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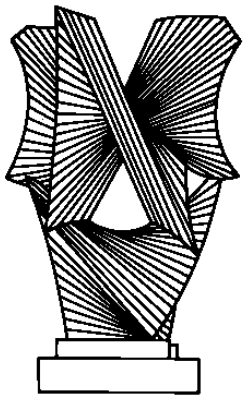

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Abstract

Like constructing a building, performance on many contracts occurs in phases. As time passes, the promisor sinks more costs into performance and less expenditure remains. For phased performance, we show that optimal liability for the breaching party decreases as the remaining costs of completing performance decrease. In brief, efficiency requires a *decreasing liability contract*. To implement such a contract, we recommend deducting past expenditure on incomplete performance from liability. We show that progress payment contracts, which are commonplace in some industries, are materially equivalent to decreasing liability contracts. Our analysis should prove useful for elucidating progress payment contracts and for drafting and litigating phased contracts.

Decreasing Liability Contracts

Robert Cooter and Ariel Porat*

Like constructing a building, performance on many contracts occurs in phases. As time passes, the promisor sinks more expenditure into performance and less expenditure remains. Unless the parties specify otherwise in the contract, the breaching party in a phased contract is liable under positive law for the entire losses suffered by promisee because of breach, subject to some well-known limitations.[1] This default rule, however, often produces inferior incentives. We analyze how liability for breach should ideally change through the phases of a contract. We show that deducting past expenditures from liability often improves incentives.

The following example illustrates our analysis.

> Example 1: Promisor's Sunk Costs—Buyer and Developer make a contract in which Buyer immediately pays Developer 90 for promise to construct a building that Buyer values at 100. Developer spends 40 on architectural drawings and a concrete foundation, which cannot be recovered or reused. Developer defaults. Buyer fails to find an alternative builder and abandons the project without receiving any benefit from it. Breach causes Buyer to lose 100. Should Developer's liability to Buyer equal 100 or 60?

Under positive law, liability for breach of a phased contract equals promisee's expected value of performance minus benefit conferred by partial performance.[2] In Example 1,

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[1] Limitations include unforeseeability, uncertainty and mitigation of damages. See *Restatement of the Law Second, Contracts 2d* §§ 350-2; E. Allan Farnsworth, *Contracts* (3rd. ed., 1999) 806-35.

[2] Farnsworh, *ibid.*, at p. 803; *Restatement of the Law Second, Contracts 2d* §347, Comment b.

however, there is no benefit to Buyer, so Developer's liability equals 100. Even so, deduction might be desirable. The desirability of deduction depends partly on the decision makers' goals. We especially consider the goal of maximizing the contract's value to its parties. The general question posed by Example 1 is, "How does deducting or not deducting past expenditures from breaching party's liability affect the parties' incentives to maximize the contract's value?"

Our answer to this question follows from two simple facts about incentives. First, in many circumstances, the promisor will breach or perform depending on which is cheaper. When performance occurs in phases, less expenditure remains as time passes, so lower damages are typically sufficient to induce performance. Consequently, any negative affects on promisor's incentives from deducing past expenditures decrease with time.

Second, turning from promisor to promisee, we note that promisee can often increase the probability of performance or lower its costs by assisting promisor. For example, Buyer in Example 1 may assist Developer in obtaining construction permits or reveal to him information necessary for performance after the contract was made**.** Reducing damages improves promisee's incentives to assist promisor's performance. If promisor cannot observe or verify promisee's assistance, then requiring promisee's assistance by a term in the contract or a rule of law will be ineffective. Furthermore, liquidating damages, which effectively prevents promisee's over-reliance, does not induce promise's assistance.[3]

Combining these facts about incentives, we conclude that, when promisor's performance is phased and promisee can assist performance in unobservable or unverifiable ways, a *decreasing liability contract* usually maximizes the contract's value. Liability can decrease at many different rates. For practical reasons that we explain later, we recommend a specific rate of decrease. Specifically, we recommend setting breaching

[3] Liquidated damages are invariant with respect to reliance. Consequently, liquidated damages solve the problem of over-reliance by making promisee internalizes the risk of marginal reliance. Robert Cooter, "Unity in Tort, Contract, and Property" 73 *Cal. L. Rev.* 1 (1985). Liquidated damages, however, do not solve the problem of promisee's assistance. To see this fact, note that the usual formula for optimal liquated damages sets them equal to the loss that breach would cause a promisee who relied at the efficient level. Under these conditions, however, promisee will be fully compensated for breach, so he has no incentive to reduce its probability by assisting promisor.

party's liability equal to promisee's losses minus breaching party's past expenditures on performance. In Example 1, this recommendation results in liability of 60.[4]

Contracts scholars and transaction lawyers do not currently use our phrase "decreasing liability contract." Many industries, however, use contracts requiring Buyer to make payments to Seller for completing each phase of a contract. In the event of Seller's breach, a nonrefundable progress payment is materially equivalent to a deduction from Seller's liability. Progress payment contracts are, consequently, materially equivalent to decreasing liability contracts.

Contracts scholars and transaction lawyers do not speak about "a decreasing liability contract." They are silent, we suspect, because they do not fully appreciate the problem of assisting performance. Promisor's interest in promisee's assistance, which we call the "assistance interest," has attracted insufficient attention from scholars. The part of the problem that they appreciate concerns explicit terms in contracts requiring one party to assist the other. To illustrate, Buyer may have an obligation to assist Seller by preparing to receive a delivery of goods. Perhaps scholars mistakenly think that contracts protect the assistance interest adequately through explicit terms. In fact many contracts remain silent about assistance. For example, terms imposing unobservable or unverifiable acts are best omitted because enforcement is ineffective. When a contract cannot effectively impose an obligation to assist, a deduction from damages must provide the required incentives. The problem that scholars neglect and we address is finding the optimal deduction from damages to protect the assistance interest. Our analysis should prove useful for understanding, drafting, and litigating decreasing liability and progress payment contracts.

Our paper begins with a general discussion of contractual liability and incentive effects. Part I contrasts alternative liability rules and Part II explains the ideal contract for the promisor and promisee's incentives. These two sections concern contracts in general,

[4] For simplicity we assume throughout the paper that all past costs cannot be recovered or reused. Our analysis does not change, however, if part of the costs can be recovered or reused, provided that the recovery or reuse has value less than past costs. We could reframe our examples and analysis under the more general (but more complicated) assumption that partial performance creates some value that is less than past costs. Under positive contract law, if past costs create value for the aggrieved party, breaching party's liability will equal expected value of performance minus the value created. (See *supra* text accompanying note 2.) Deducting the value of partial performance from damages would not change our analysis.

including both phased and abrupt performance. Parts III and IV turns to phased contracts and develops a model of decreasing liability. Part V introduces the possibility of renegotiation into the model. Part VI discusses progress payment contracts and other implementations. Part VII explains the advantages of decreasing liability contracts over other legal mechanisms. Part VIII identifies conditions in which decreasing liability contracts are best. Part IX provides perspective and a conclusion about decreasing liability contracts. The first appendix develops the main example in the paper more explicitly and the second appendix contains a mathematical model with proofs of our propositions.

I. Forms of Liability

We begin by characterizing some alternative forms of liability. Positive law encompasses three major damage measures: expectation, reliance, and restitution.[5] Example 2 represents each one.

> Example 2: Alternative Damages—Buyer and Developer make a contract in which Buyer immediately pays Developer 90 for promise to construct a building. In reliance on the contract, Buyer spends 5 preparing to move. Buyer values performance at 100. Developer spends 40 on architectural drawings and a concrete foundation, which cannot be recovered or reused. Developer defaults. Buyer fails to find an alternative builder and abandons the project without receiving any benefit from it. What is Developer's liability?

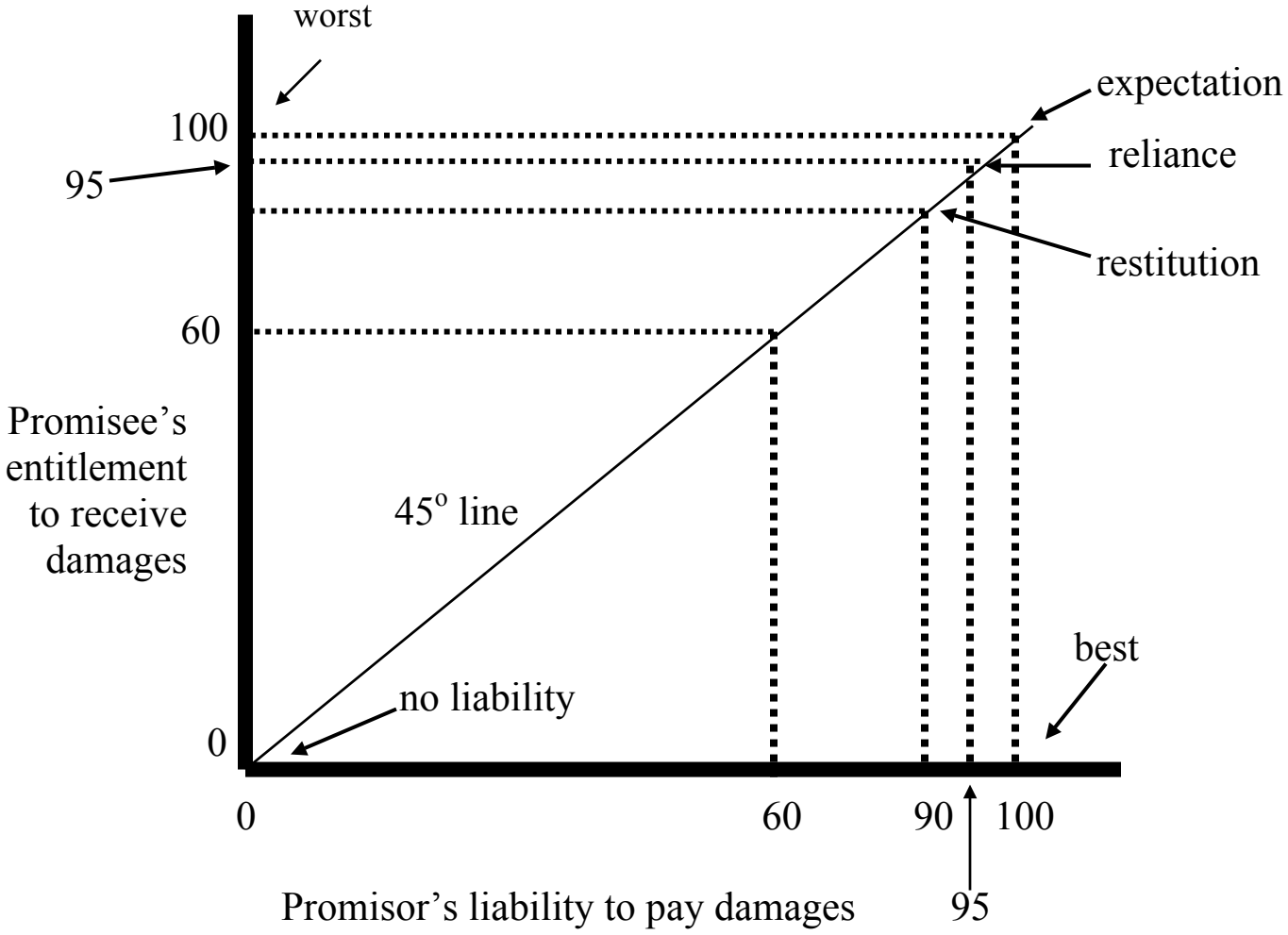
Damages for loss of the contract's *expected* value, which is the usual legal remedy, require Developer to pay 100 to Buyer. Damages for *reliance* require Developer to return the payment of 90 and also pay 5 in compensation for Buyer's expenditures on moving preparations. *Restitution* only requires Developer to return the payment of 90. The axes in Figure 1 represent the promisor's liability to pay damages and the promisee's entitlement to receive damages. Notice that this progression from expectation to reliance to restitution moves downs the 45^{o} line in Figure 1 from (100,100) to (95,95) to (90,90).[6]

Figure 1 applies to all contracts, including contracts where performance is abrupt or phased. Now we explicitly relate Figure 1 to phased contracts. In a phased contract, decreasing liability implies that the contract moves down the 45^{o} line as the promisor

[5] L.L. Fuller & W. Perdue, "The Reliance Interest in Contract Damages" 46 *Yale L.J.* 53 (1936).

goes through the phases of performance. We advocate taking expectation damages as the baseline and moving down the 45° line according to the extent of breaching party's expenditures. Expectations is the "baseline" and breaching party's past expenditures are the "deduction." To illustrate by Example 2, Developer's breach *before* he makes any expenditures yields liability corresponding to point (100,100), whereas Developer's breach after he spends 40 yields liability corresponding to point (60,60). Thus we propose liability of 100 or 60 depending on whether or not promisor has made the expenditures of 40 by the time of breach.

