THE DESIGN OF CONTRACTS AND REMEDIES FOR BREACH*

STEVEN SHAVELL

In the first part of this article, (hypothetical) contracts providing for all possible uncertain contingencies are considered. In the next part, contracts providing for only some contingencies are examined and are shown to be advantageous, due both to difficulties that could arise in making and enforcing contingent terms and to the presence of implicit substitutes for them. In the following, major part of the article, two of these substitutes for contingent terms are analyzed: remedies for breach, and the opportunity for renegotiation; the existence of both is demonstrated to induce parties to behave approximately as they would under detailed contracts.

The concern of this paper is with the implications of uncertainty for the design of contracts and of remedies for their breach.[1] Uncertainty is of course an inherent feature of the contractual relationship, for by definition there is always a lapse of time between the making of a contract and the promised performance. During that period the cost of performance may unexpectedly increase, an offer to the buyer may be made that is more advantageous than the seller's, or any number of other unforeseen contingencies may arise and may result in the seller's or the buyer's failure to perform.

Our analysis of the contractual situation will begin with a consideration of agreements that provide explicitly for such contingencies. Specifically, a characterization will be given of contracts that are both *complete*—contains terms regarding all possible contingencies—and *Pareto efficient*—cannot be improved in the eyes of the buyer and of the seller.[2]

It will next be asked why contracts ordinarily should not be expected to approach true completeness. The explanation will be that because of certain difficulties in making contingent provisions and also of the existence of various substitutes for them, it is in the mutual interests of the parties to leave many things unstated. Two types of difficulty in making provisions will be emphasized in this explanation: the costs of enumerating and of bargaining over contin-

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1. The first systematic formal analysis of damage measures for breach is presented in Shavell [1980]; but see extensions and additions made in Rogerson [forthcoming]; and see Posner [1977] for informal analysis of contracts and breach that will be of interest to economists.
2. The definition of Pareto efficiency employed here is thus a restricted one; it does not make reference to parties other than the buyer and the seller.

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gent arrangements; and the necessity that a party be able to verify the occurrence of a contingency claimed by the other party so that a provision depending on the contingency is workable.[3] It will be shown for which contingencies contractual provisions are made in view of these difficulties.

In the major part of the paper, two important types of substitute for contingent terms in contracts will be studied. The first is provided by legal or customary *remedies for breach of contract*, that is, by rules requiring a party in breach to pay money damages to the other party or perhaps requiring "specific performance." To see why remedies serve as substitutes for contingent terms, consider, for instance, that when a seller must pay damages if he defaults, he will default only if it still would be advantageous to him, say only if his production costs were larger than he anticipated or he received a bid higher than he expected from another party. But that the seller not perform in such contingencies may well be what would have been agreed to in provisions for them; and that the seller make a payment might also have been agreed upon, so as to accomplish a desirable sharing of risk. Thus, remedies for breach can serve as implicit substitutes for explicit contractual provisions by creating appropriate incentives to perform, and sometimes by allocating risk as well.

The second type of substitute for provisions for contingencies lies simply in the opportunity for *renegotiation* in light of circumstance. The seller who finds that it would be expensive to perform would often be willing to pay an amount the buyer would accept for his release; so, through bargaining ex post, the parties may achieve a result similar to what they would have written into the contract. A third type of substitute for contractual provisions should also be mentioned, but it will only be adverted to in the paper; it is that certain contingencies (notably, acts of God, *force majeure*) may already be recognized in contract law (or trade practice or custom) as excusing one of the parties from the obligation to perform.[4]

The paper concludes with a brief comment on the interpretation of the analysis.[5]

3. The necessity of verification of a contingency was first emphasized by Radner [1968].

4. While this substitute for provisions is of undeniable significance, it is subject to the important limitation that it can be employed successfully only in respect to those contingencies that are easily observed and for which the agreement that the parties would have made can be imputed confidently.

5. The contribution of this paper to the formal literature on contracts and contract law would appear to lie in the analysis of contractual incompleteness; the distinctions to be drawn between production contracts and contracts for transfer of possession; the consideration of specific performance; the treatment of imperfect knowledge of the courts; and the allowance for costly renegotiation.

I. Outline of the Model

The concern is with two parties, a buyer and a seller, who each act so as to maximize the expected utility of a single variable, "wealth."[6] The parties are assumed already to have met and not to be immediately able to make contracts with others; thus they will make a contract themselves if doing so would result in a higher expected utility for each than not making any contract, and this will generally be presumed to be the case. The elements of the contractual situation faced by the parties are as follows: In order to get the benefits of performance, the buyer must commit certain resources before he learns whether the seller will carry out his promise. (The buyer may have to advertise the expected appearance of a singer at his nightclub; he may have to make various arrangements in anticipation of going on a charter hunting trip.) The amount of such resources is assumed fixed[7] and will be referred to as reliance expenditures, or simply as *reliance*.[8] Let

$$r = \text{reliance},$$

and assume that it is positive.

After the buyer "relies," the seller learns the outcome of the uncertain contingency. In regard to *production contracts*, one of two types of contract to be studied, the uncertain contingency will be the seller's production cost. Let

$$c = \text{production cost, and}$$
$$f(\cdot) = \text{probability density of } c,$$

where f is assumed to be positive on a nondegenerate interval $[\alpha, \beta]$, with $\alpha \geqq 0$, and to be zero elsewhere. The seller is assumed to learn the production cost before he actually begins the production process. In regard to *contracts for transfer of possession*, the other type of contract, the contingency will be the value of a bid made by another party for a good (an object of art; land) that the seller initially has in his possession. Let

$$b = \text{bid},$$

6. Any nonmonetary variable affecting the well-being of a party is thus assumed to have a monetary equivalent. As the level of initial wealth will have no bearing on the analysis, it will be suppressed in the notation.
7. This is determined endogenously in Shavell [1980], where it is a focus of interest.
8. This and other terminology to be introduced below conforms to standard usage; see for example Dawson and Harvey [1977].

and let f (distributed on $[\alpha, \beta]$) stand for the probability density of b as well.[9] It will also be assumed that the seller would get no value from consumption of the good; if he does not sell the good, its worth to him is zero.

