themselves. Empowering the arbitration panel, then, to adjust the award up or down can make sense: with this flexibility, the arbitrators can opt for relatively more or relatively less reliance on formal sanctions, perhaps on a case-by-case basis. The arbitrators could tie the balance between the sanctions to fit the needs of parties.

Like the diamond industry, the cotton industry relies on a combination of formal and informal sanctions. Generally, buyers and sellers of cotton do not call on the courts for the enforcement of contracts; they rely on arbitration. In cotton transactions, trade rules—not the provisions of the UCC—govern transaction disputes and set the default rules. The Southern Mill Rules apply in merchant to mill transaction and grant "market difference damages plus a one-half cent per pound penalty." Consequential damages are not available. Rules from the regional

⁶⁹ Bernstein, *supra* note __ at 115.

⁷⁰ Cite here.

trade associations or the Memphis Cotton Exchange apply to most merchant to merchant transactions. These rules limit relief to the market damages, disallowing broader relief based on, say, lost profits. Limiting—but not the wholesale denial of relief—is consistent with infra-marginal prediction.

In this market, the prospect of a limited relief via arbitration means that the informal sanction can be weaker—any boycott can last fewer periods. At the same time, the cap on damages controls litigation costs. Indeed, the trade rules control litigation costs in other ways too. The arbitrators use a “relatively formalistic adjudicative approach that gives little explicit weight to elements of the contracting context.” The rules do not allow arbitrators to inquire course of dealing, course of performance, or trade usage, each inquiry ramps up the potential litigation costs for the parties. Bernstein finds that “in practice....arbitrators only look to custom when there are no trade rules or contract provisions on point.”⁷¹ In the end, cotton buyers and seller appear to balance an inexpensive formal remedy system with threats of informal sanctions.

D. Securities Litigation

Publicly traded securities, such as stocks and bonds on national exchanges, are subject to regulation, most notably under the Securities Act of 1933 and the Securities Exchange Act of 1934 and various regulations promulgated by the Securities and Exchange Commission (SEC). Among other things, these laws are designed to provide more accurate information to the investors and to prevent material misrepresentation. The laws are enforced through private rights of action and through actions, civil or criminal, instituted by the SEC. Damages for violations of these laws are thought to serve two purposes: to compensate harmed investors and to deter corporate misconduct in connection with the sale, purchase, or initial offering of securities.⁷²

Promulgated under Section 10(b) of the Exchange Act of 1934, rule 10(b)(5) is one of the most important sources of fraud prevention. Adopted by the SEC in 1942, this rule penalizes fraudulent activities in connection with the sale or purchase of a security.⁷³ Shortly thereafter courts began to imply a private right of action under the rule.⁷⁴ According to the Supreme Court in *Herman & McLean v. Huddleson*,⁷⁵ the “existence of this implied remedy is simply beyond peradventure.” In enforcing such private rights, class actions are often used. The social desirability of these class actions is subject to much debate.⁷⁶ In response to some criticisms of the class action process, in 1995 Congress passed the Private Securities Law Reform Act (PSLRA).⁷⁷ The PSLRA provides a number of protections designed to control litigation costs, minimize strike suits, and the agency problems between the lead plaintiff attorney and the class members.⁷⁸

⁷¹ Cite here.

⁷² Stephen J. Choi & A.C. Pritchard, *Essentials Securities Regulation* 103 (2008).

⁷³ 17 CFR 240.10b-5.

⁷⁴ *Kardon v. National Gypsum Co.*, 73 F.Supp. 798 (E.D. Pa 1947).

⁷⁵ 459 U.S. 375, 380 (1983).

⁷⁶ Cite large literature here.

⁷⁷ Private Securities Reform Act of 1995 (PSLRA), Pub. L. No. 104-67, 109 Stat. 737 (codified as amended in scattered sections of 15 U.S.C. (2006)).

⁷⁸ Stephen J. Choi, Jill E. Fisch & A.C. Pritchard, *Do Institutions Matter? The Impact of the Lead Plaintiff Provision on the Private Securities Litigation*, 83 Wash U. Law Quarterly 869, 871 (2005) (describing the motivations and

The characteristics of the securities market and the policies regulating securities transactions, including the PSLRA, are consistent with the predictions flowing from our theory.⁷⁹ First take the information prediction. Investors are dispersed and unlikely to observe a firm's effort at preventing (or committing) misrepresentation. Unless there is a formal finding or an action by some entity, such as the SEC, individual investors are unlikely to find out whether a firm has made a material misstatement in its filings or committed a fraud, including insider trading.⁸⁰ A government investigation can greatly facilitate private action by producing relevant information on unlawful behavior.