Figure 1: Liability and Entitlement



[6] Note that punitive damages and disgorgement damages can move up the 45° line past the point (100,100).

II. Anti-insurance

How does moving down the 45° line affect the contract's value? Before answering this question, we will explain why the ideal point is not on the 45° line. To have incentives to maximize the contract's value, each party should internalize the contract's costs and benefits for both of its parties. To supply both promisor and promisee with efficient incentives, each of them should bear the full loss that breach causes the other party, as well as his own loss. In Example 1, Developer internalizes the costs of breach when liability to pay damages equals 100. In Example 1, Buyer internalizes the cost of breach when the entitlement to receive damages equals 0. Consequently, Figure 1 describes the point (100,0) as "best" with respect to the incentives of the two parties.[7]

In law one party's liability to pay damages equals the other party's entitlement to receive damages. This is also true for liquidation clauses in contracts that stipulate damages. Thus the default rules of positive law and two-party stipulations can be represented as points on the 45° line. The best incentives for the two parties, however, require promisor's liability to exceed promisee's entitlement.[8] Specifically, the point (100,0) is best for the incentives of both parties.

To get off the 45° line, the parties must contract with a third party. In another paper we propose a mechanism called "anti-insurance" to achieve this result.[9] Anti-insurance is a contract that includes the two parties to the original contract and a third party called the "anti-insurer." In such a contract, promisee assigns his potential right to damages to the third party before anyone knows whether a breach will occur, and third party pays for the assignment. If a breach subsequently occurs, promisor pays expectation damages to third party, and promisee receives no damages, which corresponds to the point (100,0) in Figure 1. Consequently, both promisor and promisee internalize the full costs of the breach. By improving incentives, anti-insurance can significantly increase the value of a contract in principle and the three parties can share in the expected gain. We

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[7] Conversely, Figure 1 describes the point (0,100) as "worst" with respect to the incentives of the two parties.

[8] Getting off the 45° line is called "decoupling" damages paid and received. See A. M. Polinsky & Y.K. Che, "Decoupling Liability: Optimal Incentives for Care and Litigation" 22 *Rand J.Economics* 562 (1991).

[9] Robert Cooter and Ariel Porat, "Anti-Insurance" 31 *J. Leg. Stud.* 203 (2002).

call such a contract "anti-insurance" because it improves incentives by increasing risk, whereas an insurance contract erodes incentives by spreading risk.

III. Best Constrained Point

Since anti-insurance is unavailable in markets, this paper does not consider the best point in the space of Figure 1. Instead we confine consideration to alternatives on the 45^o line where damages paid by breaching promisor equal damages received by promisee. We look for the point on the 45^o line that creates incentives for the two parties to maximize the contract's value. Movement along the 45^o line involves a tradeoff: Starting from any point on the 45^o line, moving down the 45^o line generally worsens promisor's incentives by externalizing more of the expected harm from breach. However, moving down the 45^o line generally improves promisee's incentives to assist promisor's performance. Promisee's incentives improve because promisee internalizes more of the expected gain from assisting promisor's performance.

As explained, the 45^o line represents different points of a tradeoff between promisee's and promisor's incentives. Expectation damages (100,100) is an unlikely candidate for the best constrained point. At this point the promisor has fully efficient incentives to perform, but the promisee has no incentive to assist the promisor. Deducting a small amount from damages paid by promisor and received by promisee would decrease promisor's incentive to perform and increase promisee's incentive to assist. In many contracts, the promisee's first dollar spent on assisting increases the contract's value more than promisor's last dollar spent on performing. In these circumstances, moving *slightly* down the 45^o line from the point (100,100) increases the contract's value. The following proposition, which the appendix proves, summarizes this argument.

> Proposition 1: Assume that promisor's liability for breach equals expectation damages. Also assume the first dollar spent by promisee on assisting performance increases the contract's value by more than the last dollar spent by promisor on performing. Given these assumptions, a small reduction in damages increases the contract's expected value.

In circumstances described by Proposition 1, the law's presumption in favor of expectation damages does not maximize the contract's value. Note, however, that the best

point on the 45° line is usually much closer to expectation damages (100,100) than to no liability (0,0), because the promisor's incentives are usually more important to the contract's value than the promisee's incentives. Moving part of the way down the 45° line, but much less than half way, will often improve incentives.

Replacing expectation damages with reliance or restitution damages moves part way down the 45°, but much less than half way. Since reliance and restitution damages have this effect, the reader might expect us to advocate them. We accept that reliance or restitution damages often provide better incentives for the two parties than expectation damages. The gain from providing an incentive for promisee's assistance often exceeds the cost of reducing incentives for promisor's performance. However, the optimal distance to move down the 45° line bears no necessary relationship to reliance or restitution. Advocating reliance or restitution damages would disguise the reason that we regard as most fundamental for reducing damages below the expectation level. Incentivizing promisee to assist promisor is a different goal from protecting promisee's reliance or restoring the balance required by fairness. Expectation damages is the correct baseline, but the optimal deduction from the baseline does not depend on reliance or fairness. A different goal requires a different name.

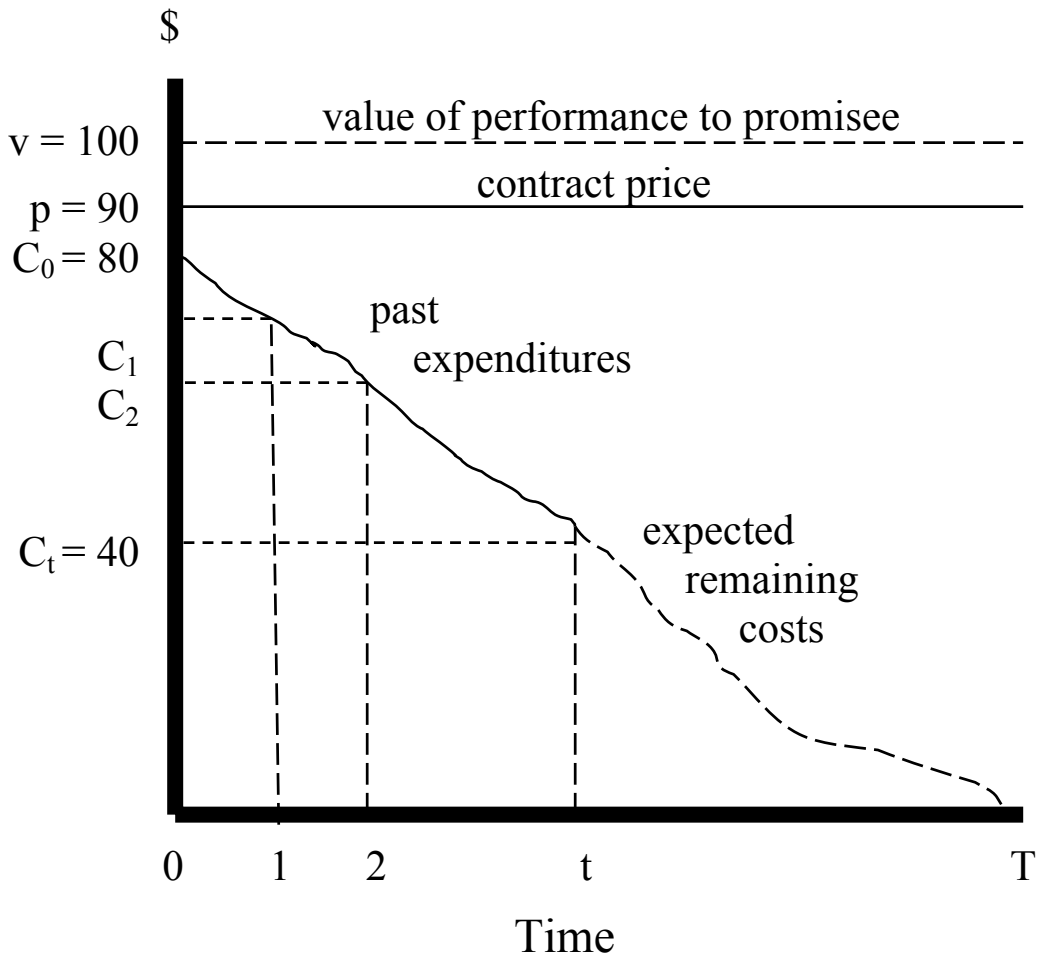
We have been discussing damages for breach generally. This paper, however, focuses specifically on phased contracts. We will show that in contracts where promisor performs in phases and promisee's assistance matters, deducting breaching party's past expenditures from expectation damages typically provides better incentives than no deduction. Consequently, the best name for an optimal phased contract is "decreasing liability contract."

IV. General Model of Phased Performance With Promisee's Assistance

To develop a model of phased contracts, Figure 2 depicts a promisor with numerous decisions. At time 0 promisor decides to accept a price p in exchange for a promise whose performance creates v for the promisee. To remain consistent with Example 2, Figure 2 sets p = 90 and v = 100. Expenditure on performance occurs in discrete phases enumerated 1,2,3,…T. At any phase the promisor can choose to default or else make an expenditure that is necessary to go on to the contract's next phase. If

expenditure at any time falls below the necessary level, promisor defaults. The downward sloping curve in Figure 2 indicates the promisor's costs that remain to complete performance, with the discrete points connected by a continuous curve. To illustrate concretely, at time 0 the promisor's expected remaining costs equal 80, so we have $C_0 = 80$. In Figure 2, the present time is t. Expenditures before t are in the past, and expenditures after t are in the future. At time t, promisor has already spent 40 and he expects that 40 more remain, so we have $C_t = 40$.

Figure 2. Decreasing Expected Costs in Phased Contract



Now we characterize how the promisor makes decisions. At each phase t, promisor defaults or continues performing according to whether the expected remaining expenditures C_t exceed liability L_t, which we write

$$\begin{array}{lll} C_t \leq L_t & \Rightarrow & \text{continue performing.} \\ C_t > L_t & \Rightarrow & \text{default.} \end{array} \qquad (1)$$

Consider the promisor depicted in Figure 2 who correctly anticipates future costs of performance. By the decision rule (1), the promisor will perform provided that liability at each point in time exceeds expected future costs C_t. Consequently, we have the following proposition, which the appendix proves.

> Proposition 2: With each phase of the contract, the expected liability required to induce performance decreases.

Thus the minimal liability sufficient to induce performance at each phase corresponds to a decreasing liability contract.

Proposition 2 has several important implications. Compared to a constant liability contract, a decreasing liability contract can provide sufficient incentives for promisor to perform, while also providing better incentives for promisee to assist. Equivalently, a constant liability contract impairs promisee's incentives unnecessarily, especially near the contract's final phase when very small damages are sufficient to induce promisor to perform.