If the seller satisfies his contractual obligation, that is, if he "performs," the buyer will enjoy a benefit called the *expectancy*. Let

$$v = \text{buyer's expectancy},$$

a positive variable. (This would be interpreted as the enhancement in profits due to the appearance of the singer, the value to the individual of going on his hunting trip, etc.) The net benefit if the buyer enjoys performance is $v - r$. The expectancy is assumed to be known to the parties with certainty.[10]

On the other hand, if the seller does not perform, the buyer does not get his expectancy (so his net benefit is $-r$), for it is assumed that the buyer is not able to purchase immediate substitute performance; the contract good or service is not traded on a well-organized market.[11]

II. Pareto Efficient Complete Contingent Contracts

A. *Case Where Parties Are Risk Neutral*

In this subsection a complete contingent contract will mean an enforceable agreement specifying whether the seller is to perform under each contingency and also specifying a price. It will be assumed that the price is paid when the contract is made and that no monetary transfers are carried out thereafter.[12] Accordingly, a com-

9. Note that the bids are taken as exogenous to the model. This simplifying assumption is appropriate if one is thinking of cases in which bids are made without real negotiation with the contracting party. If the assumption were relaxed, it can be shown that the qualitative nature of most of the results would not be altered.

10. This will be seen to imply that the buyer will never himself wish to commit a breach (whereas he might if his expectancy suddenly fell); only the seller will be led to do so. Relaxing this assumption would not change the qualitative nature of our results, as is evident from Shavell [1980].

11. If the good or service were traded on a well-organized market, the only reason for parties to make a contract would be to share the risk of fluctuations in the future market price; and because such problems of pure risk-sharing are well understood, they are not examined here. However, Shavell [1981] (an earlier version of this paper) briefly discusses contracts in a market setting.

12. This assumption is inessential. If payment were to be made only if there were performance, the contract price could be raised as if to compensate the seller for the chance he would not be paid, and so forth. See Shavell [1980]. However, if one or both parties are risk averse, we would not wish to make the assumption (and do not—see subsection B); for then subsequent monetary transfers would clearly matter, as they would serve to allocate risk.

plete contingent contract may be formally identified with a *breach set*

B = the set of contingencies under which the seller will not perform,

and with

k = the contract price.

Now let us define

$E_b(B)$ as the expected value—exclusive of price—to the buyer of a contract with breach set B

$E_s(B)$ as the expected value—exclusive of price—to the seller of a contract with breach set B.

When price is taken into account, the expected positions of the buyer and of the seller who have made a contract are, respectively, $E_b(B) - k$ and $E_s(B) + k$. Hence, a contract (B, k) is Pareto efficient if there does not exist any other contract (B', k') under which $E_b(B') - k' > E_b(B) - k$ and $E_s(B') + k' > E_s(B) + k$. We shall denote the breach set of a Pareto efficient contract by B^*.[13] Before characterizing Pareto efficient complete contingent contracts of the various types of interest to us, let us state a

Remark.[14] A complete contingent contract is Pareto efficient if and only if it is described by either of the following equivalent conditions: (a) The sum of the buyer's and of the seller's expected values is maximized by the contract (i.e., $E_b(B) + E_s(B)$ is maximized by B^*); (b) the sum of the buyer's and of the seller's values given each contingency is maximized by the contract—the seller performs in a contingency if and only if that would increase or leave equal the sum.[15]

This implies

PROPOSITION 1. Under a Pareto efficient production contract, the seller will not perform when production cost exceeds the buyer's expectancy (i.e., $B^* = \{c \mid c > v\}$).

13. B^* may not be unique; but when this is so, it will be noted, and there will be no cause for confusion.

14. The proof of the following Remark is obvious and is therefore omitted (but see Shavell [1980]).

15. This statement is not quite precise, for it does not matter what the seller does if the sum of values is not affected by whether the seller performs. In that case, we shall adopt the convention that the seller performs, and we shall adopt similar conventions later on in the paper without comment.

Note. The result may be explained as follows. Suppose that the parties contemplated making a contract calling for the seller to perform in some contingency where his cost c exceeds the expectancy v. Then the seller would be willing to accept a reduction in the contract price sufficient to induce the buyer to agree to change the contract so as to allow the seller not to perform in that contingency. Similarly, a contract allowing the seller not to perform in a contingency where $c < v$ would be altered so as to require the seller to perform in the contingency. These two statements are in turn true because there is a loss (in the sum of values) if the seller either performs when $c > v$ or fails to perform when $c < v$.

Reliance r does not affect whether it is Pareto efficient for there to be performance because reliance is like a "sunk cost."

Proof. By part (b) of the Remark, it suffices to show that when $c > v$, the sum of values is increased by failing to perform. Now if the seller does not perform, his wealth is k, and the buyer's is $-k - r$, so the sum is $-r$. If the seller does perform, his wealth is $k - c$, and the buyer's is $v - k - r$, so the sum is $v - r - c$. Hence the sum is increased by failing to perform when $-r > v - r - c$ or when $c > v$.

Q.E.D.

In regard to contracts for transfer of possession, two situations will be distinguished. In the first, it is assumed that bids b are made only to the seller; they are not available to the buyer; if the good were delivered to him, the buyer could not then sell to the bidder. By contrast, in the second situation, it is assumed that bids are available to the buyer; if the good were delivered to him, the buyer could sell to the bidder and would do so if $v < b$. In both situations it is assumed for simplicity that if the seller does not perform and sells to the bidder, then that is the end of the matter; the buyer does not attempt to make a purchase from the bidder.[16]

PROPOSITION 2. (a) If bids are made only to the seller, then under a Pareto efficient contract for transfer of possession, the seller will not perform when the bid exceeds the expectancy (i.e., $B^* = \{b \mid b > v\}$). However, (b) if bids are available to the buyer as well, then a contract in which the seller always performs is Pareto efficient; and, more generally, any contract in which the

16. If the model allowed for such purchases, then the next Proposition would still be true. This is because there would be a loss in the sum values if the buyer purchased from the bidder rather than receiving delivery directly from the contract seller; for it is natural to assume that the buyer would have to pay more than b—what the seller received—to induce the bidder to sell. (Moreover, the purchase would involve additional transaction costs.)

seller performs at least whenever the bid is less than or equal to the expectancy is Pareto efficient (i.e., B^* can be any set that is included in $\{b \mid b > v\}$).[17]

Note. Result (a) is analogous to Proposition 1. Result (b) is different from (a) because there is no loss in the sum of values if the seller performs when $b > v$; in that case the buyer would himself sell to the bidder.

Proof. We again apply part (b) of the Remark. To prove (a), note that if the seller does not perform (selling instead to the bidder), his wealth is $k + b$ and the buyer's is $-k - r$, so the sum is $b - r$. If the seller does perform, his wealth is k, and the buyer's is $v - k - r$, so the sum is $v - r$. Hence the sum is increased by failing to perform when $b - r > v - r$ or when $b > v$.