Second, take the infra-marginal prediction. Private securities litigation is quite expensive. In 2012, the average settlement amount for a securities class action was \$36 million, with a median settlement value of 12 million.⁸¹ The plaintiff attorney's take of these settlements ranged between 38.8 percent and 12.6 percent.⁸² Although the high percentage of recovery for the attorneys does not perfectly translate to high cost of litigation, one would presume that there is at least a rough correlation between the two. Given such a high litigation cost, one also sees an attempt to limit liability and damages in a number of ways. Investors can recover only the difference between the price paid and the value absent fraud. Plaintiff must prove recklessness, materiality, and a causal relationship between the fraud and the sale. In addition, the PSLRA enhanced the pleading standard, making it more difficult for the plaintiff to succeed at the motion to dismiss stage. Some of these policy choices are designed to weed out nuisance suits as well as more generally controlling litigation costs. Notably, the prospect of some legal liability remains, but the law makes effort to cap damages. Like with products liability, the contours of the law are consistent with a balance of concerns about excessive litigation costs against the infra-marginal deterrence benefit and informational value of formal sanctions.

Empirical evidence for the information prediction comes from Karpoff, et. al.. They find that securities misrepresentation is deterred through both legal and market channels.⁸³ Investigating 585 firms subject to SEC enforcement actions, they uncovered that

“The penalties imposed on firms through the legal system average only \$23.5 million per firm. The penalties imposed by the market, in contrast, are huge. Our point estimate of

provisions of the PSLRA); see also Joel Seligman, The Private Securities Reform Act of 1995, 38 Ariz. L. Rev. 717, 725 (1996) (same).

⁷⁹ As with the data on VCs and franchisors, one can tell an alternative story for this evidence based on adverse selection, which is also consistent with the data. It goes like this: The fraud lawsuit reveals that the firm is a bad type; as an institution it is unable to detect and control fraud. Given this new information, the market discounts the value of the shares. This adverse selection story, however, is inconsistent with the evidence that many firms accused of fraud return to levels of performance similar to matched firms that didn't experience such lawsuits. See discussion *infra* note ___ and accompany text. Our theory, by contrast, is consistent with both findings. In reality, however, we suspect that both theories are potentially in play.

⁸⁰ Cite Dyck and Zingales about who blows the whistle on securities fraud.

⁸¹ Renzo Comolli et al., Recent Trends in Securities Class Action Litigation: 2012 Full-Year Review (figures 25 & 26).

⁸² *Id.* at figure

⁸³ Jonathan M. Karpoff et al., The Cost to Firms of Cooking the Books, 43 J. Fin. & Quantitative Analysis, 581 (2008).

the reputational penalty...is over 7.5 times the sum of all penalties imposed through the legal and regulatory system.”⁸⁴

Other empirical studies support that the relationship between investors and firms are restored after the initial punishment. Evidence comes from Marciukaityte, et. al.⁸⁵ They examine the long run performance of firms accused of fraud and find these long run measures were comparable to a control set of firms. In a related study, Bai, et. al. find that firms who “settle class actions experience no significant decline in [long run] sales.”⁸⁶ These evidence suggests that while the market’s punishment can be quite harsh in the short-run, in the long-run, the firms can restore their tarnished reputation and successfully come back to the market.

One final area of law where reputation seems to play an important role is in initial public offerings. Since the firm that is offering to sell its securities, usually stock, to the public may be doing so for the first time in its history, the firm may have a hard time pledging its reputational capital as a bond. Formal sanctions may not work very well either especially if the firm has an intention of committing a securities fraud and has insufficient assets. Where formal and informal sanctions against the primary actor may be insufficient, reputational capital of the gatekeepers, notably the investment banks and law firms, can fill this important deterrence gap. Evidence supports that the investment banks’ reputation can greatly aid the IPO process. Prospective investors are better assured of the fundamental value of the company when a more reputable investment bank is representing the public offering. While the investment bank’s assets may be insufficient to cover any potential liability, vicarious reputational punishment can have the desirable effect on preventing material misrepresentation in the IPO process.