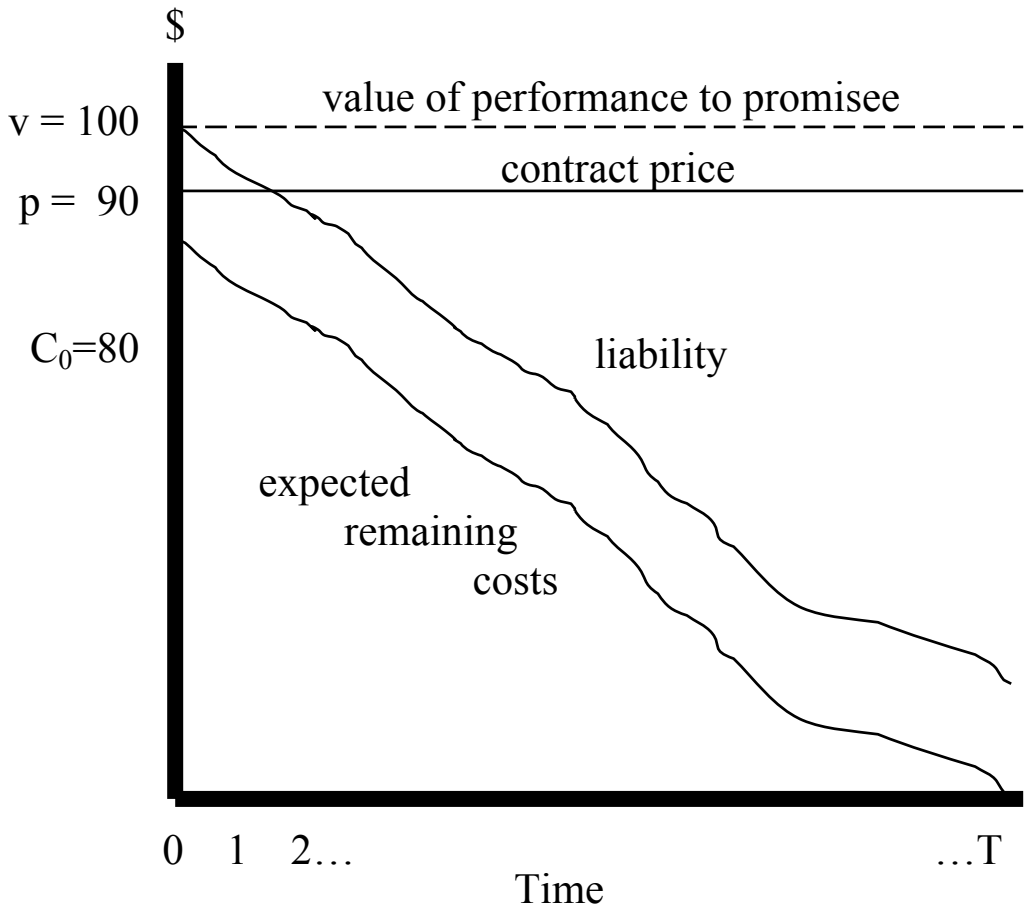
Now we consider a schedule in which liability equals expectation damages minus past expenditures. Figure 3 depicts this liability curve.[10] The fact that the cost curve is below the liability curve everywhere in Figure 3 implies that performance is cheaper than liability at each phase. This observation establishes the following proposition:

> Proposition 3: If past expenditures are deducted from expectation damages, and if promisor correctly estimates future costs of performance, then promisor performs at every phase of the contract.

[10] The formula is $L_t = v - C_t$ at each point in time t. When promisor's expectations prove accurate, the liability curve always exceeds the expected future cost of performance by the difference between promisee's value of performance and promisor's initial expected cost of performance, or $v - C_0$.

Proposition 3 has an important implication: Predictability favors deducting past expenditures from liability. When expenditures are predictable, deducting them provides sufficient incentives for promisor and better incentives for promisee.[11]

Figure 3. Decreasing Liability



In this contract, promisee's incentives to assist increase as promisor's performance progresses.[12] Thus promisee has relatively weak incentives to assist at the contract's beginning and relatively strong incentives at its end. We do *not* recommend

[11] Note that if remaining future expenditure were observable, then liability could equal remaining future expenditure plus $1. This rule would eliminate the problem of inefficient breach. Unfortunately, remaining future expenditures are usually unobservable, so this liability rule is impractical.

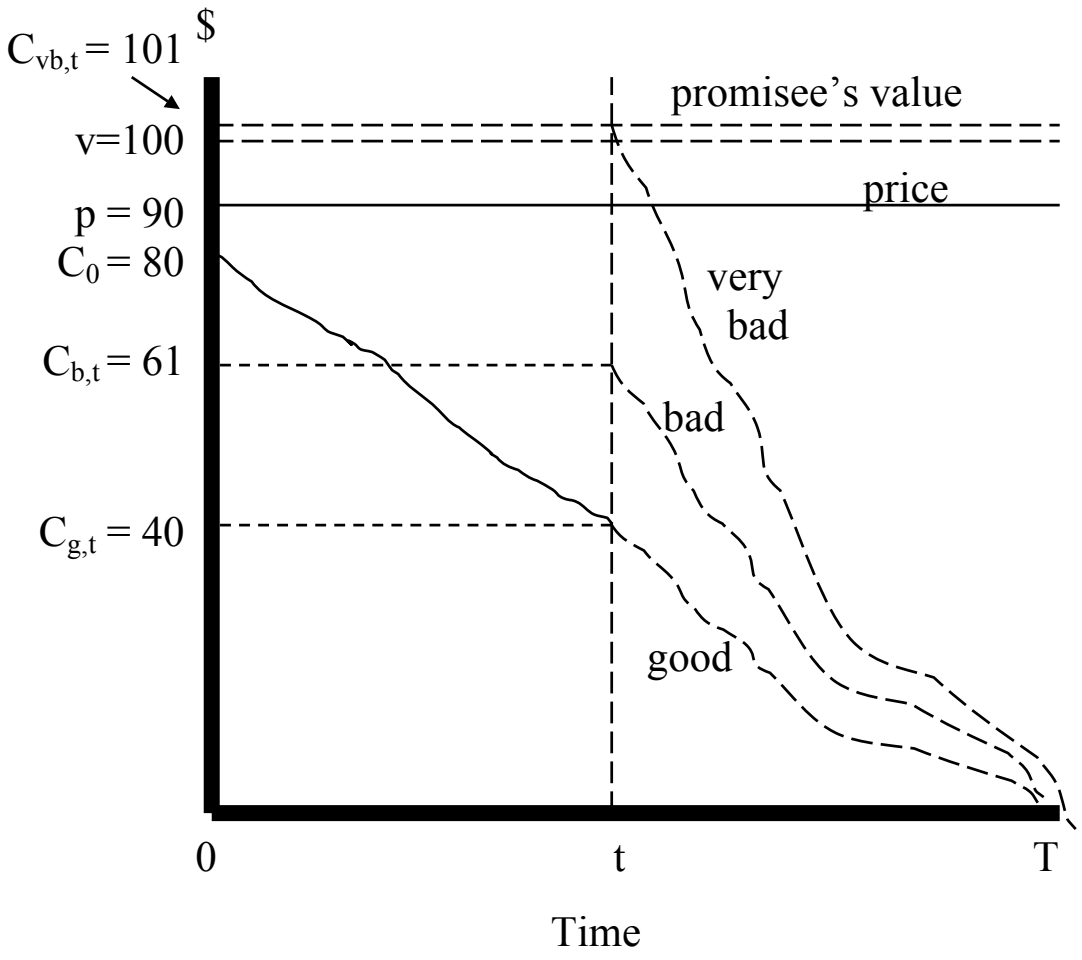
[12] Sometimes the pattern is different. It may happen that breach occurs at a point in time when partial performance created value to the promisee that equals past costs. In these circumstances, a decreasing liability contract that deducts past costs from expectation damages fully compensates the promisee, because damages equal the value of full performance minus the benefit received from part performance.

this arrangement because we think that promisee's incentives are typically more important at the contract's end than its beginning. Rather, we assume that promisor's incentives are more important than promisee's incentives, so promisee's incentive should be improved only when doing so does not undermine promisor's incentives. At an early stage of the performance, strong promisee's incentives are too detrimental to promisor's incentives, so the parties cannot afford them. At a later stage, after the promisor incurs past costs, the parties can afford improving the incentives of the promisee, because promisor's incentives remain sufficient for performance.

So far we have analyzed situations where promisor correctly anticipates future costs. In these circumstances, Proposition 3 states that performance is induced by a level of liability equal to expectation damages minus past expenditures. Now we consider the consequences of surprises, which we distinguish into three types: good, bad, and very bad news. News about costs is good if past and remaining costs of performance equal or fall short of the value of performance to the promisee. To illustrate by our example, news is good at time t if remaining costs equal or fall short of 60. An example is the "good news" line in Figure 4, where remaining costs at time t equal 40. News is bad if the past and remaining costs of performance exceed the value of performance to the promisee. To illustrate, news is bad if remaining costs exceed 60.[13] The "bad news" line in Figure 4 is the lower bound where remaining costs at time t equal 61. News is very bad if the remaining costs of performance exceed the value of performance to the promisee. To illustrate, news is very bad if remaining costs exceed 100. The "very bad news line in Figure 4 is the lower bound where remaining costs at time t equal 101.

[13] Note that the jump in remaining costs to 61 makes this into a *losing contract* in the sense that the expected *total* costs (past and future) equal 40+61, whereas the value of performance equals 100**.**

Figure 4: Good, Bad, and Very Bad News



According to these definitions, good or bad news (but not very bad) implies that remaining costs of performance to promisor are less than its value to promisee. Performance, consequently, is efficient. If, however, news is very bad, then remaining costs of performance exceed its value, so nonperformance is efficient. The boundary between bad and very bad news thus forms the boundary between efficient performance and efficient nonperformance. To illustrate by our example, whether performance or nonperformance is efficient at time t depends on whether the remaining costs of performance exceed or fall short of 100.

Now we turn to the incentive effects of surprises. As we just explained, efficiency requires the promisor to perform in response to good or bad news, and not to perform in response to very bad news. Setting liability for breach equal to expectation damages

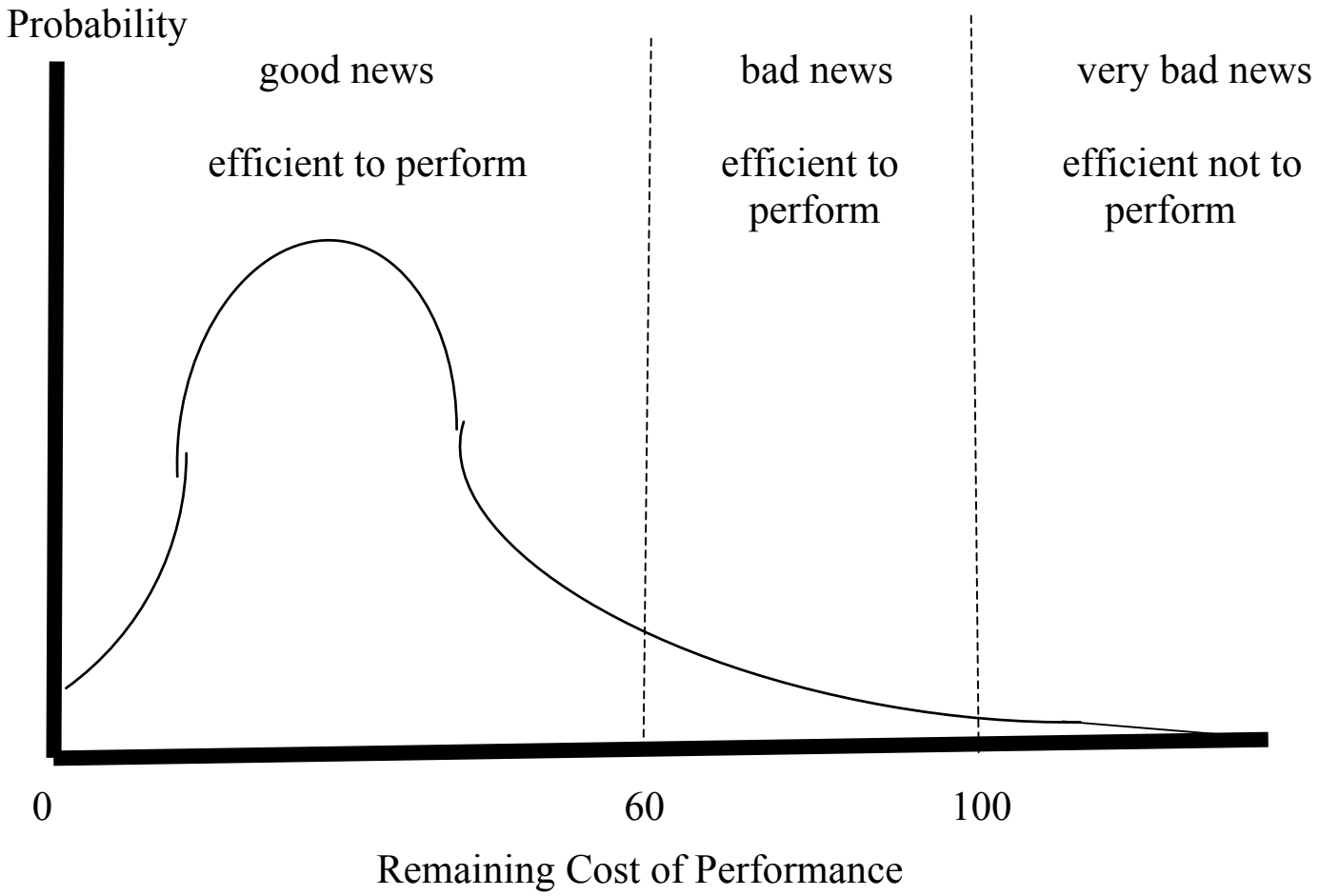
causes the promisor to internalize the benefits of performance to promisee as required by efficiency. Consequently, expectation damages cause promisor to perform in response to good or bad news, and not to perform in response to very bad news. To illustrate the effects of expectations damages by our example, if liability at time t equals 100, then promisor performs as long as remaining costs do not exceed 100, and does not perform otherwise.