To prove (b), note that if the seller does not perform, his wealth is, as before, $k + b$ and the buyer's is $-k - r$, so the sum is $b - r$. However, if the seller does perform, whereas the seller's wealth is still k, the buyer's is now $\max(b, v) - k - r$, so the sum is $\max(b, v) - r$. The difference between these sums is $b - \max(b, v)$, which is negative for $v > b$ and is 0 otherwise. Hence, for the sum to be maximized, the only requirement is that the seller perform when $v > b$.

Q.E.D.

B. Case Where Parties Are Risk Averse

The main point to be made here is that *parties' attitudes toward risk do not alter the conclusions* (in Propositions 1 and 2) *about when it is Pareto efficient for the seller to perform.* The only effect of the parties' attitudes toward risk is to make it Pareto efficient for money transfers to be made ex post. These transfers will be designed so as to accomplish a mutually beneficial sharing of risk.[18]

Thus, if the buyer is risk averse and the seller risk neutral, it will be Pareto efficient for the seller to act as a perfect insurer of the buyer; the transfers must leave the buyer with the same level of

17. It is also easy to show that the parties should be indifferent as between making contracts with distinct Pareto efficient breach sets.

18. Specifically, if we let θ denote a contingency, then a complete contingent contract is specified not only by k and B, but also by a function, say $g(\theta)$, indicating how much (positive or negative) the seller is to pay the buyer given the contingency θ. It is easy to show that a necessary condition for Pareto efficiency of a contract $(B, K, g(\theta))$ is that B be such that for each θ, the sum of values is maximized. Thus, by the Remark, the choice of B is the same as when parties are risk neutral. And given this choice of B, g must be such as to share risk in a Pareto efficient way; that is (as Borch [1962] originally showed), the ratio of the buyer's marginal utility to the seller's must be maintained constant over θ.

wealth in all contingencies.[19] In particular, when under a Pareto efficient contract the seller does not perform, he will pay the buyer his expectancy.[20]

Conversely, if the buyer is risk neutral and the seller is risk averse, it will be Pareto efficient for the buyer to act as the perfect insurer, and the transfers must therefore be such as to leave the seller with an unvarying level of wealth. Hence, under a Pareto efficient contract, the buyer will absorb the entire risk in production cost or bids, as the case may be.

If both the buyer and the seller are risk averse, then it will not be Pareto efficient for either to act as a perfect insurer of the other, and the situation will be an appropriate compromise between the situations described in the preceding two paragraphs.

III. Why Contracts Are Incomplete

As stated in the introduction, the view that will be taken here is that it is in the mutual interests of parties to leave contracts incomplete. This will be so because the possible adverse consequences of failure to provide for certain contingencies may not be sufficient to justify bearing the sure costs of including terms for those contingencies in the contract plus the expected costs of verifying their occurrence.

A. Case Where Parties Are Risk Neutral

Let us make the following assumptions. First, the parties must choose a set S of contingencies for which to write explicit enforceable provisions: Only if a contingency θ is in S does the contract specify whether the seller shall perform. Let $B \subset S$ be the subset of contingencies under which according to the contract the seller does not perform. If θ is not in S, then something outside the contract (contract law, custom, renegotiation) determines what will happen should θ occur.

Second, there is a positive cost to each party of $\frac{1}{2}\alpha(\theta)$ of providing for θ; for each party $\frac{1}{2}\int_S \alpha(\theta)\,d\theta$ is therefore the cost of including contingent terms. Third, there is also a positive cost $\beta(\theta)$ that the buyer would bear in order to verify the occurrence of θ, and it is assumed that he will do so whenever the contract calls for the seller not to perform. Thus, if $h(\theta)$ is the probability density of θ, then $\int_B \beta(\theta)\,h(\theta)\,d\theta$ is the expected verification cost.

19. This is of course a well-known aspect of Pareto efficient risk-sharing.
20. If this is true, the buyer will get his expectancy whether or not the seller performs, so that the buyer's final wealth will be constant (and will equal $v - k - r$).

Under these assumptions, what will be a Pareto efficient selection of contingencies for which to include terms and a determination concerning the seller's performance? In other words, what will be a Pareto efficient incomplete contract (S, B, k)? The next Proposition answers this question, making use of the easily shown fact that an incomplete contract is Pareto efficient if and only if S and B are chosen so as to maximize the sum of the buyer's and the seller's expected values. In stating and proving the Proposition, the following additional terms are needed: $x(\theta)$, the sum of the buyer's and seller's values given θ if the contract provides for performance; $y(\theta)$, the sum of values (exclusive of verification costs) given θ if the contract allows nonperformance; $z(\theta)$, the sum of values given θ if the contract does not provide for θ.[21]

PROPOSITION 3. Under a Pareto efficient incomplete contract, if there is a provision for a contingency θ, then (a) the provision will call for performance when $x(\theta) \geqq y(\theta) - \beta(\theta)$. Hence, (b) the set of contingencies for which there will be provisions in the contract is

$$S = \{\theta \mid \alpha(\theta) < h(\theta)[\max(x(\theta),\, y(\theta) - \beta(\theta)) - z(\theta)]\}. \tag{1}$$

Note. The formula (1) implies that the following factors militate against making a provision for a contingency: a high cost $\alpha(\theta)$ of making a provision, a low probability density $h(\theta)$ of occurrence, a high cost $\beta(\theta)$ of verification (if the provision should call for nonperformance), and a high sum of values $z(\theta)$ in the absence of a provision.

Proof. The sum of expected values is

$$E_b(S, B) + E_s(S, B) = -\int_S \alpha(\theta)\, d\theta + \int_B (y(\theta) - \beta(\theta))\, h(\theta)\, d\theta + \int_{S\sim B} x(\theta)\, h(\theta)\, d\theta + \int_{\sim S} z(\theta)\, h(\theta)\, d\theta. \tag{2}$$

Now suppose that θ is chosen in S. Then if θ is also chosen in B, the sum of integrands is $-\alpha(\theta) + y(\theta) - \beta(\theta)$; and if θ is chosen in $S \sim B$, the sum of integrands is $-\alpha(\theta) + x(\theta)$. Thus, since a Pareto efficient contract maximizes (2), part (a) is true. And from part (a) and (2), part (b) follows similarly.

Q.E.D.

21. Thus, $z(\theta)$ might equal either $x(\theta)$ or $y(\theta)$, depending on what the seller would do in the absence of a contingent term in the contract. Also, $z(\theta)$ might be less than either or both of $x(\theta)$ and $y(\theta)$ if given θ, there would be costs involved in settling disputes.

