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Optimal Remedies for Bilateral Contracts

Francesco Parisi, Barbara Luppi, and Vincy Fon

ABSTRACT

In several contract situations, parties exchange promises of future performance, creating reciprocal obligations. In this paper, we extend the standard models of contract remedies to consider the incentives created by contracts where both parties provide only executory consideration and where the parties' obligations are yet to be performed. We show that the legal remedies that govern these contracts provide valuable enforcement mechanisms that are not available when parties enter into a contract in which they exchange a promise for an actual performance. We show that when the values of the parties' performances are interdependent, contracts with executory consideration create effort incentives that are superior to the incentives of contracts with executed consideration. In contracts with independent values, contracts with executory consideration also offer a valuable instrument to correct enforcement imperfections. Such imperfections include imperfect compensation and litigation costs.

1. INTRODUCTION

In several contract situations, parties enter into an agreement in which both parties undertake an obligation to perform in the future. For example, in a bilateral contract, the offer of one party calls for a promise of the other party, and the acceptance usually takes the form of a com-

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munication by the offeree of his counterpromise; the exchange is said to be executory and not already executed (otherwise known as “executory consideration”).¹ Unlike contracts in which parties exchange a promise for an actual performance, no performance is yet rendered, and both parties can still breach.

In a contract where neither party has yet performed, each party is faced with a performance problem with respect to his side of the exchange and a reliance problem with respect to the promised counterperformance.² For example, a contract involving an exchange of goods or services between two parties creates bilateral obligations, each of which is capable of generating a surplus when received by the other party. The same bilateral nature of the contractual relationship is present when goods or services are exchanged for a promised money payment. In the absence of costless access to capital markets, parties face a reliance problem for a promised payment, as much as they face a reliance problem for a promised good or service. Parties rely on a promised payment, for example, when they plan investments that increase the value of the payment if received but could likewise increase the loss if the payment is not received.

The special features of contracts with executory consideration (that is, bilateral contracts) have thus far escaped the attention of much of the law and economics literature, which has traditionally been focused on unilateral breach situations and contracts with executed consideration (that is, unilateral contracts). With this article, we wish to fill this gap in the literature. Parties generally enter into contracts with reciprocal performance obligations as a matter of convenience (for example, an

1. Section 12 of the original *Restatement of Contracts* (1932) defined a bilateral contract as a contract in which there are mutual promises between two parties to the contract and where each party is both a promisor and a promisee; in other words, it is an agreement where the parties exchange promises of performance (rather than actual performances) with one another. *Restatement (Second) of Contracts* (1981) chose not to carry forward the definition of unilateral and bilateral contracts because of doubts about the utility of the distinction between the two types (see sec. 1, reporter’s note, comment f). In the American contract law doctrine, the term “bilateral contract” is used to brand a type of acceptance. The term refers to situations where the offeree enters into an agreement by making a promisory acceptance, rather than by tendering performance. See *Restatement (Second) of Contracts*, sec. 45, for the case where the offeree is invited to accept by an actual tender of performance. Whether referred to as bilateral contracts or contracts with executory consideration, this conceptual category remains relevant, inasmuch as it encompasses contractual situations that share a common distinctive feature.

2. When parties exchange promises with the intent to exchange performances, each party is, at the same time, a promisor of his obligation and a promisee of the other party’s obligation (*Restatement [Second] of Contracts*, sec. 231 and introductory note to ch. 10).

exchange of goods or services to reduce transaction costs, avoid outlays of money, or reduce tax burdens) or to exploit relevant synergies between the parties' performances.³ We suggest that in addition to these reasons, the choice of these contractual instruments may also be driven by the parties' wish to mitigate the effects of imperfections in the enforcement of their contractual relationship.

We show that, contrary to intuition, the incentives faced by the parties in a bilateral contract are different from those that the parties would face if entering into two separate unilateral contracts. The presence of such imperfections as imperfect compensation and litigation costs causes distortions of incentives that are mitigated when parties enter into a bilateral agreement. In a bilateral contract, the contracting parties are given an opportunity to tie together two contractual obligations, with incentives that are superior to those achievable with two independent unilateral contracts. This superiority derives from specific legal remedies that apply to bilateral contracts, such as the defense of nonperformance (used in cases of unilateral breach) and the preclusion rule (used in cases of bilateral breach). These remedies allow parties to use each other's contractual surplus as a kind of bonding mechanism. Our findings unveil the comparative advantages of these alternative contractual structures under various scenarios.

The article is structured as follows. Section 1 identifies the problem and discusses it in the context of existing literature. Section 2 develops an economic model to study the features of bilateral contracts and shows the superiority of incentives of a bilateral contract to the corresponding pair of unilateral contracts. We focus our attention on the legal remedies for breach of bilateral contracts. Specifically, in Section 3, we study unilateral breach and the incentive effects of the defense of nonperformance, under *Restatement (Second) of Contracts* (1981). The effects of this rule are first studied in a setting with perfect enforcement, and they are later extended to situations with imperfect enforcement. The same structure is followed in Section 4, where we study bilateral breach and the incentive effects of the preclusion rule. The analysis reveals the advantages of bilateral contract remedies in coping with contract imperfections. Section 5 concludes.

3. Consider, for example, the reciprocal obligations undertaken by a singer and his concert organizer, or an artist and her exhibition organizer, or the reciprocal obligations undertaken by two coauthors and, more generally, by two professional partners. In these cases, it would be costly or undesirable to disentangle the parties' bilateral obligations into separate unilateral obligations.

2. BILATERAL CONTRACTS

The question of which remedy would best incentivize the optimal performance of contracts has been widely researched in law and economics.⁴ Much of the literature in this field builds around the early contributions of Barton (1972) and Shavell (1980). The existing literature identifies expectation damages as the measure of damages best suited for promoting optimal performance and reliance investments.⁵ These well-known results are generally derived from models involving two parties, each of which plays a specific role: a promisor (the debtor of the performance), who invests in performance efforts, and a promisee (the creditor of the performance), who invests in reliance.⁶ This standard setup allows attention to be focused on the promisor's performance incentives and the promisee's reliance incentives, but it neglects to capture the peculiar features of bilateral contracts.

The present paper considers the case of bilateral contracts, in which both parties make promises of performance capable of creating a surplus for the other party. Some previous literature analyzes issues pertaining to reciprocal performance obligations, similar to the obligations studied in this paper. Che and Chung (1999) analyze breach remedies in cases of cooperative investment, wherein specific investments undertaken by one party of a contract generate a direct benefit to the other party. This situation can occur in joint ventures, partnerships, and the like. The authors show that expectation damages do not lead to optimal incentives in contracts of this type. Schweizer (2006) revisits this issue and points

4. The standard taxonomy of contract damages is generally based on the distinctions between expectation, reliance, and restitution interests (Fuller and Perdue 1936). Commonly adopted measures of damages in contract law are linked to one of these three "interests" of the promisee. See also Bishop (1985), Cooter and Eisenberg (1985), Kornhauser (1986), and Mahoney (1995, 2000).