While expectation damages provide efficient incentives to promisor, lower damages do not. Specifically, setting liability equal to expectation damages minus past expenditures on performance causes the promisor not to perform in response to bad news, which is inefficient. To illustrate by our example, if liability at time t equals 100-40, then promisor does not perform as long as remaining costs exceed 60. A decreasing liability contract, consequently, causes promisor to respond to bad news by not performing, even though efficiency requires performing. Bad news is problematic for promisor's incentives in decreasing liability contracts, but *very* bad new is unproblematic. A decreasing liability contract causes promisor to respond to very bad news by not performing, which is what efficiency requires.

Figure 5 summarizes these facts and the resulting problem. The horizontal axis represents remaining costs of performance at time t and the vertical axis represents their probability. The three zones in Figure 5 indicate the probability of good, bad, and very bad news at time t. In the left zone, news is good and completing performance is efficient. In the middle zone, news is bad and completing performance is efficient. In the right zone, news is very bad and completing performance is inefficient.

We have explained that liability for expectation damages provides efficient incentives to promisor, regardless of whether news is good, bad, or very bad. Liability for expectation damages minus past expenditures on performance, however, provides efficient incentives for promisor who receives good or very bad news, and inefficient incentives for promisor who receives bad news. If the probability is large that costs fall in the middle range of Figure 5, then decreasing liability contracts risk undermining promisor's incentives. If the probability is small that costs fall in the middle range, however, then deducting past expenditures from liability runs little risk of undermining promisor's incentives.

Figure 5: Response to Unwelcome Surprises



Note that Figure 3 depicts the vertical distance between the liability curve and the expected future cost curve as equal to 20. In Figure 3, 20 is the amount by which future costs can exceed original expected costs without affecting promisor's decision to perform. Thus 20 is the margin for error without harmful incentive effects. If costs remain on their expected course as depicted in Figure 3, the margin for error remains constant in absolute size. However, as the contract progresses through its phases, the margin for error increases as a proportion of expected remaining costs. To illustrate, the margin for error equals 20/80 or 25% at time 0, and it equals 20/40 or 50% at time t. Consequently, the magnitude of the error in predicting future costs required to cause breach increases as the contract progresses.

These observations yield our fourth proposition:

> Proposition 4: Assume that liability equals expectation damages minus past expenditures. Also make certain reasonable assumptions about the probability of errors in predictions. Then the longer the contract progresses as predicted, the lower the probability of breach.

Proposition 4 implies that the probability density in the zone labeled "bad" in Figure 4, which is the problematic area for promisor's incentives, decreases as the contract progresses.[14]

Having explained the problem of bad news, we return to the question of why we recommend the particular form of a decreasing liability contract in which the nonperforming party pays expectations damages minus past costs. Expectation damages are the correct baseline because they cause the promisor to internalize fully the cost of nonperformance. Past costs are the best deduction for two practical reason. First, past costs provide sufficient margin for error that promisor seldom receives bad news that causes inefficient nonperformance. The promisor who has sunk costs in the project usually has sufficient incentives to perform, even without internalizing the full cost of nonperformance. Second, "past costs" are sufficiently easy to observe and verify that these terms figure frequently in everyday contracts or legal rules applied to them.

In some circumstances, adjusting the deduction for past costs makes sense. To illustrate, if the parties feel that "bad news" is likely, they might prefer to stipulate a deduction equal to *half* of past costs. Instead of adjusting the deduction for past costs, however, the parties might calculate the deduction on an entirely different principle. Fundamentally different principles of deduction are easy to imagine, but, on examination, they usually have practical or theoretical objections. To illustrate, an appealing alternative is to deduct *future* costs from expectation damages. In reality, however, future costs are more speculative and easily manipulated that past costs. The practical advantage in drafting contract terms or rules strongly favors past costs rather than future costs.

[14] An implication of Proposition 4 that we do not investigate here is that, under certain assumptions, the optimal contract not only provides for decreasing liability with time, but also liability decreases at an increasing rate. For practical reasons such complicated liability schedules are unlikely to be used.

V. Renegotiation

This section asks whether the possibility for renegotiation increases or decreases the attractiveness of decreasing liability contracts. Two reasons typically cause parties to renegotiate a contract. First, when circumstances change, modifying the contract can avoid inefficient behavior and increase the contract's expected value. As we will explain, the possibility of avoiding inefficient behavior by renegotiation makes decreasing liability contracts more attractive. Second, when bargaining power changes, one of the parties may demand modification to redistribute the contract's value. Demands for redistributive modifications slow performance and waste transaction costs. As we will explain, decreasing liability increases the effectiveness of threats of nonperformance by irrational promisors and repeat players, which makes decreasing liability contracts less attractive.

We begin our analysis of renegotiation by discussing commitment. In general, an actor commits to doing an act by increasing his cost of not doing it. Specifically, making an enforceable promise commits the promisor to performing by increasing the cost of not performing. A promise is credible so long as performing costs the actor less than not performing. We have been discussing a contract whose performance occurs in phases. If events unfold as anticipated, promisor finds that performing is cheaper at each phase than not performing, so the promise to perform is credible and a threat not to perform is incredible. This is true regardless of whether the contract stipulates constant liability or decreasing liability.

What about threats by the promisee not to assist promisor? In our model, promisee's assistance is unobservable and unverifiable. Given this fact, promisee cannot effectively promise to assist, nor can promisee effectively threaten not to assist.

Although promises and threats are ineffective, incentives to assist can be effective. As we have shown, a decreasing liability contract gives better incentives for promisee's assistance than a constant liability contract.

We have explained that, for constant or decreasing liability contracts, threats not to perform are incredible so long as events unfold as anticipated. The situation is different, however, when promisor receives disappointing news. Figure 5 distinguishes disappointing news into "bad news" and "very bad news." As explained, very bad news is

unproblematic, because performance is inefficient and promisor will not perform under a constant or decreasing liability contract. Bad news, however, is problematic, because performance is efficient and promisor will not perform under a decreasing liability contract. In other words, bad news gives promisor a credible threat of nonperformance under a decreasing liability contract.[15]

Our earlier analysis of Figure 5 concluded that parties who make a decreasing liability contract run a risk that bad news will cause inefficient nonperformance. The possibility of renegotiation and modification can ameliorates this problem. Instead of inefficient breach, promisor can credibly threaten to breach unless promisee agrees to modify the contract's terms and pay promisor more. The parties can presumably agree on terms that give each of them a share of the surplus from performing rather than not performing. Courts should enforce such a value-increasing modification, where bad news motivates renegotiation.

Our analysis of rational behavior and credible threats concluded that the possibility of renegotiation increases the attractiveness of decreasing liability contracts relative to constant liability contracts. Now we consider irrational behavior and incredible threats. Choosing the action with higher net costs is ordinarily irrational, but people sometimes do it. For example, experiments in behavioral economics show that people will often reduce their own objective payoffs to prevent someone else from gaining an unfair advantage.[16] As another example, a repeat player may undertake the more costly action in a particular situation to gain the future advantage of a reputation for toughness. In this situation, the repeat player's local irrationality is globally rational.

A threat is effective, whether rational or not, if the hearer believes that the speaker may act on it. The speaker is presumably more likely to act if the threatened action costs less. Consequently, promisor's threat against promisee is presumably more effective if the threatened action costs the promisor less. To illustrate, assume that not performing cost promisor 50 and performing costs promisor 40. Since promisor loses 10 from nonperforming, promisor's threat not to perform is incredible. If promisor is irrational or

[15] *Cf.* Ian Ayres and Kristin Madison, "Threatening Inefficient Performance of Injunctions and Contracts" 148 *U. Pa. L. Rev.* 45 (1999-2000).

[16] Ernest Fehr and Simon Gachter, "Altruistic Punishment in Humans" 415 *Nature* 137 (2002).

a repeat player, however, promisor's threat may be effective. Presumably the threat would be even more effective if nonperformance causes promisor to lose 5 rather than 10

Holding constant the probability that the threatening party will act, the threat is also more effective if its consequences are worse for the threatened party. To illustrate, promisor's threat not to perform is more effective if promisee losses from nonperformance increase from 20 to 25.

With these observations in mind, we compare the effectiveness of promisor's threats in constant and decreasing liability contracts. In terms of Figure 1, a constant liability contract is a point on the 45^{o} line, and a decreasing liability contract is a movement down the 45^{o}. Lower liability makes the threat of nonperformance less costly for the promisor to carry out, which increases its effectiveness. Similarly, lower damages make nonperformance more costly to the promisee, which also increases the threat's effectiveness. So, starting from any constant liability level, decreasing liability below that level increases the effectiveness of the promisor's threat not to perform, and the threat becomes more effective if liability decreases with time.

To summarize our analysis, the possibility of renegotiation makes decreasing liability contracts more attractive by reducing the probability of inefficient nonperformance and less attractive by increasing promisees' vulnerability to threats of nonperformance by repeat players and irrational promisors.

VI. Progress Payment Contracts and Other Implementations

Earlier we explained that transaction lawyers use progress payments to achieve the same incentive effects as decreasing liability. We will explain how to choose parameters so that any decreasing liability contract is equivalent to a progress payment contract, and vice verse. First, however, we need to discuss the general problem of the timing of payments.

In Example 1, Buyer pays 90 upfront for Developer's promise to build the building. Instead of paying upfront, assume that Buyer wants to postpone payment until time T, when the building is scheduled for completion. Postponing payment until time T makes no difference to our analysis so long as Buyer's obligation to pay depends *only* on time. To illustrate, Buyer in Example 1 could pay Developer upfront with a bond of 90

that falls due at time T. Using a bond shifts Buyer's payment in time, and, assuming Buyer's solvency, leaves the other features of the contract unchanged, including its incentive effects.

The analysis changes, however, if Buyer's obligation to pay depends on Developer's performance. To illustrate, we modify our example so that Buyer promises to pay contingent on Developer completing the building.

> Example 3: Buyer's Contingent Payment—Buyer and Developer make a contract in which Buyer promises to pay 90 for Developer's construction of a building that Buyer values at 100. The contract stipulates that the full payment falls due on completion of the building. Developer spends 40 on architectural drawings and a concrete foundation, which cannot be recovered or reused. Developer defaults. Buyer fails to find an alternative builder and abandons the project without receiving any benefit from it. Breach causes Buyer to lose 10, which is the difference between the Buyer's value of performance and the contract price.