B. Case Where Parties Are Risk Averse

If one or both parties are risk averse, although an analogue to the Proposition can be proved according to which the same qualitative results are valid (a high $\alpha(\theta)$, a low $h(\theta)$, etc., militate against including θ in S), there is no simple formula determining whether a provision for a contingency will be made.[22]

IV. Remedies for Breach of Contract and Renegotiation as Substitutes for Contingent Provisions

The last Proposition motivates interest in the question to be asked here: namely, if we assume (for simplicity) that there are no contingent terms whatever in a contract, will the incentives to perform that are inherent in remedies for breach and will the possibilities for renegotiation result in outcomes that approximate the Pareto efficient outcomes of a completely specified contract? As indicated in the introduction, the answer to the question will be a qualified, "Yes." This, and consideration of the costs and difficulties in making contingent provisions discussed above will help to explain the observed incompleteness of contracts, the use of remedies for breach, and the frequent resort to renegotiation.

Because the assumption will be that a contract contains no provisions for contingencies, a contract will merely be a statement of the form "the seller promises to deliver a good" or to "perform a service" and an agreement over price. As before, the price will be assumed to be paid at the outset. The parties will be assumed to be aware that there is a remedy available for breach of contract[23] and that there may be an opportunity for renegotiation if a problem arises.

As noted in the beginning, two types of remedy will be considered. The first is *specific performance*, under which the seller must do what he promised, and the second is payment of an amount of money as determined by a *damage measure*. Three damage mea-

22. There is no simple formula because the decision whether to include a particular contingency now depends on whether there are provisions for other contingencies. Specifically, if provisions are made for other contingencies, a party's wealth will be lowered due to the costs $\int_S \alpha(\theta)\, d\theta$. In principle, this could increase his need for "insurance" against an adverse θ and thus his desire to include a provision allowing for an appropriate sharing of risk given such a θ.

23. With one exception, it will make no difference whether one thinks of the parties as being aware of the remedy the courts will apply (the interpretation made in the paper) or as having specified in the contract which remedy (so called liquidated damages) will apply. The exception concerns the expectation measure; see note 24.

sures will be compared. Under the first, the *restitution measure*, if the seller commits a breach he must return the payment k that he had received from the buyer. Under the *reliance measure*, the defaulting seller must return the payment and compensate the buyer for reliance expenditures, so the buyer gets $r + k$ in damages. Thus the buyer is put in the position he was in before he made a contract. Under the *expectation measure*, the defaulting seller must pay the buyer what the court perceives to be the expectancy; thus, if the expectancy were accurately estimated, the buyer would be put in the position he would have enjoyed if the seller had performed.[24] Interest in the possibility of the court's misperceiving the expectancy is due to the commonly held belief that because the determination of the value of performance to the buyer requires the court to answer a hypothetical question, it is easy for errors to be made. By contrast, the determination of the contract price or of reliance do not require the courts to engage in such speculation; the price paid and money spent in reliance should usually be assessed fairly readily. Now let

$$u = \text{court's estimate of the expectancy } v,$$

and

$$q(\cdot, u) = \text{joint probability density of } u \text{ and other random variables—either } b \text{ or } c\text{, as specified,}$$

where q is assumed to be positive when and only when u is in a nondegenerate interval $[\underline{u}, \overline{u}]$. Moreover, it is assumed that v is contained in $(\underline{u}, \overline{u})$, and this interval is itself contained in $[\alpha, \beta]$. Last, it is assumed that $\underline{u} > r + k$, in keeping with the idea that the court knows that v must certainly be higher than $r + k$—the buyer would never be willing to make a contract if what he had to spend, $r + k$, was greater than or equal to the value of performance v.

In what follows, the behavior of the parties under the various remedies will be determined and compared with that under Pareto efficient complete contracts. Also the factors that would make a particular remedy *Pareto superior* to another will be determined. One remedy is Pareto superior to a second if given any contract price and use of the second remedy, both parties would prefer to make some adjustment in the price and to employ instead the first remedy.

24. If the reader wishes to consider the situation where the parties set out in the contract the amount to be paid for breach, then it might be appropriate to assume that $u \equiv v$, since the seller would often have a better idea of the expectancy than the court (u will be defined below).

A. *Case Where Parties Are Risk Neutral*

The first situation to be analyzed is that where parties do not engage in renegotiation of the contract because it is assumed to be too costly to do so. (Thus, the seller decides about performance only on the basis of whether this would make him better off given the buyer's remedy for breach.) Then the more complicated situation with renegotiation will be analyzed.

Performance and breach when there is no renegotiation. Initially, consider production contracts. Under specific performance, the breach set is by definition empty. Thus, there is too little breach relative to the Pareto efficient breach set $B^* = \{c \mid c > v\}$; whenever production cost exceeds the expectancy, there ought to be breach, but there is not. The expected value to the buyer of the contract under specific performance is

$$E_b(\mathrm{sp}) - k = v - r - k, \tag{3}$$

and to the seller it is

$$E_s(\mathrm{sp}) + k = -\int_\alpha^\beta cf(c)\,dc + k. \tag{4}$$

Under the restitution measure, the breach set is $B(\mathrm{res}) = \{c \mid c > k\}$. But $k < v - r < v$, for otherwise the buyer would not have made the contract.[25] Thus, $B(\mathrm{res})$ contains B^*, and there is too much breach; whenever production cost exceeds k and is less than v, there ought not to be breach, but there is. The expected values of the contract to the buyer and the seller are, respectively,

$$E_b(\mathrm{res}) - k = vPr\{c \mid c \leqq k\} - r + kPr\{c \mid c > k\} - k, \tag{5}$$

and

$$E_s(\mathrm{res}) + k = -\int_\alpha^k cf(c)\,dc - kPr\{c \mid c > k\} + k. \tag{6}$$

It should be noted here that $k > \alpha$, otherwise the seller would not have made the contract.[26]

Under the reliance measure, the breach set is $B(\mathrm{rel}) =$

25. For the buyer to make the contract, we must have $E_b(\mathrm{res}) - k > 0$. Thus, using the next equation, we have $vPr\{c \mid c \leqq k\} - r + kPr\{c \mid c > k\} - k > 0$ or $vPr\{c \mid c \leqq k\} - r - kPr\{c \mid c \leqq k\} > 0$ or $v - r/Pr\{c \mid c \leqq k\} > k$, which implies that $v - r > k$.

26. If $k \leqq \alpha$, the seller will commit breach with probability one under restitution, so that the expected value of the contract to the seller would be zero (and to the buyer it would be negative). It will also follow by similar reasoning that k must exceed α under the other remedies as well, and we shall not bother to mention this fact again.