5. Expectation damages compensate the promisee for the forgone benefit from the contract, bringing to him the same level of utility that he would have received in the event of successful performance. This compensation effectively associates liability with the promisee's loss, creating incentives for efficient performance in the absence of other externalities caused by the breach (Posner 1972; Shavell 1980). However, expectation damages operate as a form of implicit insurance, inducing the promisee to invest in reliance as if performance were likely to materialize with certainty. This result may lead to excessive reliance investments (Shavell 1980).

6. The issue of optimal remedies for breach of contracts has also been investigated from the perspective of incomplete contracts. Standard results show that the impossibility of entering into complete contracts that specify the efficient level of effort and reliance in each state contingency induces underinvestment in relationship-specific assets (Williamson 1985; Hart and Moore 1988, 1990). For the effects of ex post renegotiation on ex ante efficient incentives, see Edlin and Reichelstein (1996).

out that the results of Che and Chung are derived using the implicit assumption of unilateral expectation damages. However, Schweizer points out that the very nature of cooperative investments means that both parties could claim damages. In a regime of cooperative investments, Schweizer then shows that a rule of bilateral expectation damages is efficient. Triantis and Triantis (1998) consider the incentives created by the opportunity to engage in anticipatory repudiation. In their paper, the authors consider the case of bilateral contracts, in which both parties have an option to breach. The authors show that in such bilateral situations, each party has an incentive to repudiate earlier than is socially optimal, because the private decision to repudiate does not take into account the value of the other party's lost breach option.⁷ Adler (2008) also considers the case of anticipatory repudiation in a bilateral contract setting.⁸

In this paper, we extend the analysis to investigate whether existing legal remedies for bilateral contracts are appropriate to deal with the peculiar problem posed by contracts with interdependent performance values and contracts with imperfect enforcement.

2.1. Setting the Stage: A Bilateral Contract Model

We develop a model that adopts many of the conventional assumptions: parties are risk-neutral players, and their objective is to maximize their wealth; ex post renegotiation is prohibitively costly;⁹ performance efforts affect the probability of performance (performance quality is fixed); per-

7. Jackson (1978) and Craswell (1990) consider the issue of anticipatory repudiation in a unilateral contract setting. Early repudiation counts as a breach of contract (making the promisor liable for breach of contract), but it also triggers the promisee's duty to mitigate his loss (hence reducing the promisor's liability). Jackson (1978) considers the existing legal rules and their effect on the promisee's incentives to act efficiently in the mitigation of the harm. Craswell (1990) considers possible legal strategies to allow early termination only when it is cost justified from a social point of view.

8. Unlike the present study, the study by Adler (2008) focuses on how a prohibition on a breaching party's suit can lead to efficient performance of an inefficient contract and can distort investment incentives in anticipation of this event. In Adler's framework, there is no circumstance in which a party both breaches and desires performance; rather, Adler considers whether a party will engage in anticipatory repudiation if and only if it is efficient to do so.

9. The assumption of "no ex post renegotiation" applies to the case of material breach where the benefit of the forgone performance is irreversibly lost as a result of nonperformance. Examples would include situations in which the time of the performance is of the essence (for example, catering for a wedding) or in which the nature of the performance is nonfungible (for example, breach through the sale of a piece of art to a third party). Results do not depend on the assumption of no ex post renegotiation.

formance materializes as an all-or-nothing event (partial performance is not possible); and contracts do not create externalities for third parties.

The timing of the model is as follows. At time 1, the parties enter into a contract in which they make reciprocal promises of performance and counterperformance. At time 2, both parties invest in both performance effort and reliance. At time 3, the state of nature is observed, and we see whether performance and counterperformance are possible. At time 4, each party will either (1) obtain performance or (2) face breach and sue for damages.

Performance efforts undertaken by party 1, e_1 , influence the probability $p_1(e_1)$ of successful performance by party 1, where the probability of success increases with effort at a decreasing rate: $p'_1 > 0$ and $p''_1 < 0$.¹⁰ Party 2 undertakes investments r_2 in reliance on party 1's performance. We assume that, in the relevant region, the gain $G_2(r_2)$ obtained by party 2 when performance is carried out increases with reliance at a decreasing rate: $G'_2 > 0$ and $G''_2 < 0$. To simplify the model, we normalize the payoff or loss for nonperformance to be zero. We assume incomplete contracts, excluding the possibility for the parties to specify effort and reliance levels *ex ante* in their contract (that is, e_1 and r_2 are noncontractible).¹¹

In a bilateral contract, one or both parties could default on their contractual obligations, with four possible performance outcomes: both parties fulfilling their contractual obligations, one or the other party performing and the other contracting party breaching, and both parties breaching. We allow for different measures of damages to be due in the event of unilateral or bilateral breach. Specifically, $D_2^U(r_2)$ denotes damages caused by party 2 when party 1 unilaterally defaults on the contract (we refer to this as a unilateral breach case), and $D_2^B(r_2)$ denotes damages caused by party 2 when party 2 is himself in default (we refer to this as a bilateral breach case).

Without loss of generality, we allow interdependence in the values of the parties' performances. \bar{G}_1 denotes the value of performance to party 1 when both parties perform their contractual obligations, and \underline{G}_1 denotes the value of performance to party 1 in the event that only

10. In accordance with the established convention in the literature, we use a probabilistic performance function in which the probability of performance depends on effort, rather than on modeling a deterministic performance/breach decision. This allows us to consider interior solutions and compare effort and reliance levels under alternative legal rules.

11. Analogous notation applies to party 2.

party 2 performs.¹² In contracts with interdependent values, the surplus for each party is larger when both fulfill their promise—that is, $\overline{G}_1 > \underline{G}_1$. The surplus created by the contractual synergies is therefore equal to the difference between \overline{G}_1 and \underline{G}_1 . Contracts with independent values, $\overline{G}_1 = \underline{G}_1$, will be studied as well.¹³

2.2. The Social Optimization Problem

In the absence of effects on third parties, the social objective function is the sum of the expected welfare of the contracting parties and can be written as follows:¹⁴

$$\begin{aligned} \max_{e_1, e_2, r_1, r_2} & p_1(e_1)p_2(e_2)[\overline{G}_1(r_1) + \overline{G}_2(r_2)] \\ & + p_1(e_1)[1 - p_2(e_2)]\underline{G}_2(r_2) \\ & + [1 - p_1(e_1)]p_2(e_2)\underline{G}_1(r_1) \\ & - e_1 - e_2 - r_1 - r_2. \end{aligned} \quad (1)$$