When positive law is applied to Example 3, Developer who breaches after phase 1 must pay expectation damages of 10. Expectation damages, however, create an incentive problem that we have already analyzed. Specifically, Developer's liability of 10 makes Buyer indifferent between Developer's performance or breach, so Buyer has deficient incentive to assist Developer's performance. In contrast, a decreasing liability contract gives Buyer an incentive to assist Developer.

To improve incentives, the parties in Example 3 might change their contract into a decreasing liability contract. To create decreasing liability, the contract should stipulate that breaching Developer pays expectation damages minus past expenditures on performance. Note that Developer who breaches after the contract's first phase owes expectation damages of 10 minus past expenditures of 40, or liability of –30, which means that Buyer owes 30 to Developer. "Negative liability"[17] of 30 seems odd if you think of Developer as getting paid 30 to breach. The result, however, does not seem odd if you think of Developer as getting 30 if he breaches and 90 if he performs, for a net loss of 60 from nonperformance.

Actual contracts often achieve the equivalent result through progress payments. In a typical contract, Buyer promises to make progress payments to Developer for completing each phase of the project and to pay a bonus for completing the entire project.

[17] Thanks to Barry Adler for suggesting this phrase.

In the event that Developer does not complete the project, the parties just walk away. That is, Developer retains the progress payments and Buyer receives no damages.—We modify our example to embody these facts.

> Example 4: Progress Payment Contract—Buyer and Developer make a contract for the latter to construct a building that Buyer values at 100. In the first phase, Developer will spend 40 on architectural drawings and a concrete foundation. After Developer completes the first phase, Buyer will make a progress payment of 40. After these steps, Buyer or Developer can renounce the contract with no further consequences. If the contract is renounced, architectural plans and concrete foundation cannot be recovered or reused. In the second phase (assuming there is one), Developer will complete the building at an additional cost of 40. Buyer will make another progress payment of 40 plus a completion bonus of 20.

Now we want to show the material equivalence of incentive effects in progress payment contracts and decreasing liability contracts. First consider the incentives of Developer to renounce the contract in Example 4 after phase one. Developer will renounce or complete depending on the difference in payoffs. By renouncing (which is not a breach of contract), Developer's future net payments equal 0. By completing, Developer's future net payments equal the completion bonus. So the completion bonus of 20 represents Developer's incentive to complete rather than renounce.

Compare this to the decreasing liability contract. In the later, Developer who breaches after phase one pays expectation damages of 100 minus past costs of 40, for a net payment of 60, and Developer who decides to complete performance will spend an additional 40. So the difference between 60 and 40, which equals 20, represents Developer's incentive to complete performance rather than breach.

We explained that incentives for promisor to perform are 20 for the progress payment contract and 20 for the decreasing liability contract. Thus the Developer's incentive to perform are materially equivalent under the two contracts. Next we show the material equivalence of Promisee's incentives to assist.

If Developer renounces the progress payment contract after completing phase one, Promisee's future net payoffs equal 0. If Developer completes phase one and then decides to complete phase two, Promisee's future net payoffs equal the value of performance, 100, minus progress payments in phase two of 40 and the completion bonus of 20, for a net payoff of 40. So 40 represents Promisee's incentive to assist Developer in phase 2.

Now compare to the decreasing liability contract. In the later, Developer who breaches the contract after phase one pays Promisee the value of performance 100 minus costs incurred of 40, for a net payoff of 60. If Developer completes the contract, Promisee receives the value of performance 100. So 40 represents Promisee's incentive to assist Developer in phase 2.

We have explained that the incentives for promisee to assist are 40 for the progress payment contract and 40 for the decreasing liability contract.

Now we state the generalization underlying this example, which the appendix proves.

Proposition 5: For any decreasing liability contract, there exists a progress payment contract with materially equivalent incentives for promisor's performance and promisee's assistance, and vice versa.

Although very difference in appearance, appropriate choice of parameters makes these two contractual forms materially equivalent.[18] Progress payments are common in a variety of contractual settings involving interdependence between the parties, where unobservable and unverifiable assistance is required. Examples include making a movie, building a computer program to buyer's specifications, retaining an attorney in complex litigation, or most complex construction projects.[19]

VII. Mechanisms in Contract Law to Give Efficient Incentives to Both Parties

We recommend that transaction lawyers use decreasing liability contracts for conditions where both parties need incentives to increase the contract's value. The law has legal mechanisms to induce promisee's assistance and promisor's performance. Unlike decreasing liability contracts, however, these mechanism cannot reach unobservable or unverifiable forms of effort. We cannot discuss all of these mechanisms,

[18] Note this difference in our example: The progress payment contract in Example 4 gives all of the surplus to Developer, whereas the decreasing liability contract we discussed divides the surplus equally between them (v = 100; P = 90; C = 80). To make Example 4 produce an equal division of the surplus, we could add this sentence. "On signing the contract, Developer gives 10 to Buyer as proof of commitment to proceed." In general, payments made at the contract's beginning influence the attractiveness of making the contract, but do not necessarily effect future behavior.

but we will discuss some of them. Specifically, we will discuss stipulating a duty to assist, a defense of comparative negligence, and limiting damages to reliance damages or some other measure of damages smaller than expectation damages.—We will not discuss mitigation of damages and liquidated damages, which reduce promisee's over-reliance without improving promisee's incentives to assist in performance.[20]

Stipulating an explicit duty to assist in performance. When assistance by the promisee is observable and verifiable, stipulating a duty to assist (or making assistance by the promisee a precondition to performance) is a possible way to improve the promisee's incentives. Besides being possible, this is a good way when the transaction costs of drafting the relevant terms are moderate. However, this mechanism is ineffective when drafting is too costly or the promisee's assistance is unobservable or unverifiable. In these circumstances, a decreasing liability contract is desirable because it does not suffer from these limitations.

Comparative negligence defense. The comparative negligence (or fault) defense, which is generally not recognized by American contract law, is a second mechanism that can give efficient incentives to both parties to the contract.[21] Under the comparative negligence rule, promisee's unreasonable failure to assist performance may reduce damages from breach.[22] Like the previous mechanism, however, the comparative negligence defense suffers from one main drawback: It is effective only when assistance is observable and verifiable.

Limiting liability. A third mechanism is limiting liability to reliance damages or to any other measure of damages that is below expectation damages.[23] To illustrate by Example 1, the contract could stipulate that liability equals 80 instead of 100. In contrast

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[19] Victor Goldberg analyzes various complex contracts with some of these features. *See* Victor Goldberg, "Bloomer Girl Revisited or How to Frame an Unmade Picture" [1998] *Wisc. L. Rev.* 1051 (1998); Victor Goldberg, "The Net Profits Puzzle" 97 *Colum. L. Rev.* 524 (1997).

[20] The mitigation of damages defense is effective only after breach (or anticipatory breach) and therefore does not affect pre-breach reliance. As to liquidated damages, *see supra* note 3.

[21] Although it gained some recognition in warranty cases, probably because of their affinity to tort cases. *See* James J. White & Robert S. Summers, *Uniform Commercial Code* 410-13 (5th ed., 2000).

[22] For comparative negligence in contracts, and for various attitudes toward it in various jurisdictions, see Ariel Porat, "Contributory Negligence in Contract Law: Toward a Principled Approach" 28 *U. B. C. L. Rev.* 141 (1994); Ariel Porat, *Comparative Fault in Contract Law* (1997) (Hebrew). For a comparative negligence approach in contracts , see *S.J. Groves Co. v. Warner Co.* 576 F. 2d 524 (3d Cir. 1978).

to the preceding mechanisms, limiting liability will improve the promisee's incentives to assist, even if his behavior is unobservable and unverifiable. This mechanism, however, is generally inferior to decreasing liability for phased contracts. In phased contracts, the optimal damage schedule is dynamic and adapts the level of damages to changed circumstances. The changed circumstances are the changing amount of past costs, which cannot be recovered or reused. As more costs sink into performance, the efficient level of damages, taking into account both parties incentives, decreases. Consequently, for any constant damage measure, a superior decreasing damage measure exists.

VIII. Identifying Contracts in Which Efficiency Requires Decreasing Liability

The preceding model identified two factors that determine the efficiency of decreasing liability: the benefit of improving the promisee's incentives and the cost of undermining the promisor's incentives. In this section we elaborate on these two factors and characterize contracts where decreasing liability is best.

A. Improving the Incentives of the Promisee

Promisee can often assist performance and take precaution against breach in various ways. To the extent that these efforts are unobservable or unverifiable, a legal duty to perform them is unenforceable, regardless of whether the duty is stipulated in the contract or inferred from a legal doctrine such as contributory or comparative fault.[24] In such circumstances, however, under-compensation gives the promisee an incentive to assist, and the incentive increases as damages decrease. To illustrate by Example 1, under-compensation gives Buyer an incentive to help Developer to obtain building permits and reveal information necessary for performance after the contract was made, even if the efforts are unobservable or unverifiable. This example exemplifies a wide category of cases where promisee's assistance in performing the contract could prevent a breach or reduce its likelihood.

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[23] For the argument that reliance damages supply better incentives to the promissee to cooperate than expectation damages or liquidated damages, see Yeon-Koo Che and Tai-Yeong Chung, "Contract Damages and Cooperative Investments" 30 *Rand J. Econ.* 84 (1999).

[24] *Supra*.

Sometimes courts recognize the importance of assistance by the recipient of performance, and even imply comparative negligence-like principles or contractual duties of cooperation. Some examples are elaborated in the footnote.[25] Note, however, that unobservable or unverifiable contractual or legal obligations are ineffective.

Next we describe some forms of promisee's assistance where observation or verification is difficult.

> Example 5: Revealing Information Necessary for Performance—Developer promises to build a building for Buyer. After partly performing, Developer encounters difficulties in completing performance due to geological obstacles to construction. Buyer easily could have acquired information concerning those obstacles**,** but refrained from doing so.[26] Buyer's lack of effort is unobservable and unverifiable. Developer begins construction and encounters geological obstacles that cause default.

Expectation damages from breach in Example 5 gives Buyer no incentive to acquire or disclose information concerning geological difficulties. The situation changes when damages fall below the expectation level. Each fall in damages gives Buyer

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[25] See: *AMPAT/Midwest v Illinois Tool Works, Inc*. 896 F.2d 1035, 1041 (7th Cir. 1990), where Judge Posner said: ". . . the parties to a contract are embarked on a cooperative venture, and a minimum of cooperativeness in the event of unforeseen problems arise at the performance stage is required even if not an explicit duty of contract".

Similarly, in *Market Associates v. Frey*, 941 F.2d 588, 595-96 (7th Cir. 1991), Judge Posner maintained: "It is true that an essential function of contracts is to allocate risk. . . . But contracts do not just allocate risk. They also (or some of them) set in motion a cooperative enterprise… which may to some extent place one party at the other's mercy... At the formation of the contract the parties are dealing in present realities; performance still lies in the future. As performance unfolds, circumstances change, often unforeseeably; the explicit terms of the contract become progressively less apt to the governance of the parties' relationship… and the scope and bite of the good faith doctrine grows".

For a case where the court reduced damages due to the non cooperation of the plaintiff, *see S.J. Groves Co. v. Warner Co.* 576 F. 2d 524 (3d Cir. 1978). Groves was a subcontract for the replacement of a bridge's concrete decks parapets. Groves contracted with Warner for the delivery of concrete to the site. Because of defaults of Warner in performance Groves had to remove and replace defective slab from the site. Groves sued Warner for his losses. It was proved that Groves's crew also functioned inefficiently and weather conditions were extremely unfavorable. The district court found Werner liable for breach of contract, but award Groves only for one-fourth of the losses associated with the slab. The Federal Court of Appeal for the 3rd Circuit affirmed the trial court decision, reasoning that since both parties contributed to the loss "… The action of the trial judge in dividing the loss between the parties was a fair solution to a difficult problem…". For another case of the same type, see *Lesmeister v. Dilly* 330 N.W. 2d 95 (Minn. 1983).