$\{c \mid c > r + k\}$, which contains B^*, since $r + k < v$.[27] Thus, there is again too much breach (but given k, less than under restitution). The buyer's and seller's expected values are

$$(7) \qquad E_b(\text{rel}) - k = vPr\{c \mid c \leqq r + k\} - r + (r + k)Pr\{c \mid c > r + k\} - k,$$

and

$$(8) \qquad E_s(\text{rel}) + k = -\int_{\alpha}^{r+k} cf(c)\,dc - (r + k)Pr\{c \mid c > r + k\} + k.$$

Last, under the expectation measure, the breach set is $B(\exp) = \{c, u \mid c > u\}$, since the seller, who is assumed to know the court's estimate u of the expectancy, will default and pay u when the production cost is higher.[28] Thus, if u were accurate and equaled v, $B(\exp)$ would equal B^*, and breach would occur when it ought to. However, if u is an underestimate of v, then there might be breach when there ought not; and if u is an overestimate, there might be performance when there ought not. The expressions for the buyer's and seller's expected values are[29]

$$(9) \quad E_b(\exp) - k = vPr\{c, u \mid c \leqq u\} - r + \iint_{\{c>u\}} uq(c, u)\,dc\,du - k,$$

and

$$(10) \quad E_s(\exp) + k = -\iint_{\{c\leqq u\}} cq(c, u)\,dc\,du - \iint_{\{c>u\}} uq(c, u)\,dc\,du + k.$$

Figure I summarizes the relationship between breach and performance under the four remedies and under a Pareto efficient complete contingent contract, and will help in comparing the remedies as to their mutual desirability.

PROPOSITION 4. In a production contract, (a) the reliance measure is always Pareto superior to the restitution measure. However, the relationship among the other remedies depends on the nature of the contractual situation. (b) The expectation measure is Pareto superior to the other remedies if the estimate of the

27. This follows from the condition $E_b(\text{rel}) - k > 0$ by an argument analogous to that in note 25.

28. Alternatively, one might interpret u as the (conditional) expected value of the courts' estimate and assume that u would be paid as a settlement by the defaulting seller.

29. In the double integral in (9), it will be convenient to indicate the set over which integration is performed by the shorthand $\{c > u\}$, and we shall also employ similar shorthands in other expressions.

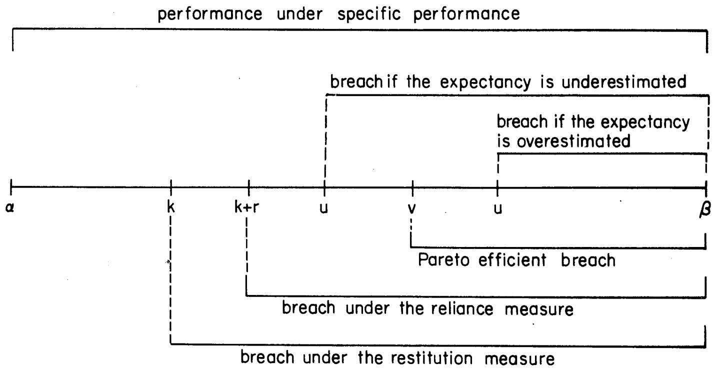

FIGURE I
Performance and Breach under Different Remedies
(as a function of the uncertain production cost or alternative bids)

expectancy is sufficiently precise (i.e., if $\underline{u}$ and $\overline{u}$ are sufficiently close to v). (c) The reliance measure is Pareto superior to the other remedies if the problem of excessive performance under specific performance and under the expectation measure (due to overestimation of the expectancy) is more important than the problem of inappropriate breach.[30] (d) Specific performance is Pareto superior to the other remedies if the problem of excessive breach under the expectation measure (due to underestimation of the expectancy) and under the reliance measure is more important than the problem of excessive performance.

Proof. To demonstrate (a), we must show that for any price k_1 of a contract under the restitution measure, there exists a price k_2 such that both parties are better off under the reliance measure. (We cannot demonstrate (a) merely by showing that the sum of expected values is higher under the reliance measure, for under that measure the contract price affects breach behavior and thus the sum of expected values.) To do this, we shall show several facts that will enable us to employ a graphical proof. Let $E(\text{res}) = E_b(\text{res}) + E_s(\text{res})$, and define similarly $E(\text{rel})$, $E(\text{exp})$, and $E(\text{sp})$; and observe that for any k such that $r + k \leqq v$,

$$(11)\quad E(\text{rel}) - E(\text{res}) = vPr\{c \mid k < c \leqq r + k\} - \int_k^{r+k} cf(c)\,dc = \int_k^{r+k} (v - c)f(c)\,dc > 0.$$

30. The precise meaning of "the problem of excessive performance" and "the problem of inappropriate breach" is best explained in the proof.

In particular, this must be true at k_1 since we noted before that under the restitution measure the buyer would not be willing to make a contract unless $r + k < v$. Additionally, we have for any k

$$(12)\quad (E_s(\text{res}) + k) - (E_s(\text{rel}) + k)$$
$$= \int_k^{r+k} cf(c)\,dc + (r+k)Pr\{c \mid c > r+k\} - kPr\{c \mid c > k\}$$
$$= \int_k^{r+k} (c-k)f(c)\,dc + rPr\{c \mid c > r+k\} > 0,$$

and this also must be true at k_1. Moreover,

$$(13)\quad \frac{dE(\text{rel})}{dk} = vf(r+k) - (r+k)f(r+k)$$
$$= (v-r-k)f(r+k) > 0$$

for $k < v - r$, and

$$(14)\quad \frac{d(E_s(\text{rel}) + k)}{dk} = -(r+k)f(r+k) + (r+k)f(r+k)$$
$$- Pr\{c \mid c > r+k\} + 1 > 0.$$

Finally, since at $k = v - r$

$$(15)\quad E_b(\text{rel}) - k = vPr\{c \mid c \leqq v\} - r + vPr\{c \mid c > v\} - (v-r) = 0,$$

we must have at $k = v - r$, $E_s(\text{rel}) + k = E(\text{rel})$. These facts justify the relationship among the points above k_1 in Figure II and also our

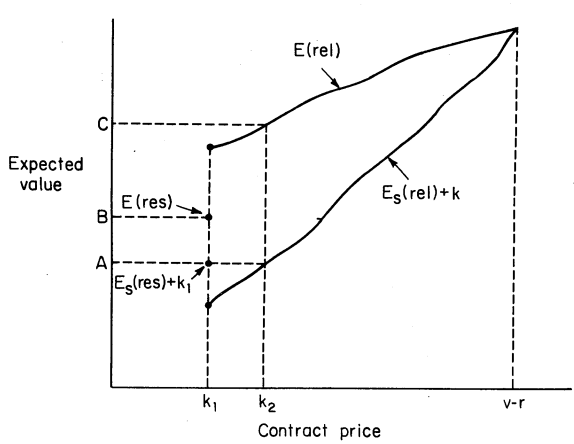

FIGURE II

having drawn E(rel) and E_s(rel) $+ k$ as rising and meeting above the point $v - r$. Now if given k_1, the reliance measure is employed rather than restitution, the seller is made worse off; he moves from A to E_s(rel) $+ k_1$. Suppose then that the price is raised to k_2, which is the point at which the seller becomes just as well off as he had been under restitution. But at k_2, the buyer is strictly better off than he had been, for $E_b(\text{rel}) - k_2 = C - A$, which exceeds $B - A = E_b(\text{res}) - k_1$. Hence, if the price is raised a little above k_2, both buyer and seller are made better off by use of the reliance measure.