The necessary first-order conditions with respect to the performance efforts e_1 and e_2 for the social optimum are

$$p'_1(e_1)[G_2^e(r_2) + p_2(\overline{G}_1 - \underline{G}_1)] = 1 \quad (2)$$

and

$$p'_2(e_2)[G_1^e(r_1) + p_1(\overline{G}_2 - \underline{G}_2)] = 1, \quad (3)$$

where $G_i^e = p_i\overline{G}_i + (1 - p_i)\underline{G}_i$ is the expected value of performance for party i , where $i = 1, 2$. Conditions (2) and (3) specify that, for a social optimum, the marginal benefit of performance efforts for the two parties, given by the increased probability of successful performance, should equal the marginal cost of performance effort. Bilateral contracts with interdependent values are characterized by the presence of a positive externality that each party creates through his or her own performance effort: an increase in a party's own effort level produces a higher probability of securing the sought-after contract-specific surplus, equal to

12. Following a standard assumption in the literature, the value of performance is assumed to be verifiable by courts when liquidating damages.

13. Contracts with independent values can be treated analytically as a special case of contracts with interdependent values.

14. The social problem in condition (1) and first-order conditions reduces to a standard contract problem in the unilateral contract scenario.

$\overline{G}_i - \underline{G}_j$.¹⁵ The results concerning optimal reliance are consistent with the standard results.¹⁶

2.3. The Private Optimization Problem

The private problem for party 1 is given as follows:¹⁷

$$\begin{aligned} & \max_{e_1, r_1} p_1(e_1)p_2(e_2)\overline{G}_1(r_1) \\ & \quad + p_1(e_1)[1 - p_2(e_2)]D_1^U(r_1) \\ & \quad + [1 - p_1(e_1)]p_2(e_2)[-D_2^U(r_2) + \underline{G}_1(r_1)] \\ & \quad + [1 - p_1(e_1)][1 - p_2(e_2)][-D_2^B(r_2) + D_1^B(r_1)] \\ & \quad - e_1 - r_1. \end{aligned} \tag{4}$$

In the objective function (4), the first term refers to the payoff in the event of bilateral performance. The second and third terms concern the case of unilateral breach by party 2 and party 1, respectively, with the corresponding unilateral damage payments. The fourth term concerns the case of bilateral breach, where party 1 receives damage compensation D_1^B and pays damages D_2^B to party 2.

The necessary first-order condition for the private optimum for party 1 with respect to e_1 is the following:

$$p_1'(1 - p_2)[(D_1^U - D_1^B) - (D_2^U - D_2^B)] + p_1'[D_2^U + p_2(\overline{G}_1 - \underline{G}_1)] = 1. \tag{5}$$

Proposition 1. When the values of the parties' performances are interdependent, bilateral contracts provide incentives that are superior to the corresponding pair of unilateral contracts. The level of effort under the rule of expectation damages is socially optimal when

$$D_1^U - D_1^B = D_2^U - D_2^B. \tag{6}$$

Proof. See the Appendix.

When the performances have interdependent values, bilateral con-

15. The externality increases the expected marginal benefit of effort by a positive term in LHS in conditions (2) and (3). This term is absent in unilateral contracts and bilateral contracts with independent values.

16. In the following analysis, we omit the explicit discussion of reliance incentives since the condition for the private optimum of zero marginal damages applies to all cases under scrutiny. Proofs are available from the authors upon request.

17. The private problem faced by party 2 is symmetrical, and the conditions stated in proposition 1 in Section 2.3 must be equally satisfied to create optimal incentives for party 2.

tracts are superior because they allow the parties to internalize the externality created by one performance on the other, by linking the two performances in a single contract. When performance values are independent, a bilateral contract creates incentives that are equivalent to the sum of two unilateral contracts.

To align private and social incentives, the traditional expectations damages (that is, the idea of giving the non-breaching party the “benefit of the bargain”) must hold. Proposition 1 shows an additional requirement, as specified in condition (6). The easiest and most practical way to satisfy this condition would be to set damages for unilateral and bilateral breach equal to one another, such that both sides of the equality in condition (6) would be equal to zero. This would suggest imposing expectation damages in cases of bilateral breach. This result is consistent with the rule of bilateral expectation damages derived by Schweizer (2006), but it is inconsistent with the preclusion rule adopted by most legal systems, as discussed in Section 4.

Although most contract rules apply to unilateral and bilateral contracts alike, there are two important legal remedies that apply to bilateral contracts only. In the face of a breach, the parties confront additional options made available to them by the specific legal remedies applicable to the cases of unilateral or bilateral breach. In the following sections, we will discuss the effects of these options on parties’ incentives. Section 3 examines the defense of nonperformance, which becomes available to the nonbreaching party when a unilateral breach occurs. Section 4 considers the effect of the preclusion rule that applies when a bilateral breach occurs. The results in Sections 3 and 4 hold in cases of both independent and interdependent values. We therefore omit any distinction between the two cases.

3. UNILATERAL BREACH AND THE DEFENSE OF NONPERFORMANCE

Under most legal systems, a material breach or a lack of substantial performance of a bilateral contract gives the nonbreaching party the right to suspend his own obligations under the contract.¹⁸ This right is generally known as the defense of nonperformance. The existence of a defense of nonperformance implies that, in the case of unilateral breach, the nonbreaching party has two options. He can either sue for full ex-

18. If breach is nonmaterial (that is, if there has been substantial performance), then the other party has a claim for damages but is not excused from fulfilling his contractual obligation.

pectation damages, or he can face breach and exercise the defense of nonperformance, suing for reduced damages.

The defense of nonperformance has ancient roots and can be viewed as a fundamental form of self-help in contracts (Beale, Bishop, and Furmston 2007, p. 549). The principle of excusing the victim of a contractual breach for his nonperformance finds its origins in the Roman principle *exceptio inadimpleti contractus* (also known as the principle *inadimplenti non est adimplendum*), which states that lack of performance relieves the nonbreaching party from his duty to perform his counterperformance. The principle enjoys widespread adoption in civil-law systems as a general principle of contract law and/or a specific rule for nominate contracts¹⁹ and is part of recent draft codifications.²⁰ Other legal systems, including the international law of sales²¹ and public international law,²² recognize a defense of nonperformance by permitting

19. The French Code Civil adopts the exception of nonperformance through many specific provisions relating to sales (Articles 1612 and 1652), barter (Article 1704), and deposit (Article 1948); however, the exception of nonperformance is generally regarded as a principle applicable to all contracts creating bilateral obligations (Malecki 1999, pp. 37–53). Likewise, German law (*Bürgerliches Gesetzbuch*, par. 320) formulates the exception as a general principle, under the name of a plea of unperformed contract. A similar approach is followed by Spanish-based legal systems (for example, Article 1426 of the Spanish *Código Civil*) and by the Swiss law of obligations (Article 82 of the Swiss *Code des Obligations*). Italian law adopts the *exceptio inadimpleti contractus* both as a general principle (Articles 1453 and 1460 of the Italian *Codice Civile*) and as a rule applicable to specific bilateral contracts (for example, under Articles 1565 and 1901).