[26] Alternatively, Buyer refrained from obtaining the information for fear that Developer would accuse him of possessing it when the parties originally contracted. Generally, courts are not willing to recognize one party's implied duty to provide the other with information during the performance of the contract. See H. Collins, "Implied Duty to Give Information During Performance of Contracts" (1992) 55 M.L.R. 556. *Cf Bank of Nova Scotia v. Hellenic Mutual War Risks Association (Bermuda) Ltd, The Good Luck* [1989] 3 All E. R. 628, 664 *et seq.* (C.A.).

stronger incentives to acquire and disclose the information. Foreseeing these facts, the parties might recognize that a decreasing liability contract improves incentives relative to a constant liability contract.

> Now we turn to an example of misunderstandings.
>
> Example 6. Clarifying Misunderstandings—Seller mistakenly renders defective or delayed performance, thus breaching the contract. Buyer knew or could easily have known about Seller's misunderstanding but did not take any steps to prevent it. Had Buyer clarified the misunderstanding, Seller would not have breached the contract. Proving that a misunderstanding caused Seller's breach or that Buyer knew or could easily have known about Seller's misunderstanding, is difficult or impossible.[27]

By assumption, stipulating a duty by Buyer to clarify misunderstandings in Example 6 is ineffective. Under-compensating Buyer, however, would encourage him to prevent misunderstandings.

Finally we turn to an example of high losses.

> Example 7. Warning for Potentially High Losses—Seller promises to deliver unique goods to Buyer. When contacting, the parties recognize that Buyer's value

[27] In *Market Associates v. Frey* 941 F.2d 588 (7th Cir. 1991), the Court of Appeal of the Seventh Circuit (Judge Posner) decided that there is a duty on a contracting party not to take advantage of an oversight by the other party to the contract concerning rights and duties under the contract:

"…[E]ven after you have signed a contract, you are not obliged to become an altruist toward the other party and relax the terms if he gets into trouble in performing his side of the bargain. . . . But it is one thing to say that you can exploit your superior knowledge of the market—for if you cannot, you will not be able to recoup the investment you made in obtaining that knowledge—or that you are not required to spend money bailing out a contract partner who has gotten into trouble. It is another thing to say that you can take deliberate advantage of an oversight by your contract partner concerning his rights under the contract. Such taking advantage is not the exploitation of superior knowledge or the avoidance of unbargained-for expense; it is sharp dealing. Like theft, it has no social product, and also like theft it induces costly defensive expenditures, in the form of over elaborate disclaimers or investigations into the trustworthiness of a prospective contract partner, just as the prospect of theft induces expenditures on locks… Before the contract is signed, the parties confront each other with a natural wariness. Neither expects the other to be particularly forthcoming, and therefore there is no deception when one is not. Afterwards the situation is different. The parties are now in a cooperative relationship the costs of which will be considerably reduced by a measure of trust. So each lowers his guard a bit, and now silence is more apt to be deceptive… [I]mmensely sophisticated… enterprises make mistakes just like the rest of us, and deliberately to take advantage of your contracting partner's mistake during the performance stage (for we are not talking about taking advantage of superior knowledge at the formation stage) is a breach of good faith. To be able to correct your contract partner's mistake at zero cost to yourself, and decide not to do so, is a species of opportunistic behavior that the parties would have expressly forbidden in the contract had they foreseen it. The immensely long term of the lease amplified the possibility of errors but did not license either party to take advantage of them."

For a thorough discussion of this case, see Melvin A. Eisenberg, "The Duty to Rescue in Contract Law", *Fordham Law Review* (2002).

> of performance is uncertain and it could be 100 or 500. After contracting, Buyer receives unverifiable information that performance will be worth 500. Buyer wishes to keep the information confidential and does not tell Seller. Seller realizes that performing will cost 150. Consequently, Seller prefers to breach if liability equals 100 and to perform if liability equals 500.
> Seller mistakenly thinks his liability for breach will be 100, so he breaches.

In Example 7, the high losses of 500 from breach are foreseeable under the *Hadley v. Baxendale* rule. Consequently, breaching Seller cannot invoke the "unforeseeability defense." An obligation of Buyer to disclose unverifiable information is ineffective, regardless of whether the obligation is stipulated in the contract or imputed to it as a matter of law.[28] As in the other two examples, reducing damages below the expectation level would encourage Buyer to convey information about the value of performance to Seller so that he will perfo.

B. Undermining the Efficient Incentives of the Promisor to Perform

By our definitions, news is "bad" (but not *very* bad) when the total costs of performance modestly exceed its value, and bad news distorts promisor's incentives. Thus a *low* probability that the cost of performance modestly exceeds its value favors decreasing liability contracts. For this result, the following considerations are usually decisive:

Length of Performance. When the time needed for performance is short, the risk that costs of performance will exceed its value is typically low. In these circumstances, a

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[28] *Cf.* Charles Goetz & Robert Scott, "The Mitigation Principle: Toward a General Theory of Contractual Obligation" 69 *Va. L. Rev.* 967, 1012-14 (1983); Porat, *supra* note; Eisenberg, *ibid*.

In legal systems that do not adopt the foreseeability test regarding the remoteness of damages we do find a larger group of cases where the negligent failure of the promissee to warn the promisor from a large potential loss is considered as contributory (or comparative) negligence. Such is the case in the German legal system, where the remoteness of damage test is one of "adequate cause." Article 254 of the BGB, which establishes the contributory negligence defence in torts as well as in contract law, makes it clear that the defence also applies "if the fault of the injured party consisted only in an omission to call the attention of the debtor to the danger of unusually high damage which the debtor neither knew nor should have known" (I. S. Forrester, S.L. Goren, H. Ilgen (trans.), The German Civil Code (Amsterdam & Oxford, 1975)). In Germany, this article is often interpreted to mean that the party in breach is released from all liability for damages, and as applicable even when the aggrieved party's failure to warn stems from negligent ignorance of the foreseeable consequences of a breach of the contract. Note that, in German law, even when the loss foreseen by the aggrieved party due to breach of contract is not particularly large, the burden of warning applies as long as the party in breach could not, as a reasonable person, anticipate the occurrence of the type of loss that actually came about. Munchen Kommentar zum Burgerliches Gesetzbuch, Band II (Munchen, 1985), Grunsky, §254, s. 14, §254, ss. 39-42.

decreasing liability contract is a good way to induce unverifiable assistance in performance by the promisee.

Stable markets. Performance often requires the promisor to purchase inputs. Stable markets for inputs reduce the probability of "bad news." To illustrate, when the price and supply of working materials and manpower is predictable, decreasing liability contracts pose little risk of creating incentives for inefficient breach. Conversely, unstable markets for inputs create risk that an increase in costs will cause promisor to breach inefficiently.

In some circumstances, the parties can solve the problem of unstable markets for inputs without abandoning the advantages of a decreasing liability contract. To solve the problem, the promisee may assume the risk of market fluctuations. To illustrate, Buyer might agree to reimburse seller for an increase in the cost of construction materials. In these circumstances, the risk that input costs will increase need not prevent the parties from adopting a decreasing liability contract.

The risk that a decreasing liability contract will cause inefficient breach relates to the time-pattern of market fluctuations. News of rising costs is more likely to cause promisor's breach when received in an early phase, because more inputs remain to be purchased. When breach occurs early enough so that promisor has made little or no expenditures, the deductibility of expenditures makes little or no difference to liability. Consequently, early receipt of bad news does not cause a significant different in decreasing liability contracts as compared to constant liability contracts.

Conversely, news of rising costs is less likely to cause promisor's breach when received in a later phase, because few inputs remain to be purchased. Consequently, late receipt of bad news is unlikely to cause inefficient breach of a decreasing liability contract.

The greatest risk that a decreasing liability contract will cause inefficient breach occurs when promisor receives bad news in the middle phases of the contact. When drafting the contract, the parties should keep this fact in mind when they compare the time-pattern in the contract's phases to possible market fluctuations.

We have discussed the potential problem that unstable input prices pose for decreasing liability contracts. A similar problem concerns unstable output prices. When

output prices are unstable, a third party may appear and offer Seller more than Buyer promised to pay in the contract. To illustrate by our first example, Developer might get a bid from a third party during performance that he can accept only if he defaults on the original contract with Buyer.

The third party presents an opportunity to Developer that will be lost by performance on the contract. The cost of performing includes the cost of inputs and the lost opportunity. Consequently, the analysis of unstable input and output prices is essentially the same. When the output price is predictable, decreasing liability contracts pose little risk of creating incentives for inefficient breach. Conversely, unstable output markets for inputs create risk that an increase in output prices will cause promisor to breach inefficiently. As with unstable input prices, the parties can solve the problem of unstable output prices without abandoning the advantages of a decreasing liability contract by the promisee assuming the risk. To illustrate, Buyer might agree to reimburse Seller for loss of an opportunity to sell to a third party.

Correlated costs and value of performance. The cost of performance and its value are sometimes correlated. The correlation often exists because an increase in production costs causes an increase in the product's value. To illustrate, an increase in the cost of construction may increase the value of the existing stock of buildings.

Consider the consequences for a contract stipulating liability equal to expectation damages minus actual costs. As long as expectation damages increase by the same amount as remaining costs, the former offsets the latter, so the change in prices does not induce promisor to breach. Consequently, bad news about remaining costs of performance correlates with bad news about liability for breach, so the difference between them remains constant. In these circumstances, the parties can stipulate decreasing liability without fear that price changes will cause inefficient breach.

Promisor's inefficient investment in performance. In our model, Promisor must make expenditures in an early phase of performance in order to go on to the next phase. Furthermore, our model assumes that expenditures in each phase are binary -- either expenditures are sufficient to go to the next phase, or expenditures are insufficient and the promisor cannot perform. Our model allows no time-shifting of expenditures on performance. The real world, however, usually permits some time-shifting. In most

phased contracts, higher expenditures in a later phase can make up for lower expenditures in an earlier phase. Also, in the real world, higher expenditures in any phase often increase the probability of completing performance later.

A less tractable and more realistic model than ours would allow a flexible time-pattern of expenditures on performance. We make no attempt to construct such a model, but we mention a new problem for decreasing liability contracts that we anticipate. In a constant liability contract with expectation damages, promisor internalizes 100% of the costs of breach, regardless of when it occurs. However, in a decreasing liability contract, the promisor internalizes a variable percentage of the costs of breach, depending on when it occurs. With a flexible time-pattern of expenditures on performance, a decreasing liability contract may enable the promisor to shift expected costs to the promisee by shifting expenditures forward in time. Promisor who expects to gain from shifting expenditures forward in time will not take account of negative effects on promisee, which are the reduction in damages promisee expects to receive in the event that promisor breaches early in the contract.[29] Even in these circumstances, however, *decreasing liquidated damages* might solve the problem.[30]

Litigation costs. We will briefly discuss litigation costs. In any decreasing liability contract, promisor's liability for breach decreases with time, so promisee's recovery also decreases with time. In the decreasing liability schedule that we recommend, promisee's recovery equals promisee's value of performance minus

[29] To illustrate, assume the contract in Example 1 stipulates that Developer who breaches at time t pays expectation damages V = 100 minus expenditures on partial performance C_t. If Developer breaches at time t after expenditures of 40, Developer's liability equals 60. Consequently, breach at time t results in Developer's total costs of 40 + 6 = 100. Now assume that technology changes and allows Developer to shift costs of 30 from after time t to before time t. Consequently, breach at time t results in Developer's total costs of 70+30=100. Since Developer's cost of breach are constant regardless of whether or not he shifts costs forward in time, he will decide whether or not to make the shift purely on the basis of whether his costs of performance rise or fall. Thus he will shifts costs forward in time if he saves 1 in costs of performance.

When he shifts costs forward in time, however, Buyer's damages from breach fall by much more than 1. Specifically, Buyer's damages from Developer's breach at time t fall from 60 to 30. If the probability of breach is significant, shifting costs forwards in time is inefficient, but Developer gains an advantage by doing so.