To demonstrate (b), we shall merely show that E(exp) exceeds E(sp) and E(rel) if $\underline{u}$ and $\overline{u}$ are sufficiently close to v. (This method of proof will suffice, since under the expectation measure the contract price does not affect the breach set and thus the sum of expected values.) Now $E(\text{exp}) \rightarrow vPr\{c \mid c \leqq v\} - r - \int_\alpha^v cf(c)\,dc$ as $\underline{u}$ and $\overline{u} \rightarrow v$, whereas E(sp) and E(rel) are unaffected. Hence

$$E(\text{exp}) - E(\text{sp}) \rightarrow -v(1 - Pr\{c \mid c \leqq v\}) + \int_v^\beta cf(c)\,dc = \int_v^\beta (c - v)f(c)\,dc > 0.$$

Also

$$E(\text{exp}) - E(\text{rel}) \rightarrow vPr\{c \mid r + k < c \leqq v\} - \int_{r+k}^v cf(c)\,dc = \int_{r+k}^v (v - c)f(c)\,dc > 0,$$

since it was noted that under the reliance measure the buyer would not be willing to make the contract unless $r + k < v$.

To show (c), let us first compare E(rel), assuming that $k = 0$, with E(sp) (which is independent of k). Then

$$\text{(16)} \qquad E(\text{rel}) - E(\text{sp}) = -vPr\{c \mid c > r\} + \int_r^\beta cf(c)\,dc = \int_r^\beta (c - v)f(c)\,dc = \int_v^\beta (c - v)f(c)\,dc - \int_r^v (v - c)f(c)\,dc.$$

The first term after the last equal sign is positive and represents the waste of excessive performance under specific performance, while the second term is negative and corresponds to the loss due to excessive breach under reliance. Our assumption will be that the first term is sufficiently large to exceed the second. Now consider a contract with price k_1 under which specific performance is the remedy for breach. To prove that there is a price k_2 such that both parties would be better off under the reliance measure, consider Figure III. Since our assumption is that $C > B$ and since from (13) $E(\text{rel})$ rises with k, we know that $D > B$. And observe that at k_2 the seller is just as well off under the reliance measure as he was under specific performance at k_1, but the buyer is strictly better off since $D - A > B - A$. Consequently, at a price slightly above k_2 both parties will be better off under the reliance measure. The argument for Pareto superiority of the reliance measure over the expectation measure is analogous: We have (after some manipulation) that

$$(17)\quad E(\text{rel}) - E(\text{exp}) = \iint_{\{u \geqq c > v\}} (c - v)\, q(c, u)\, dc\, du - \iint_{\{u \geqq c,\ v \geqq c > r+k\}} (v - c)\, q(c, u)\, dc\, du,$$

where the first term is positive, representing the relative gain when there is appropriate breach under reliance but excessive performance under the expectation measure, and where the second term is negative, corresponding to the relative loss when there is inappropriate breach under reliance and worthwhile performance under the expectation measure. Employing, then, the assumption that the first term exceeds the second, we can use a graph similar to that of Figure II to complete the argument.

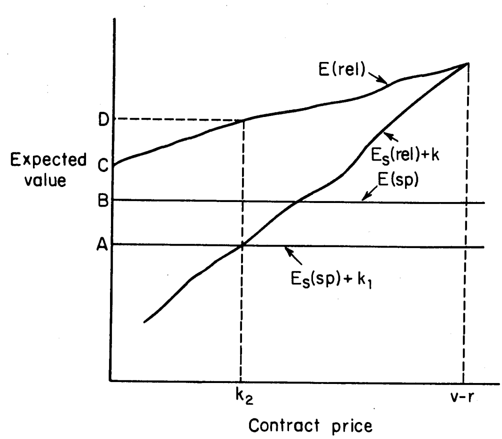

FIGURE III

To prove (d), it will suffice to show that $E(\text{sp})$ exceeds $E(\text{rel})$ and $E(\text{exp})$ (for $E(\text{sp})$ does not depend on the contract price). Observe first that

$$E(\text{sp}) - E(\text{rel}) = vPr\{c \mid c > r + k\} - \int_{r+k}^{\beta} cf(c)\,dc \tag{18}$$

$$= \int_{r+k}^{\beta} (v - c)f(c)\,dc$$

$$= \int_{r+k}^{v} (v - c)f(c)\,dc - \int_{v}^{\beta} (c - v)f(c)\,dc.$$

This will be positive if the first term, the cost of excessive breach under the reliance measure, exceeds the second, the cost of excessive performance under specific performance. Likewise,

$$E(\text{sp}) - E(\text{exp}) = \iint_{\{v \geqq c > u\}} (v - c)\,q(c, u)\,dc\,du - \iint_{\{c > v,\ c > u\}} (c - v)\,q(c, u)\,dc\,du, \tag{19}$$

which will be positive if the first term, the cost of excessive breach under the expectation measure, exceeds the second, the relative cost of excessive performance under specific performance.

Q.E.D.