20. Section 4.III.3:401 of the Model Rules of European Private Law governs the right of a breachee to withhold performance: “Right to withhold performance of reciprocal obligation: (1) A creditor who is to perform a reciprocal obligation at the same time as, or after, the debtor performs has a right to withhold performance of the reciprocal obligation until the debtor has tendered performance or has performed.” See the ongoing work by the Study Group on a European Civil Code/Research Group on EC Private Law (2008), as well as Moyle (1892) and Treitel (1988).

21. The defense of nonperformance has been adopted by the United Nations Convention on Contracts for the International Sale of Goods (Vienna, 11 April 1980, Treaty Document No. 98–9 [1984], UN Document No. A/CONF 97/19, 1489 UNTS 3). Under Article 71, a party may suspend the performance of his obligation if it becomes apparent that the other party will not perform a substantial part of his obligations. Article 72 provides that the right to withhold performance also applies in the case of anticipatory breach of contract and offers a remedy that is available even before the obligation becomes due, providing protection against a future breach of contract. For a more detailed analysis, see Cenini and Parisi (2009).

22. In international law, a material breach of a treaty gives the aggrieved state the right to suspend or terminate its obligations under the treaty. This rule was first affirmed by a well-known decision of the Permanent Court of International Justice, which stated “The principle . . . [*inadimplenti non est adimplendum*] is so just, so equitable, so universally recognized that it must be applied in international relations” (*Diversion of Water from the*

the performance of an obligation to be withheld if the other party fails to perform its obligation.

Historically, the common-law defense of nonperformance has come in many doctrinal forms. Several eighteenth-century common-law decisions embody the idea that, in bilateral contracts, the obligation of each party is conditional on performance of the other party, and, in later times, case law has come to recognize a general defense of nonperformance. The scope of the defense of nonperformance under current U.S. law is quite broad, and it acquires particular significance in the context of bilateral promises, although the prerequisites for this defense vary across jurisdictions. *Restatement (Second) of Contracts* recognizes a general defense of nonperformance, making the defense available in all but a few cases in which different periods are affixed within which each party is to perform.²³ The anticipatory repudiation doctrine is replete with examples of defense of nonperformance. The common law accepts the proposition that anticipatory repudiation constitutes a present breach. This gives the aggrieved party a right to withhold his own performance even if the time set for the counterperformance has not yet elapsed.²⁴ In recent codifications, it is possible to observe an increased reliance on this instrument, giving a promisee the right to withhold performance and to use it as a defensive strategy in the face of contractual insecurity. Even if short of anticipatory repudiation, a party faced with the serious possibility of a breach may be entitled to withhold his own performance. The Uniform Commercial Code (sec. 2-609), for example, gives either party the right to withhold his own performance in the absence of an adequate assurance of performance from the other party.²⁵ Similar principles are found in the United Nations Convention

Meuse [Netherlands v. Belgium] [1937], P.C.I.J., Series A/B, No. 70). The rule was subsequently codified under Article 60 of the 1969 Vienna Convention on the Law of Treaties (A/CN.4/492,2; A/CN.4/496, sect. D; A/CN.4/498 and add. 1-4; and A/CN.4/L.574 and corr. 1 and 3). See also Goma (1996).

23. This is now the default rule followed by *Restatement (Second) of Contracts*, sec. 234, for contracts that are capable of being performed simultaneously.

24. The same principle applies under the United Nations Convention on Contracts for the International Sale of Goods, allowing the promisee to withhold his performance in the face of anticipatory repudiation (Strub 1989).

25. The following is from Uniform Commercial Code sec. 2-609: "Right to Adequate Assurance of Performance. (1) . . . When reasonable grounds for insecurity arise with respect to the performance of either party the other may in writing demand adequate assurance of due performance and until he receives such assurance may if commercially reasonable suspend any performance for which he has not already received the agreed return."

on Contracts for the International Sale of Goods (Articles 71 and 72), the International Institute for the Unification of Private Law (UNIDROIT) Principles (Articles 7.3.3 and 7.3.4), and the (Lando) Principles of European Contract Law (Articles 8:105 and 9:304).

When used in response to a breach, a defense of nonperformance gives the nonbreaching party the option of withholding performance in the event of a substantial breach. As a practical matter, the nonbreaching party can choose to withhold performance and to be released from his obligations, or he can continue to pursue the performance of the bilateral contract. The right of the nonbreaching party to be excused from counterperformance does not eliminate his right to obtain full damages. When invoking a defense of nonperformance in contracts involving bilateral promises, damages are calculated by taking the value of the promised performance and subtracting the benefits, if any, that the nonbreaching party received by not having to complete his or her own performance (*Daugherty v. Bruce Realty and Development*, 892 S.W. 2d 332 [Mo. App. 1995]).²⁶

A nonbreaching party may choose to cancel the contract and exercise the defense of nonperformance for a variety of reasons.²⁷ In the case of unilateral breach considered in Sections 3.1 through 3.3, we model a bilateral contract with simultaneous performances in which each party has the right to exercise the defense of nonperformance.²⁸ The availability of this defense modifies the options available at time 4 of the timeline of our model. At time 4, each promisee who is ready to perform will alternatively (1) obtain counterperformance, (2) face breach and sue for full expectation damages, or (3) face breach and exercise the defense of nonperformance with reduced damages. The assumptions regarding the parties' information at this stage are not too stringent, given the legal rules that govern how parties can be placed in default under most

26. When exercising a defense of nonperformance, expectation damages are adjusted in light of the salvage value of the withheld performance.

27. In addition to the possible psychological inclination to withhold one's own cooperation when the other party fails to cooperate, several economic factors help an aggrieved party decide whether to exercise the defense. For an interesting study of strategic and irrational threats of nonperformance, see Bar-Gill and Ben-Shahar (2004).

28. In Section 3.4, we will extend the model to consider the case of sequential performances, in which only the party whose performance is due last is entitled to exercise the defense of nonperformance.

legal systems.²⁹ In Section 3.4, we extend the analysis to consider contracts where performances are due at different times. Whenever the defense of nonperformance is exercised, courts reduce the damages that the breaching party should pay by an amount equal to the savings that the nonbreaching party attains by not having to complete his performance.

3.1. The Incentive Effects of the Defense of Nonperformance

The defense of nonperformance applies to cases of unilateral breach of a bilateral contract. We study the incentive effects of the defense, starting from the following stylized definition.