[30] Instead of stipulating that breaching promisor can deduct *actual* expenditures, the contract might stipulate the exact deduction in dollars allowed after breach at each phase. The parties might try to liquidate damages equal to expectation damages minus *optimal* expenditure, regardless of *actual* expenditures. Liquidated decreasing liability requires a lot of information. Also it may not solve the problem of time-shifting to lower the probability of breach, as opposed to time-shifting to lower the cost of performance.

promisor's costs. As performance approaches completion, promisee's recovery approaches promisee's value of performance minus promisor's cost of performance, which is the value created by the contract. Our recommended decreasing liability schedule thus gives a credible threat to sue throughout contract's life so long as the contract's value exceeds litigation costs. If, however, plaintiff's costs of litigation exceed the contract's value, then the contract no longer has a credible threat to sue nonperforming promisor and the contract becomes ineffective. If the parties foresee that these circumstances are likely, they gain by making a different contract in damages decrease at a slower rate.

To illustrate by Figure 3, promisee's damages fall from 100 at time 0 to 20 at time T. Promisee in Figure 3 has a credible threat to sue for nonperformance throughout the contract's life so long as his litigation costs do not exceed 20. If, however, promisee's cost of litigation exceed 20 and equal, say, 30, then the credibility of his threat to sue nonperforming promisor disappears when damages fall to 30. Foreseeing this fact, the parties should stipulate a liability schedule that decreases more slowly so that damages always exceed 30.

IX. Conclusion

The economic analysis of contracts clarified debates over alternative liability rules, especially by demonstrating that ideal expectation damages cause promisor to internalize the cost of breach to the promisee. Relying on this insight, most law and economics scholars have commended expectation damages as more efficient than any alternative. This conclusion, however, loses sight of promisee's incentives to assist promisor's performance. The economic analysis of contracts has discussed the problem of promisee's reliance, but not promisee's assistance.[31]

The standard argument for expectation damages is not justified in contracts where promisee's unverifiable assistance significantly affects performance. In these circumstances, efficient incentives for both parties require promisee to assign the right to expectation damages to a third party ("anti-insurer"). In the absence of such an assignment, reducing liability below the level of expectation damages usually increases

[31] *Supra* note 3.

efficiency. To be precise, reducing liability below expectation damages increases efficiency when promisor's last dollar spent on performing increases the contract's value less than promisee's first dollar spent on assisting.

For this reason, we advocate reducing damages below the expectation level whenever promisee's unverifiable assistant significantly affects performance. Reliance or restitution damages typically achieves such a reduction, but we do not advocate them. Instead, we advocate a damage measure whose justification relates directly to the goal of improving promisee's incentives to assist promisor. For phased contracts, the promisor's remaining costs of performance ordinarily decrease as each phase is completed. Consequently, the level of liability required to induce performance also decreases. A contract that stipulates decreasing liability can provide sufficient incentives for promisor to perform, while motivating promisee to assist.

To implement such a contract, we recommend deducting past expenditure on incomplete performance, either actual or stipulated, from liability. (We omit the related question of deducting from liability other losses suffered by the breaching party.[32]) The justification for this form of decreasing liability over possible alternatives is practical. Specifically, this form produces good incentives by using variables that parties have experience writing into contracts and courts have experience adjudicating.

If promisee's unobservable and unverifiable assistance to promisor is important, the parties usually draft a contract requiring progress payments and a completion bonus. In the event of premature termination, the promisee cannot recover past progress payments, just as the promisee in a decreasing liability contract cannot recover past costs when promisor breaches. Furthermore, in the event of premature termination, promisor loses the completion bonus, just as the promisor who breaches a decreasing liability contract loses his share of the surplus from performance. Consequently, appropriate choice of parameters in a progress payment contract will make it materially identical to a decreasing liability contract. In our view, the advantage of a decreasing liability contract

[32] Thus, the promisor could suffer reliance losses, lost profits, or nonlegal sanctions imposed by third parties. Like expenditures on phases of performance, the presence of such losses decrease the level of liability required to induce promisor to perform, so a case could be made for deducting these losses from liability. We leave this problem to another paper.

over a materially equivalent progress payment contract is merely the fact that incentives effects are somewhat easier to understand.

Decreasing liability, or its material equivalence through progress payments, is the only practical way for a contract to motivate a promisee whose assistance is unobservable or unverifiable. Transaction lawyers who appreciate the problem of promisee's unverifiable assistance will understand better when to use progress payments and how to set their magnitude and timing. In some circumstances, transaction lawyers may find that switching language from "progress payments" to "decreasing liability" increases the contract's clarity. In addition, courts that understand the purpose of decreasing liability and progress payments will interpret and enforce contracts better. Perhaps courts will someday adopt decreasing liability as the default rule for damages in some circumstances.

Appendices

There are two appendices. Appendix 1 is a more elaborate version of Example 1 that models promisee's reliance more explicitly. Appendix 2 provides mathematical proofs of the propositions..

Appendix 1

Analysis of Example 1

To keep the analysis of Example 1 simple, we did not explicitly model how promisee's assistance affects the contract's expected value. In general, promisee's assistance lowers the expected cost of performance. In this appendix, we use a numeric example to model promisee's performance. We elaborate Example 1 and depict the contract's phases explicitly as a tree in Figure 6.

Example 8: A Construction Contract Occurs in Five Phases—

Phase 1. Formation. Buyer pays Developer a price p = 90 for promise to construct a building. Buyer values the completed project at v = 100. In event of Developer's default at any phase, Buyer will abandon the project without receiving any benefit from it.

Phase 2. Developer spends. Developer either breaches or else spends $c_2 = 40$ on architectural drawings and a concrete foundation. Breach terminates the process, whereas spending $c_2 = 40$ moves to phase 3.

Phase 3. Buyer assists. Buyer either does not assist Developer's performance or assists by helping to obtain the necessary construction permits. Assisting costs Buyer 5. Developer cannot observe whether or not Buyer assists, so the contract is silent on this matter and Buyer has no contractual obligation to assist Developer.

Phase 4. Nature acts. Unpredictable forces outside the parties' control, which we call "Nature," determine Developer's remaining costs of completing the project. The state of nature is good, bad, or very bad. The probabilities are denoted q_g, q_b, and q_{vb}, respectively. If Buyer does not assist, the probabilities are $(q_g, q_b, q_{vb},) = (.6,.3,.1)$. If Buyer assists the probabilities shift in favor of a better state. Specifically, if Buyer assists the probabilities are $(q_g, q_b, q_{vb},) = (.9,.06,.04)$.

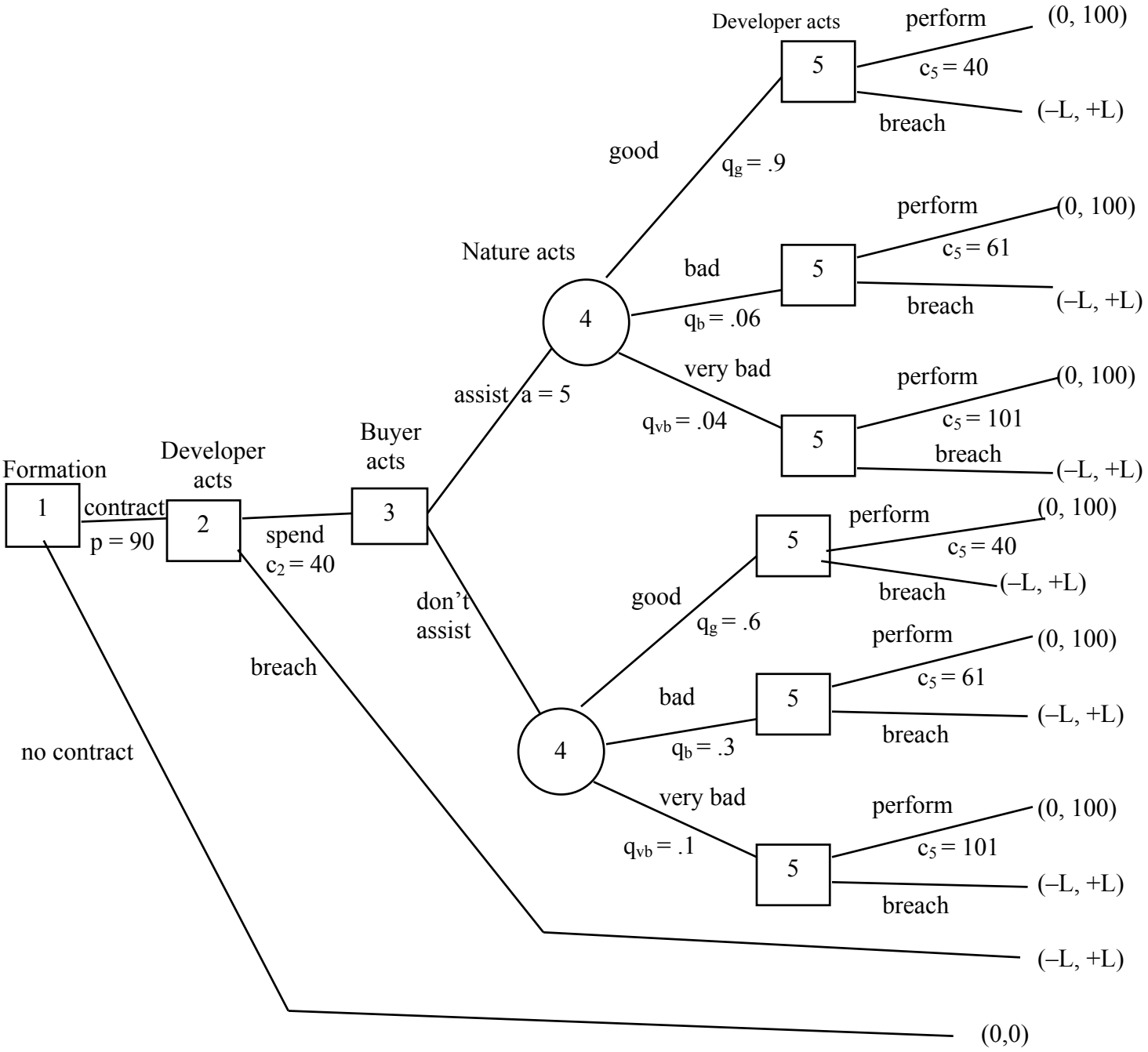
Phase 5. Developer spends. c_5 denotes the expenditures required to complete performance at phase 5, which depends on the state of nature. Developer observes the state of nature and then he either defaults or completes performance by spending c_5.

A "good" state of nature results in low remaining costs, specifically $c_5 = 40$.

A "bad" state results in high remaining costs, specifically $c_5 = 61$.

A "very bad" state results in very high remaining costs, specifically $c_5 = 101$.

Figure 6: Example 8 as a Tree



Assume that the parties want to maximize the expected value of the contract in Example 8 when it is formed. When forming the contract, the parties anticipate the possibility that Developer receives bad news at phase 5 and defaults. We show that the expected value of the contract is higher at the time of formation when Developer's liability for breach at phase 5 equals 60 rather than 100.

Consider the effects of deducting or not deducting past expenditures on Developer's incentives to perform and Buyer's incentives to assist. At phase 5, Developer applies the decision rule:

$(c_5 \leq L) \Rightarrow$ perform
$(c_5 > L) \Rightarrow$ breach.

Depending on whether the state of nature is good, bad, or very bad at phase 5, the remaining costs of performance equal 40, 61, or 101, respectively.

Consider Developer's incentives with deduction of costs from liability. Expectation damages written L = v, equal 100. Consequently, expectation damages without deduction exceed the cost of performance in a good state or a bad state, but the cost of performance in a very bad state exceeds expectation damages. Thus expectation damages without any deduction causes developer to perform when the state of nature is good or bad, and to breach when the state of nature is very bad.

Developer's behavior differs in one respect when liability equals expectation damages minus past expenditures, written $L = v - c_2$,. At phase 5 expectation damages of 100 minus Developer's past expenditures of 40 equal 60. As a result of the deduction, the cost of performance in a bad state, which is 61, exceeds liability. Deduction changes promisor's performance when the state of nature is bad, but not otherwise, as depicted in Figure 5 above.