Consider now contracts for transfer of possession and assume initially that bids are made only to sellers. Then the situation is essentially the same as it was for production contracts: Figure I still applies (but with the axis representing bids rather than production cost); there is excessive performance under specific performance, excessive breach under the restitution measure, etc. For completeness, however, we shall write the various expected values. Under specific performance, they are simply

$$E_b(\text{sp}) - k = v - r - k, \tag{20}$$

and

$$E_s(\text{sp}) + k = k. \tag{21}$$

Under the restitution measure, since the seller defaults and sells to the bidder when the bid b exceeds k, the expected values are

$$E_b(\text{res}) - k = vPr\{b \mid b \leqq k\} - r + kPr\{b \mid b > k\} - k, \tag{22}$$

and

$$E_s(\text{res}) + k = \int_k^\beta bf(b)\,db - kPr\{b \mid b > k\} + k. \tag{23}$$

Similarly, under the reliance measure, the formulas are

$$E_b(\text{rel}) - k = vPr\{b \mid b \leqq r + k\} - r + (r + k)Pr\{b \mid b > r + k\} - k, \tag{24}$$

and

$$E_s(\text{rel}) + k = \int_{r+k}^\beta bf(b)\,db - (r + k)Pr\{b \mid b > r + k\} + k. \tag{25}$$

And under the expectation measure, the formulas are

$$E_b(\text{exp}) - k = vPr\{b,u \mid b \leqq u\} - r + \iint_{\{b>u\}} uq(b,u)\,db\,du - k, \tag{26}$$

and

$$E_s(\text{exp}) + k = \iint_{\{b>u\}} bq(b,u)\,db\,du - \iint_{\{b>u\}} uq(b,u)\,db\,du + k. \tag{27}$$

When bids made to the seller are available to the buyer also, some of the buyer's expected values are changed, since if he had the good he would sell to the bidder whenever $b > v$. (Of course, the seller's behavior and expected values are as before.) To be precise, under specific performance,

$$E_b(\text{sp}) - k = vPr\{b \mid b \leqq v\} + \int_v^\beta bf(b)\,db - r - k, \tag{28}$$

and under the expectation measure,

$$E_b(\text{exp}) - k = vPr\{b,u \mid b \leqq u,\ b \leqq v\} + \iint_{\{u \geqq b > v\}} bq(b,u)\,db\,du - r + \iint_{\{b>u\}} uq(b,u)\,db\,du - k. \tag{29}$$

Under the restitution measure, however, the buyer's expected value is unchanged; since he will get delivery only when $b \leqq k$ and since $k < v$ (otherwise it can be shown that he would not have been willing to make the contract), the buyer will never wish to sell the good to the bidder. Similarly, the buyer's expected value is unchanged under the reliance measure.

With these formulas, the next result may be proved.

PROPOSITION 5. In a contract for transfer of possession, (a) if it is assumed that bids are made only to the seller, then the relationship among remedies for breach is exactly as described (in Proposition 4) in respect to production contracts. However, (b) if it is assumed that bids are available to the buyer as well, then specific performance is Pareto superior to the expectation measure, which is Pareto superior to the reliance measure, which is Pareto superior to the restitution measure.

Note. As remarked, part (a) is true for reasons analogous to those explaining the previous Proposition; and since the proof is virtually the same as that of the Proposition (with (20)–(27) playing the role of (3)–(10)), it is omitted, With regard to part (b), it is obvious that when bids are available to the buyer, specific performance is Pareto superior to the other remedies. On the one hand, Proposition 2 (b) states that the seller's behavior is actually Pareto efficient under specific performance because there is no problem of excessive performance; if the seller is delivered the good when the bid is higher than the expectancy, he will sell it. On the other hand, under the other remedies, there is a possibility that the seller will default when the bid is less than the expectancy. And since the likelihood of this is higher under the reliance measure than under the expectation measure, and higher still under the restitution measure than under the reliance measure, the relative ranking of the remedies is explained.

Proof. To prove (b), it suffices to show that $E\,(\mathrm{sp}) > E\,(\exp) > E\,(\mathrm{rel})$, for $E\,(\mathrm{sp})$ and $E\,(\exp)$ do not depend on k. (We already know by appeal to part (a) that the reliance measure is Pareto superior to the restitution measure, since we observed that under these two measures neither the buyer's nor the seller's behavior changes on account of the availability of bids to the buyer.) Now, recalling that $E\,(\mathrm{sp}) = E_b(\mathrm{sp}) + E_s(\mathrm{sp})$ and that $E\,(\exp)$ and $E\,(\mathrm{sp})$ are defined similarly, we have from (28), (21), (29), and (27),

$$(30)\quad E\,(\mathrm{sp}) - E\,(\exp) = v(Pr\{b \mid b \leqq v\} - Pr\{b,u \mid b \leqq u,\ b \leqq v\})$$
$$+ \int_v^{\beta} bf(b)\,db - \iint_{\{u \geqq b > v\} \cup \{b > u\}} bq(b,u)\,db\,du = vPr\{b,u \mid u < b \leqq v\}$$
$$- \iint_{\{u < b \leqq v\}} bq(b,u)\,db\,du = \iint_{\{u < b \leqq v\}} (v-b)\,q(b,u)\,db\,du > 0,$$

as required. Also, from (23) and (24),

$$(31)\quad E(\exp) - E(\text{rel}) = v(Pr\{b,u \mid b \leqq u,\ b \leqq v\}$$

$$- Pr\{b \mid b \leqq r + k\}) + \iint\limits_{\{u \geqq b > v\} \cup \{b > u\}} bq(b,u)\,db\,du - \int_{r+k}^{\beta} bf(b)\,db$$

$$= vPr\{b,\ u \mid b \leqq u,\ r + k < b \leqq v\} - \iint\limits_{\{b \leqq u,\ r+k<b\leqq v\}} bq(b,\ u)\,db\,du$$

$$= \iint\limits_{\{b \leqq u,\ r+k<b\leqq v\}} (v - b)\,q(b,\ u)\,db\,du > 0.$$

Note here that in combining terms to get the second equality, we made use of the fact that u must exceed $r + k$, for we had assumed that $\underline{u} > r + k$.

Q.E.D.

Performance and breach when there is renegotiation. It will be assumed here that the parties will engage in renegotiation if (given the contingency) the resulting benefits would exceed the costs. Specifically, if the buyer and the seller engage in renegotiation, each will bear a positive cost t in the process; and they will agree on whether the seller is to perform or to be released on the basis of which would maximize the sum of values (i.e., they will agree on the Pareto efficient outcome). Further, if they engage in renegotiation, they will split equally the gain in the sum of values from having done so; this will be done by means of a sidepayment.[31] Last, they will decide to engage in renegotiation if and only if the resulting increase in the sum of values exceeds the joint costs of $2t$.

The possibility of renegotiation does not alter the qualitative nature of the results of the last subsection; Propositions 4 and 5 remain valid. This is because when there was no renegotiation, the mutual desirability of a remedy depended on how well it functioned as a device to induce the seller to behave in a Pareto efficient way; a remedy was undesirable to the extent that it resulted in Pareto inefficient breach or Pareto inefficient performance. In the present case, such departures from Pareto efficiency under a remedy are still undesirable: if a departure would be large, then the parties will engage in the costly process of renegotiation; and if the departure would not be so large as to justify renegotiation, the departure will be observed to occur. In sum, then, the possibility of renegotiation

31. The assumptions that they split the gain equally and that they bear equal costs of renegotiation are not important to our results.