Definition 1. In defense of nonperformance, when a bilateral contract is unilaterally breached, the breachee has the option of withholding performance and can be released from his obligations. The right of the nonbreaching party to be excused from counterperformance does not eliminate his right to obtain damages.

Formally, the nonbreaching party who exercises the defense of nonperformance has the opportunity to redeploy the performance toward alternative uses, with an expected benefit V_i^e ,³⁰ and this party realizes savings equal to h_i (to be computed as a reduction in the breacher's damages). Assume that the defense of nonperformance is invoked with probability α_i . Payoffs will be modified accordingly. In the case of party 2's unilateral breach, party 1 is entitled to D_1^U and V_i^e . Likewise, in the event of his own breach, party 1 would be liable to compensate party 2 D_2^U for party 2's loss net of the reduction in damages when party 2

29. According to the *Restatement (Second) of Contracts*, sec. 234, when performances are due simultaneously, the tender of one party's performance is required for a demand of counterperformance (that is, each duty of performance is constructively conditioned on tender of the other). Therefore, no counterperformance is due unless the first obligation is duly performed or tendered. See also Perillo (2003, pp. 424–29) and Corbin (1999, sec. 35.6). Hence, a party that is in breach cannot strategically invoke a defense of nonperformance against his breaching counterpart to avoid being found in breach, simply because he should show his readiness to perform before demanding performance and putting the other party in default.

30. Redeployment is assumed not to be possible when breach materializes. The breach probability includes only situations in which a party fails in his efforts and is not ready to deliver the contractual performance. The redeployment value V_i will depend on the fungible nature of the performance (for example, contract specificity of the performance investment and ability to redeploy the performance toward alternative uses). The redeployment value V_i is not known with certainty by parties and is higher than damages reduction h_i with probability α_i . Hence, the expected benefit is $V_i^e = \alpha_i V_i$.

exercises the defense of nonperformance (with probability α_2) and \underline{G}_1 , the counterperformance value, when party 2 performs (with probability $[1 - \alpha_2]$).

The private problem for party 1 becomes³¹

$$\begin{aligned} \max_{e_1, r_1} & p_1 p_2 \overline{G}_1 + p_1 (1 - p_2) [D_1^U + V_1^e] \\ & + (1 - p_1) p_2 [-D_2^U + \alpha_2 b_2 + (1 - \alpha_2) \underline{G}_1] \\ & + (1 - p_1) (1 - p_2) (-D_2^B + D_1^B) - e_1 - r_1. \end{aligned} \quad (7)$$

The first-order condition for privately optimal effort of party 1 becomes

$$p_1' [G_2^e + p_2 (\overline{G}_1 - \underline{G}_1) + (1 - p_2) V_1^e + p_2 \alpha_2 (\underline{G}_1 - b_2)] = 1. \quad (8)$$

Proposition 2. The defense of nonperformance creates an incentive to produce effort that is above the socially optimal level.

Proof. See the Appendix.

This is because a prospective breacher faces a double threat from his breachee: (1) liability for expectation damages, and (2) loss of the sought-after contractual surplus. As a result of this double threat, each party's efforts are tied to the value of the breached performance (that is, the effect of expectation damages) as well as to the value of the sought-after counterperformance (that is, the effect of the defense of nonperformance). This double threat may induce a double internalization of the cost of breach with excessive performance efforts.

In the following subsections, we examine the role of the defense of nonperformance in correcting contract imperfections.

3.2. Imperfect Compensation

The defense of nonperformance plays an important role in correcting the distortions created by imperfect compensation. Imperfect compensation may be caused by a variety of factors, among which insolvency and court errors play an important role. It is well known in the literature that the presence of insolvency in contract relationships dilutes the effort incentives of the insolvent party or parties. In a contract situation, a party is potentially insolvent or judgment proof if his level of wealth cannot cover the damages set by the court at the level of expectation damages. In addition, as the literature points out, courts are prone to incur systematic errors or biases in the quantification of damages (Muris

31. In the interest of brevity, the functions $p_i(e_i)$ and $G_i(r_i)$ will be denoted, without their arguments, as p_i and G_i .

1983; Dore and Veitch 1994). Likewise, courts may liquidate damages in accordance with a measure that falls short of expectation damages because of difficulties in establishing proof of subjective value, or they can impose limitations on damages based on the foreseeability of harm (Goetz and Scott 1980; Ayres and Gertner 1989).

Imperfect compensation can be modeled as an error term k_i . Damages will be analytically set as follows:

$$D_i^U = D_i^B = G_i^e + k_i, \quad i = 1, 2. \quad (9)$$

When perfect expectation damages are awarded, k_i is equal to zero. In the case of imperfect compensation, k_i will have a negative value, giving the nonbreaching party compensation that is lower than the expected damages. The objective function of party 1, as stated in condition (8), is changed to incorporate imperfect compensation, as in condition (9).

The first-order condition with respect to e_1 becomes

$$p_1'[G_2^e + k_2 + p_2(\overline{G}_1 - \underline{G}_1) + (1 - p_2)V_1^e + p_2\alpha_2(\underline{G}_1 - b_2)] = 1. \quad (10)$$

Proposition 3. In bilateral contracts, the defense of nonperformance corrects the distortions caused by imperfect compensation.

Proof. See the Appendix.

Imperfect compensation dilutes performance incentives. The defense of nonperformance corrects this distortion. In the face of a contractual breach, the defense of nonperformance gives a prospective breachee some additional leverage against his prospective breacher. The defense of nonperformance provides a prospective breacher an additional incentive to avoid breach, to ensure the surplus from the contractual counterperformance. This additional benefit of effort can be seen in the two extra terms that are present in condition (10), compared to condition (5), under perfect expectation damages.³² In situations of imperfect compensation, the breachee's threat to exercise the defense of nonperformance is very credible, because it gives the breachee an opportunity to limit the loss due to imperfect compensation by redeploying the performance toward alternative uses. Losses due to imperfect compensation are only partially recoverable, and reducing the amount that needs to

32. Overcompensation increases performance incentives above the social optimum. Hence, the defense of nonperformance would be undesirable because it exacerbates this distortion.

be collected through litigation by means of defense of nonperformance effectively reduces the nonbreaching party's exposure.³³

3.3. Litigation Costs

Similar to a tax, litigation costs create a wedge between one party's liability and the other party's net compensation in case of breach. We begin by modeling litigation costs in accordance with the American rule, in which each party is responsible for his or her own attorney's fees unless otherwise specified by the contract. We extend the analysis to consider the English rule, in which the losing party in a dispute pays the litigation costs of the prevailing party. We consider litigation costs that are proportional to the value of the case—that is, to the damages liquidated by courts.