Now we relate Developer's behavior to the contract's value. Maximizing the contract's value at phase 5 requires Developer to perform if the value of performance to Buyer exceeds the remaining cost of performance to Developer. The value of performance exceeds the remaining cost of performance in a good state or a bad state, but not in a very bad state. So maximizing the contract's value requires Developer to perform in a good or bad state, and to breach in a very bad state. Expectation damages, produce incentives for efficient behavior by Developer in all three circumstances, whereas

expectation damages with a deduction of past expenditures creates efficient behavior in good or very bad states, but not in bad states.

Next we turn from Developer's to Buyer's incentives. We show that expectation damages with no deduction cause Buyer not to assist in Example 8, and expectation damages with deduction of past expenditures cause Buyer to assist. Consider each damage measure. With expectation damages and no deduction, Buyer receives 100 from performance of the contract and 100 in damages from breach. Consequently, Buyer gains nothing from spending 5 to assist Developer. While expectation damages give Buyer no incentive to assist, the situation is different when Developer deducts past expenditures of 40 from expectation damages of 100. With deduction, Buyer receives 100 from performance of the contract and 60 in damages from breach. By spending 5 to assist performance, Buyer expects to gain by increasing the probability of receiving 100 instead of 60. The expected gain exceeds the cost of 5.[33] Consequently, deduction motivates Buyer to assist.

Note that Nature's random influence prevents Developer from inferring from his costs whether or not Buyer assisted. Buyer's assistance is thus unobservable directly or by inference.

We have explained that deducting Developer's expenditures on performance from liability for breach causes Buyer to assist and Developer sometimes to breach inefficiently. It is easy to show that the gain from improving promisee's incentives exceeds the expected loss from worsening promisor's incentives. Specifically, with deduction the contract's expected value equals 9, and without deduction the contract's expected value equals 7.7.[34]

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[33] Specifically, the expected gain equals (.9-.6)(100-60)=12, whereas the cost equals 5.

[34] With deduction, the expected value of the contract equals .9(100-40)+.06(0)+.04(0)-5-40=9. Without deduction, the expected value of the contract equals .6(100-40)+.3(100-61)+.1(0)-40=7.7.

Appendix 2

Mathematical Appendix

Part III is based on a model without phased performance. Parts IV and V extend this model to encompass phased performance. We develop each model in turn.

Model Without Phased Performance Used in Part III

Definition
v = promisee's value of performance.
c = promisor's expenditure on performance.
a = promisee's expenditure on assistance.
q = probability of performance
  = q(c,a).
L = promisor's liability for breach.
D = promisee's entitlement to damages for breach.

Behavioral Assumptions:
Promisor chooses c to minimize $-(1 - q(c,a))L - c$. Let the solution be given by $c = c(L)$, where we assume $c` > 0$.
Promisee chooses a to maximize $vq(c,a) + D(1 - q(c,a)) - a$, where $a \geq 0$. Let the solution be given by $a = a(D)$, where we assume that $a` < 0$. Note $D = v$ implies the solution $a = 0$.

Proposition 1: Assume that promisor's liability for breach equals expectation damages. Also assume the first dollar spent by promisee on assisting performance increases the contract's value by more than the last dollar spent by promisor on performing. Given these assumptions, a small reduction in damages increases the contract's expected value.

Proof:

1. The contract's net expected value equals $vq(c,a) - c - a$. Assume that liability equals expectation damages: $L = D = v$.
2. Now consider the consequences of a small change in liability. Fully differentiate to obtain:
   $(vq_1 - 1)c`dL + (vq_2 - 1)a`dL$
3. Assuming that expectation damages are optimal, the preceding expression nonpositive, so we have
   $(vq_1 - 1)c` \leq -(vq_2 - 1)a`$.
4. The left side of this expression is the marginal value of more effort by promisor to perform, and the right side of this expression is the marginal value of more effort by promisee to assist. Thus the preceding expression contradicts the assumption that promisee's first dollar spent on assisting promisor increases the contract's expected value by more than a dollar. Hence reducing damages below expectation damages will increase the contract's value.

Model of Phased Performance Used in Parts IV and V

Additional Definitions

p = contract price.

t = present time.

T = number of phases in the contract.

k_i = actual expenditures in past at time i, where $i \leq t$ and $k_i \geq 0$.

K_j = total past expenditures as of time j

$$= \sum_{i=1}^{j} k_i$$

e_i = expenditures necessary in phase i to continue on to phase i + 1, where $e_i \geq 0$.

$q_{t,t+i} = q_{t,t+i}(e_{t+i})$

= probability at time t that expenditures necessary in phase t + i to go on to phase t + i + 1 will equal e_{t+i}.

$c_{t,t+i} = \int q_{t,t+i}(e_{t+i}) e_{t+i} d\, e_{t+i}$

= expectation at time t of expenditures necessary in phase t + i to continue on to phase t + i + 1.

$$C_{t,t+i} = \sum_{j=1}^{T-t-1} c_{t,t+i+j}$$

=expectation at time t of total expenditures remaining at time t + i to complete performance.

$TC_t = K_t + C_{t,t}$

= past expenditure + plus expected remaining expenditures

= expected total costs of performance at time t.

L_t = liability for breach at time t.

L_t = v = expectation damages.

$L_t = v - K_{tm}$ = m expectation damages minus past expenditures on performance.

Behavioral Assumptions:

1. Formation: The parties form a contract if the expected cost of performance to promisor is less than its value to promisee:

$$C_0 \leq v \Rightarrow \text{form contract.} \qquad (1)$$

2. Bargain: The contract price lies between the promisor's expected cost of performance and the promisee's value of performance:

$$C_0 \leq p \leq v. \qquad (2)$$

3. Performance: At each phase t, promisor decides whether to default or spend the amount necessary to go forward according to whether the expected remaining expenditures exceed liability, which we write

$$C_t \leq L_t \Rightarrow \text{continue performing.} \qquad (3)$$
$$C_t > L_t \Rightarrow \text{default.}$$

Proposition 2: With each phase of the contract, the expected liability required to induce performance decreases.

1. The expected change in expected future costs between time t and t+1 equals $C_{t,t+i} - C_{t,t+i+1}$.
2. By definition of variables, $C_{t,t+i} - C_{t,t+1+1} = c_{t,t+i}$, where $c_{t,t+i} \geq 0$.
3. Consequently, $C_{t,t+i} \geq C_{t,t+i+1}$.
4. By decision rule (3), the smallest expected liability necessary to induce performance at any stage t equals the expected remaining costs.
5. The two preceding steps prove the conclusion.

Proposition 3. If past expenditures are deducted from expectation damages, and if promisor correctly estimates future costs of performance, then promisor performs at every phase of the contract.

1. According to the bargain condition in expression (2), we have $C_0 \leq p \leq v$.
2. By assumption, costs sunk as of i are the same as anticipated at 0, so $C_0 = K_j + C_{i,j}$, for all i, j.
3. Combining the two preceding expressions yields $K_j + C_{i,j} \leq v$, which implies $C_{i,j} \leq v - K_i$.
4. By assumption that liability equals expectation damages minus past expenditures, we have $L_j = v - K_j$.
5. Combining the two preceding expressions yields the condition for promisor to decide to perform rather than breach: $C_{i,j} \leq L_j$. This is true for all times i, j.

Proposition 4: Assume that liability equals expectation damages minus past expenditures. Also make certain reasonable assumptions about the probability of errors in predictions. Then the longer the contract progresses as predicted, the lower the probability of breach.

1. Assume the contract progresses as predicted to time t-1. If the contract progresses another period as predicted, then expectations are confirmed: $C_{t-1,t} = C_{t,t}$.
2. If, however, the promisor receives bad new that causes him to revise his cost estimate upwards, then $C_{t-1,t} < C_{t,t}$.
3. The increase in expected future costs due to the bad news equals $C_{t,t} - C_{t-1,t}$.
4. By assumption, the liability rule is $L_t = v - K_t$ and the breach condition at time t is $C_{t,t} > L_t$. So breach will occur if $C_{t,t} > v - K_t$. (Note that this is the condition for a losing contract.)
5. Subtract $C_{t-1,t}$ from both sides of the preceding inequality: $C_{t,t} - C_{t-1,t} > v\text{-}K_t - C_{t-1,t}$.
6. Substitute $TC_{t-1}=K_t + C_{t-1,t}$ into the preceding inequality to obtain $(C_{t,t} - C_{t-1,t}) > v - TC_{t-1}$.
   $v - TC_{t-1}$ is the margin of error, which, if exceeded by expected future costs, causes breach .
7. Using the definitions, $C_{t,t} - C_{t-1,t} = \sum_{j=1}^{T-t} c_{t,t+j} - \sum_{j=1}^{T-t} c_{t-1,t+j} = \sum_{j=1}^{T-t} \int [q_{t,t+i}(e_{t+i}) - q_{t-1,t+i}(e_{t+i})] e_{t+i} d\, e_{t+i}$
   For larger t, the sum is over fewer phases. Under reasonable assumptions about the distribution of errors, the cumulative effect of bad news is smaller for fewer phases. Hence the longer the contract proceeds as expected, the lower the probability of future breach.

Proposition 5: For any decreasing liability contract, there exists a progress payment contract with materially equivalent incentives for promisor's performance and promisee's assistance, and vice versa.

Proof:

1. Consider a contract requiring phased expenditures by promisor designated (c_1,c_2,..,c_T), whose completion has value V to promisee.
2. Let $C_{m,n}$ denote the sum of costs between m and n, or ($c_m + c_{m+1} + c_{m+2} + \ldots + c_n$), for any m and n between 1 and T.
3. Let $P_{m,n}$ denote the sum of periodic payments promisee makes promisor between m and n, or = ($p_m + p_{m+1} + p_{m+2} + \ldots + p_n$), for any m and n between 1 and T.
4. A decreasing liability contract and a progress payment contract are defined a stream of net payoffs to promisee and promisor. Columns (1), (2), and (3) in the following table define these two contracts by representing net payoffs at arbitrarily chosen time t.
5. Column (2) represents future payoffs expected at time t from completing performance, and column (3) represents future payoffs expected at time t from terminating performance at time t. Column (4) depicts the difference, when determines promisor's incentives to complete performance and promisee's incentives to assist.
6. Choose the periodic payments in period 1 to T – 1 to equal costs: $p_i = c_i$ for i = 1,2,…,T – 1. Choose the periodic payment in period T to equal cost in period T plus a completion bonus equal to the difference between the value of performance to promisee and contracts total cost: $p_T = c_T + V - C_{1,T}$.
7. By definition, $c_T = C_{1,T} - C_{1,T-1}$.). From this fact and the preceding step, the sum of all past costs $C_{1,t}$ and future payments $P_{t,T}$ equals value V of performance: $V = C_{1,t} + P_{t,T}$. This is the condition under which the difference in promisee's incentives given in column (4) are the same under DLC and PLC.
8. Total past costs as of t, denoted $C_{1,t}$, equal total costs of the project $C_{1,T}$ minus future costs of completion $C_{t,T}$. Substitute this fact into step 7 to obtain $V= -C_{t,T} + C_{1,T} + P_{t,T}$. This is the condition under which the difference in promisor's incentives given in column (4) are the same under DLC and PLC.
9. If the difference in net payoffs given in column (4) for promisor and promisee is same under the two contracts, their incentive effects are equivalent.

(1) party and contract	(2) future payoff from completing performance	(3) future payoff from terminating performance	(4) difference between (2) and (3)
(i) Promisor in DLC	$-C_{t,T}$	$-(V - C_{1,t})$	$V - C_{1,T}$
(ii) Promisee in DLC	V	$(V - C_{1,t})$	$C_{1,t}$
(iii) Promisor PPC	$P_{t,T} - C_{t,T}$	0	$P_{t,T} - C_{t,T}$
(iv) Promisee in PPC	$V - P_{t,T}$	0	$V - P_{t,T}$

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