Conclusion

This paper started with a question: what is the relationship between formal and informal sanctions? In most relational contracts and consumer contracts both seem to be in play. As

⁸⁴ Id. at 581. Many other studies find significant negative abnormal returns following the announcement of a lawsuit or the underlying fraud. See Paul A. Griffin, Joseph A. Grundfest, & Michael A. Perino, Stock Price Response to News of Securities Fraud Litigation: An Analysis of Sequential and Conditional Information, 40 ABACUS 21 (2004); Stephen P. Ferris & A.C. Prichard, Stock Price Reactions to Securities Fraud Class Actions Under the Private Securities Reform Act, working paper 01-008, University of Michigan John M. Olin Center for Law and Economics (2001); James Bohn & Stephen Choi, Fraud in the New Issues Market: Empirical Evidence on Securities Fraud Class Actions, 144 U. Pa. L. Rev. 903 (1996); and Roberto Romano, The Shareholder Suit: Litigation without Foundation, 7 J. L. Econ. & Org. 55 (1991). Unlike the Karpoff et al. discussed in the text, these studies do not attempt to disentangle the legal penalty from the reputational penalty. It could be that the abnormal negative returns reflect only the reduction in share value arising out of the payment of damages and the litigation costs arising from the lawsuits, nothing more. That said, these findings are also consistent with the market punishing the firm by more than the amount at stake in the litigation. For more evidence on the reputational effects of corporate misconduct, see Lott paper.

⁸⁵ Dalia Marchukaityte, et. al., Governance and Performance Changes After Accusations of Corporate Fraud, Fin. Analysts J., May-June 2006, at 32.

⁸⁶ Lynn Bai, et. al., Lying and Getting Caught: An Empirical Study of Effect of Securities Class Action Settlements on Targeted Firms, 158 U. Pa. L. Rev. 1877, 1912 (2010). As a caveat, these firms did experience some liquidity problems and worsening Altman Z-score which measures the financial health of a company. The observations also lead to more testable predictions. For firms where proving fraud is relatively difficult, we should observe relatively more extensive reputational sanctions following a suit. On the other hand, for firms where proving fraud is less difficult, we should observe relatively less severe reputational sanctions following suit.

Stewart Macaulay identified long ago, contracting parties don't rely solely on formal contracts to ensure commitment.⁸⁷ But they don't rely exclusively on reputation sanctions either. They write enforceable contracts and terminate relationships. The analysis revealed three points, which we reiterate one last time for emphasize here.

First, legal sanctions and reputation sanctions are both costly to deploy. The key task for contracting parties is to reach the desired level of deterrence at the lowest total cost of the sanctions. In so doing, the parties are apt to recognize that more of one type of sanction means less of the other type is required. The optimal mixture will then often entail a little bit of both. Second, legal sanctions can form the informational basis for unleashing reputational sanctions. Without the legal sanction, the market or other trading partners can't learn when to punish. In this way, even when litigation is quite costly it can nonetheless be desirable. Reputation penalties won't work without it.

With respect to the informational role, conditioning liability on proxies for effort—through a best efforts clause, negligence, or the good faith standard—can improve the functioning of both the legal sanction and the reputational sanction. The proxies provide additional noisy signals above what the court receives in “no fault” regimes (regimes where liability turns only on delivery of low quality). Subject to litigation cost concerns, the court should consider signals correlated with effort until the next signal to be examined provides no more information than what can be found in the prior ones. This recipe can be used to ground judicial investigations into good faith.

Third, legal sanctions bring an infra-marginal benefit that reputational sanctions lack. This effect rationalizes why legal sanctions are often capped—but not entirely eliminated in—contract and tort. Caps control litigation costs while preserving some of the infra-marginal and informational benefit of the formal sanction.

In closing, the paper calls out for empirical testing of the hypotheses. The numerical example is consistent with much existing empirical evidence, but none of those papers were developed with this analysis in mind. One might wonder whether reputational sanctions are usually triggered by litigation or alternatively if reputational sanctions arise frequently absent litigation. Second, we set aside issues of adverse selection. What if litigation revealed information about the seller's underlying ability to keep his promises not just his willingness to do so? Would the market or trading partner completely learn about the seller's ability over time? How much litigation would be desirable in such a setting, more or less than in settings involving just moral hazard? We leave questions like these for future work.

⁸⁷ Stewart MacCaulay, *Noncontractual-Relations: A Preliminary Study*, 28 *Amer. Soc. Rev.* 1 (1963).