For the American rule, c denotes the fraction of nonrecoverable litigation costs that a party has to pay in the event of litigation. The defense of nonperformance does not generally eliminate the need for litigation for the parties. The breachee who exercises the defense is in fact entitled to receive (reduced) damages from his breacher and will likely need to resort to litigation to collect such damages. In the presence of litigation costs, a bilateral contract with a defense of nonperformance poses the following private problem for party 1:

$$\begin{aligned} \max_{e_1, r_1} & p_1 p_2 \overline{G}_1 + p_1(1 - p_2)[(1 - c)D_1^U + V_1^e] \\ & + (1 - p_1)p_2[-(1 + c)(D_2^U - \alpha_2 b_2) + (1 - \alpha_2)\underline{G}_1] \quad (11) \\ & + (1 - p_1)(1 - p_2)[-(1 + c)D_2^B + (1 - c)D_1^B]. \end{aligned}$$

For a social optimum, the first-order condition with respect to e_1 , under bilateral expectation damages, becomes

$$\begin{aligned} p_1'[(1 + c)G_2^e + p_2(\overline{G}_1 - \underline{G}_1) + (1 - p_2)V_1^e \\ + p_2\alpha_2\underline{G}_1 - p_2\alpha_2(1 + c)b_2] = 1. \end{aligned} \quad (12)$$

Proposition 4. In bilateral contracts, the defense of nonperformance has an undetermined effect on the distortion caused by litigation costs under the American and English rules.

33. A breachee may find it convenient to exercise the defense of nonperformance to reduce his exposure because of imperfect compensation. Interestingly, because of imperfect compensation, the nonbreaching party may exercise the defense of nonperformance even when the redeployment value falls below the reduction of damages. This would be a case of inefficient redeployment undertaken to reduce breachee's losses.

Proof. See the Appendix.

The indeterminate effect of the defense of nonperformance on the parties' efforts in the presence of litigation costs is due to the existence of two countervailing effects. The first effect is the one identified in proposition 2: by performing, the nonbreaching party eliminates the other party's defense of nonperformance, hence protecting his right to demand the sought-after contractual benefit. This benefit may lead to excessive performance efforts. The second effect mitigates this excessive effort problem by reducing the distortion created by litigation costs. By reducing the amount of payable damages, the defense of nonperformance reduces the "tax" that litigation imposes on the parties in the event of breach, rendering the breach-litigation outcome less undesirable than it would be otherwise. This leads to a reduction in performance incentives. As shown in the Appendix, this effect applies to both American-type and English-type systems. These two effects entirely offset one another in the special case where the litigation costs equal the surplus that was obtainable through the contractual performance.

3.4. Bilateral Contracts with Sequential Performances

In the United States, when the parties' obligations are capable of being performed simultaneously, the defense of nonperformance can be invoked by both contracting parties. However, contractual performances are seldom due simultaneously. Indeed, this temporal element is what distinguishes most contracts from barter (Jackson 1978, p. 70). Under *Restatement (Second) of Contracts*, sec. 234, when performances are due at different times, the defense of nonperformance is only available to the party whose performance is due last.³⁴ We extend the analysis to take into account the possibility of sequential performances in bilateral contracts. Assume that, in a bilateral contract, party 1's performance is due before party 2's performance. The defense of nonperformance can

34. In the case considered under *Restatement (Second) of Contracts*, sec. 234, where different periods during which each party is to perform are affixed, the default rule of simultaneous performance does not apply, and the defense of nonperformance is available only for the party whose performance is due last. This is because when performances are due at different times, the performance, or tender of performance, of one party is not needed to put the other party in default (that is, the performance for the party whose performance is due first cannot be constructively conditioned on the tender of the other).

be exercised only by party 2, who can observe party 1's breach before his performance is due.³⁵

The first-order conditions for the privately optimal effort of party 1 and 2 become, respectively,

$$p_1'([G_2^e + p_2(\overline{G}_1 - \underline{G}_1) + p_2\alpha_2(\underline{G}_1 - b_2)] = 1 \quad (13)$$

and

$$p_2'[G_1^e + p_1(\overline{G}_2 - \underline{G}_2) + (1 - p_1)V_2^e] = 1. \quad (14)$$

Proposition 5. In bilateral contracts with sequential performances, the defense of nonperformance has qualitatively similar effects to the with simultaneous performances.

Proof. See the Appendix.

The effects of the defense of nonperformance are robust even in the presence of sequential performances, where the defense is available only to the party whose performance is due last. Of interest, even though in the sequential case the defense is only available to one party, the effects of the defense of nonperformance are present for both parties, inducing both parties to invest in higher effort. In the presence of the contract imperfections studied in Sections 3.2 and 3.3, a unilateral defense of nonperformance corrects the incentives in a way qualitatively similar to the case where the defense is available to both parties. Effort incentives are clearly improved in the case of imperfect compensation, such as insolvency and undercompensation errors, whereas the effect remains undetermined in the presence of legal costs. The correction of incentives is weaker but is still present for the party whose performance is due last. This is because the party whose performance is due first has no opportunity to withhold performance in case of breach by the other party.

These results have several practical implications. For example, our results suggest that when the parties face a problem of bilateral insolvency, it is preferable to specify that the performances are due simultaneously, to empower both parties with a defense of nonperformance. When the parties' obligations are not capable of being performed si-

35. The timeline of the contract is as follows: (1) at time 0, parties sign a bilateral contract; (2) at time 1, each party chooses e_i ; (3) at time 2, state of nature on party 1's ability to perform is observed; (4) at time 3, party 1 either performs or does not perform; (5) at time 4, the state of nature on party 2's ability to perform is realized; (6) at time 5, party 2 decides whether to exercise the defense of nonperformance; and (7) at time 6, parties eventually sue for damages.

multaneously, it is desirable to specify the timing of performance and counterperformance in such a way as to give the solvent (or less insolvent) party a defense of nonperformance against his counterpart. Similarly, in case of undercompensation errors that affect one contracting party, incentives may be realigned by making the party who faces the undercompensation error perform last. The inverse sequence of performances could instead be used to correct overcompensation errors.

4. BILATERAL BREACH AND PRECLUSIONS

Bilateral contracts create bilateral obligations between parties. When neither party is able to perform his obligation, a bilateral breach occurs. Legal systems differ in their treatment of bilateral breach cases, but the outcome is often the same: when both parties are in breach, they are barred from bringing an action against one another.³⁶

Legal systems follow different paths to achieve this fundamentally common result. In most legal systems, a successful action in contracts requires showing that the plaintiff would have been ready to perform but for the other party's breach.³⁷ Parties' performances are seen as conditional on the other party's offer to perform. As a result of this legal construct, no action in contracts is available to the parties (*Malani*

36. The legal solutions adopted in the case of bilateral breach differ across legal systems. Although most civil-law systems do not allow a breaching party to claim or recover damages against his breaching counterpart and/or consider the contract resolved in case of bilateral breach, some civil-law jurisdictions will apportion damages looking at a variety of factors, including the timing, gravity, and possible justifications of the parties' breach. Two notable exceptions can be found under Chinese and Russian law. These systems adopt a concept of bilateral breach that leaves the door open for reciprocal claims of damages based on the comparative evaluation of the parties' faults. See, for example, the provisions of Article 120 of Contract Law of the People's Republic of China: "In case that both parties violate a contract, they shall bear the liabilities respectively." The Chinese rule of bilateral breach has been criticized by Ling (2002, pp. 397–99). The Russian Civil Code follows a similar principle, although the fault (and intent) basis of contractual liability under Russian contract law substantially narrows the practical scope of bilateral breach situations (Komarov 1999).

37. In most cases, either party can demand performance from the other by offering or tendering his own performance (*Restatement [Second] of Contracts*, sec. 238; Uniform Commercial Code, sec. 2–507). This is because of a general presumption that performances are due simultaneously. Specifically, in the case of contracts in which the same time is fixed for both performances, or where time is fixed for one party and no time is fixed for the other, or where no time is fixed for the performance of either party, performances are presumed to be due simultaneously. In these cases, either party can trigger performance from the other (after the specified period has elapsed, when a time was specified), by offering his own counterperformance (*Restatement [Second] of Contracts*, sec. 234).

v. Clapp, 56 Haw. 507, 542 P.2d 1265 [1975]; Perillo 2003, p. 430). Legal systems create this preclusion on either substantive³⁸ or procedural³⁹ grounds. The effect of a preclusion is similar to a “clean hand rule,” in which a breaching party cannot exercise an action in contracts against his breaching counterpart. The effects of a preclusion rule differ from the effects of a damage offsetting rule. When money is owed by both parties, an offsetting rule only reduces pro tanto the amount payable by the parties, whereas a preclusion rule entirely extinguishes the right of action for both parties.

In the United States, case law affirms the “plaintiff in default” rule, according to which a party who repudiates or defaults on his contractual obligations is not entitled to maintain an action on the contract. The rationale of this principle is best expressed in an 1824 leading case in which the Massachusetts Supreme Judicial Court barred the action of the defaulting plaintiff, stating “The law is indeed most reasonable in itself. . . . It requires [the plaintiff] to act justly by a faithful performance of his own engagements before he exacts the fulfillment of dependent obligations on the part of others” (*Stark v. Parker*, 19 Mass. [2 Pick.] 267, 275 [1824]). This decision still reflects the weight of authority, although not without challenge.⁴⁰

4.1. Incentive Effects of the Preclusion Rule

We study the incentive effects of the preclusion rule, starting from the following stylized definition.

Definition 2. Preclusion rule: when a bilateral contract is bilaterally

38. In some cases, an action brought by a breaching party is barred on substantive grounds: the right to demand performance presupposes readiness to provide counterperformance. A breaching party is, by definition, not ready to perform his obligation, and in these legal systems he has no rights against his breaching counterpart.

39. Other systems create a similar preclusion on procedural grounds: a plaintiff is required to put his defendant in default (providing him with an opportunity to perform), before commencing an action in contracts. In bilateral contracts with mutually conditional obligations, a promisee who wishes to put his promisor in default is required to make a conditional offer or tender of his own performance: a promisee who is himself in breach cannot possibly make such an offer.

40. For discussions of the judicial treatment of claims brought by plaintiffs who were themselves in default, see A.D. (1949, p. 844), Lee (1966, p. 1023), Palmer (1978, sec. 5.13), and Perillo (2003, p. 445). In most common-law jurisdictions, case law affirms the principle that no action in contracts stands for a party who repudiates or defaults on his contractual obligations. A party who is guilty of even a substantial or material default may still be allowed a remedy, however, for the restitution of the value conferred through partial performance (*Restatement [Second] of Contracts*, sec. 388[1]).

breached, both parties are barred from bringing an action in contracts against the other, and neither party is entitled to receive compensation.

Unlike the case of unilateral breach, in which the breachee can withhold his counterperformance but remains entitled to receive expectation damages, in the event of bilateral breach both parties are precluded from seeking damages. Formally, the effects of a preclusion rule on parties' incentives can be analyzed by assuming that no action (and, therefore, no damages) arises in the event of bilateral breach:

$$D_1^B = 0$$

and

$$D_2^B = 0.$$

In the case of bilateral breach considered here, the preclusion rule offers the same options available at time 4 of the timeline of the general model, although with different payoffs. At time 4, the breaching party will alternatively (1) face a bilateral breach and avoid liability due to the preclusion rule, or (2) obtain performance and become responsible for full expectation damages for unilateral breach.

Proposition 6. A preclusion rule induces the party who produces the higher surplus to exert lower effort and the party who produces the lower surplus to exert effort higher than the socially optimal efforts.

Proof. See the Appendix.

Application of the preclusion rule to bilateral contracts creates asymmetric distortions on the parties, leading to a paradoxical inversion of incentives: the party that produces higher value undertakes lower effort, whereas the party that produces lower value undertakes higher effort toward his or her performance. This is because a preclusion rule leads the parties to consider their forgone gain, rather than the other party's forgone benefit (a rule of bilateral expectation damages would instead lead them to take into account the other party's forgone benefit from the bargain).

4.2. Imperfect Compensation

In the presence of imperfect compensation according to condition (9), the preclusion rule yields a first-order condition with respect to e_1 equal to

$$p_1[G_2^e + k_2 + p_2(\overline{G}_1 - \underline{G}_1) + (1 - p_2)(G_1^e - G_2^e) + (1 - p_2)(k_1 - k_2)] = 1. \quad (15)$$

Proposition 7. In bilateral contracts with imperfect compensation, the preclusion rule corrects the distortion of effort for the party who produces the lower surplus from the contract and exacerbates the distortion for the other party.

Proof. See the Appendix.

A standard rule of expectation damages would lead party 1 to take into account the other party's benefit from the bargain, $D_2^B = G_2^e$. However, in the event of a bilateral breach, a preclusion rule leads party 1 to consider his forgone gain G_1^e . Consider two parties with asymmetric contract surplus—for example, $G_1^e > G_2^e$ —facing the same imperfect compensation problem, with a reduction in damages $|k_1| = |k_2|$. The preclusion rule corrects the distortion for the party who produces the lower surplus from the contract and exacerbates the distortion for the other party. The intuition lies in the previous observation: the preclusion rule induces the party to take into account his own forgone gain, and so it induces an increase in effort for the party that faces the higher preclusion loss in the case of a bilateral breach. On the other hand, consider two parties having the same contract surplus, $G_1^e = G_2^e$, but facing an asymmetrical court bias $|k_1| > |k_2|$. In this case, the preclusion rule corrects the distortion induced by imperfect compensation for the party that faces the smaller undercompensation but exacerbates the distortion for the other party. When both surpluses and levels of imperfect compensation are asymmetrical, the preclusion rule has mixed effects on the parties' incentives, depending on the relative sizes of the contractual surplus and imperfect compensation.

4.3. Litigation Costs

Under a preclusion rule, a breacher is precluded from obtaining any compensation from his counterpart who is also in breach. Hence, when the contracting parties find themselves in a situation of bilateral breach, they generally will choose not to litigate, thus avoiding litigation costs. With a preclusion rule and litigation costs, the private problem for party 1 becomes

$$\max_{e_1, r_1} p_1 p_2 \overline{G}_1 + p_1(1 - p_2)(1 - c)D_1^U + (1 - p_1)p_2[-(1 + c)D_2^U + \underline{G}_1], \quad (16)$$

The first-order condition with respect to e_1 , under bilateral expectation damages and preclusion rule, becomes

$$p'_1[(1+c)G_2^e + p_2(\overline{G}_1 - \underline{G}_1) + (1-p_2)(G_1^e - G_2^e) - (1-p_2)(G_1^e + G_2^e)c] = 1. \quad (17)$$

Proposition 8. In bilateral contracts with symmetric contract surplus, the preclusion rule corrects the distortion of effort incentives created by litigation costs under the American and English rules for both parties.

Corollary. When the contract surplus is asymmetrical, the effort incentives induced by litigation costs under the American and English rules are corrected for the party who produces the higher surplus but are exacerbated for the other party.

Proof. See the Appendix.

The preclusion rule becomes an effective instrument for the creation of optimal effort incentives in the presence of litigation costs. This is because, with a preclusion rule, the parties avoid litigation in the event of a bilateral breach. In accordance with our analogy of litigation costs to a tax, the preclusion avoids the imposition of the litigation tax in cases of bilateral breach, hence reducing the distortion created by litigation costs under both American-type and English-type systems.

5. CONCLUSIONS

Bilateral contracts and the legal remedies that govern bilateral contracts provide valuable enforcement mechanisms that are not available when parties enter into separate unilateral contracts. In this paper, we extend the standard contract model and show that bilateral contracts have two important advantages compared to unilateral contracts. First, when the values of the parties' performances are interdependent, bilateral contracts create effort incentives that are superior to those created by unilateral contracts. Second, bilateral contracts offer a valuable instrument for correcting imperfections in the contract enforcement, such as imperfect compensation due to parties' insolvency or court errors, and litigation costs. The superiority of bilateral contracts in the presence of imperfections hinges upon the specific legal remedies that apply to bilateral contracts.

Further analysis, empirical and comparative, would be desirable to understand the extent to which the identified features of bilateral contract remedies affect contractual practice. Our analysis suggests that

more frequent use of bilateral contracts should be observed when the contract is affected by potential insolvency, costly litigation, and imperfect adjudication. This may be the case in industries where it is hard to quantify the actual value of performance or in jurisdictions that put caps on liquidated damage amounts, or in situations where the value of the contract is high relative to the wealth of the parties. The peculiar features of bilateral contract remedies could in fact be used instrumentally by contracting parties to cope with potential enforcement problems. Also, there are relevant theoretical extensions that are worthy of consideration. For example, parties may lack complete information on the actual distribution of contractual surplus between themselves, and it would be interesting to verify under which circumstances incomplete information could affect the results identified in our analysis.

APPENDIX

In the following text, we refer to a bilateral contract with interdependent values. The same proof applies to a bilateral contract with independent values. Symmetrical analysis applies to party 2. The left-hand side of first-order conditions for privately optimal effort for party i is increasing in e_i , $i = 1, 2$.

Proposition 1. Suppose parties negotiate two separate unilateral contracts. The objective function and first-order conditions for private optimal effort for party 1 are, respectively,

$$\min_{e_1} [1 - p_1(e_1)] [-D_2^U(r_2)] - e_1 \quad (\text{A1})$$

and

$$p_1'(e_1) D_2^U = 1. \quad (\text{A2})$$

Under expectation damages and condition (6): $e_i^{*U} \leq e_i^{*B}$, $i = 1, 2$, where e_i^{*U} and e_i^{*B} denote the privately optimal effort, respectively, in a unilateral contract, in accordance with condition (A2), and a bilateral contract, in accordance with condition (5), for party i , $i = 1, 2$. The social optimum and the private optimum coincide under condition (6), following logically from the comparison of conditions (2) and (5).

Proposition 2. This follows logically from comparison of conditions (2) and (8).

Proposition 3. This follows logically from comparison of conditions (8) and (10) under $k_2 < 0$.

Proposition 4. The effect is indeterminate from the comparison of conditions (8) and (12), since LHS in condition (12) contains two additional positive terms $(1 - p_2)V_1^e + p_2\alpha_2\underline{G}_1$ and a negative term equal to $-p_2\alpha_2(1 + c)b_2$. Under English rule, party 1's FOC coincides with condition (12); hence, the same proof applies.

Proposition 5. This follows logically from comparison of conditions (8) and (13) and (14), respectively.

Proposition 6. This follows logically from the comparison of conditions (2) and (5) under $D_1^B = D_2^B = 0$.

Proposition 7. This follows logically from the comparison of conditions (5) and (15) under $D_1^B = D_2^B = 0$.

Proposition 8. Assume that $D_1^B = D_2^B = 0$. Condition (17) simplifies to

$$p_1'[(1 + c)G_2^e + p_2(\overline{G}_1 - \underline{G}_1) - (1 - p_2)(G_1^e + G_2^e)c] = 1. \quad (\text{A3})$$

This follows logically from the comparison of conditions (2) and (A3), since the left-hand side in condition (A3) is increasing in e_1 .

In case of an English rule, the private problem for party 1 becomes

$$\max_{e_1, r_1} p_1 p_2 \overline{G}_1 + p_1(1 - p_2)D_1^U + (1 - p_1)p_2[-(1 + c)D_2^U + \underline{G}_1]. \quad (\text{A4})$$

First-order conditions with respect to e_1 , under bilateral expectation damages and the preclusion rule, becomes

$$p_1'[(1 + c)G_2^e + p_2(\overline{G}_1 - \underline{G}_1) \quad (\text{A5})$$

$$+ (1 - p_2)(G_1^e - G_2^e) - (1 - p_2)cG_2^e] = 1.$$

Under $D_1^B = D_2^B = 0$, condition (A5) simplifies to

$$p_1'[(1 + c)G_2^e + p_2(\overline{G}_1 - \underline{G}_1) - (1 - p_2)cG_2^e] = 1. \quad (\text{A6})$$

This follows logically from the comparison of conditions (2) and (A6).

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