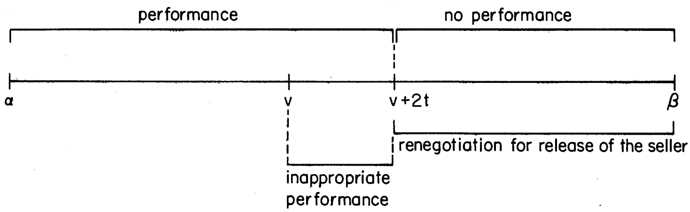

FIGURE IV
Performance, Breach, and Renegotiation under Specific Performance
(as a function of production cost or alternative bids)

may mitigate but does not eliminate losses that would otherwise occur under the remedies.

Let us now describe precisely how the opportunity to renegotiate affects the behavior of parties and the expected value formulas. This will be done only for production contracts, as the situation for contracts for transfer of possession is similar and may easily be understood by analogy to the previous subsection. Under specific performance, the situation is shown in Figure IV. As illustrated, the buyer and the seller will renegotiate for release of the seller when $c - v > 2t$, or when $c > v + 2t$; and the seller will pay the buyer $v + \frac{1}{2}(c - v)$ for his release.[32] Thus, the expected value formulas are[33]

$$(32)\quad E_b(\mathrm{sp}) - k = vPr\{c \mid c \leqq v + 2t\} - r + \int_{v+2t}^{\beta} (v + \tfrac{1}{2}(c - v))f(c)\,dc - tPr\{c \mid c > v + 2t\} - k,$$

and

$$(33)\quad E_s(\mathrm{sp}) + k = -\int_{\alpha}^{v+2t} cf(c)\,dc - \int_{v+2t}^{\beta} (v + \tfrac{1}{2}(c - v))f(c)\,dc - tPr\{c \mid c > v + 2t\} + k.$$

Under the restitution measure, since the seller can default and pay

32. If we let z be the payment made by the seller for his release, then the improvement in the buyer's position will be $(z - t - r - k) - (v - r - k) = z - t - v$. But we assumed that the parties split equally the gain in the sum of values from renegotiation, and these gains are $(c - v) - 2t$. Hence z must satisfy $z - t - v = \frac{1}{2}(c - v) - t$, or $z = v + \frac{1}{2}(c - v)$. (Note therefore that the higher the seller's cost of production would be, the more he pays the buyer for release.) Our claims below about payments made as a result of negotiation under the damage measures can be verified in a similar way.

33. In (32), the first term on the right-hand side is the expected benefit from performance, the third is expected payments made by the seller when renegotiation occurs, and the fourth is the expected cost of renegotiation. The other formulas below are similarly explained.

k, the situation is as illustrated in Figure V. Here the parties will renegotiate only when there would be breach—when both $k < c$ and when the consequent loss $v - c$ would exceed $2t$; that is, when $k < c < v - 2t$. (Thus, if $k \geqq v - 2t$, the parties will never renegotiate; as this was analyzed in the last subsection, we assume that $k < v - 2t$.) Given that this occurs, under our assumptions the buyer will pay the seller $c + \frac{1}{2}(v - c) - k$ to perform. If $c \geqq v - 2t$, the seller will default and pay damages. Therefore, the expected value formulas are

$$\begin{aligned}(34)\quad E_b(\text{res}) - k &= vPr\{c \mid c < v - 2t\} - r \\ &- \int_k^{v-2t} (c + \tfrac{1}{2}(v - c) - k)f(c)\,dc - tPr\{c \mid k < c < v - 2t\} \\ &+ kPr\{c \mid c \geqq v - 2t\} - k,\end{aligned}$$

and

$$\begin{aligned}(35)\quad E_s(\text{res}) + k &= -\int_\alpha^{v-2t} cf(c)\,dc + \int_k^{v-2t} (c + \tfrac{1}{2}(v - c) - k)f(c)\,dc \\ &- tPr\{c \mid k < c < v - 2t\} - kPr\{c \mid c \geqq v - 2t\} + k.\end{aligned}$$

Under the reliance measure, the situation is pictured in Figure VI and is similar to that under the restitution measure. There will be renegotiation when $r + k < c < v - 2t$ (we assume that $r + k < v - 2t$ to avoid the case treated before when there was no renegotiation), and the buyer will pay the seller $c - r + \frac{1}{2}(v - c) - k$ to perform. Hence

$$\begin{aligned}(36)\quad E_b(\text{rel}) - k &= vPr\{c \mid c < v - 2t\} - r \\ &- \int_{r+k}^{v-2t} (c - r + \tfrac{1}{2}(v - c) - k)f(c)\,dc - tPr\{c \mid r + k < c < v - 2t\} \\ &+ (r + k)Pr\{c \mid c \geqq v - 2t\} - k,\end{aligned}$$

and

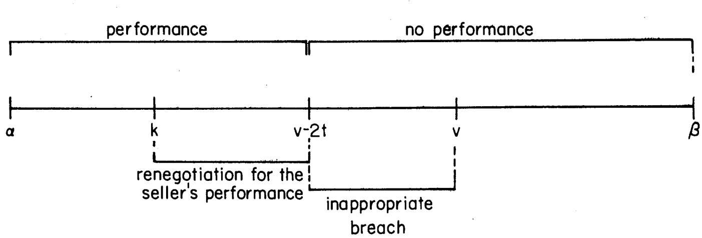

FIGURE V
Performance, Breach, and Renegotiation under the Restitution Measure (as a function of production cost or alternative bids)

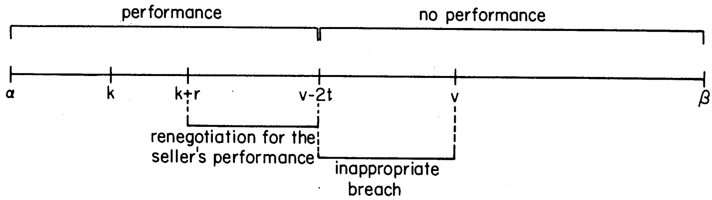

FIGURE VI
Performance, Breach, and Renegotiation under the Reliance Measure (as a function of production cost or alternative bids)

$$(37)\quad E_s(\text{rel}) + k = -\int_{\alpha}^{v-2t} cf(c)\,dc + \int_{r+k}^{v-2t} (c - r + \tfrac{1}{2}(v-c) - k)f(c)\,dc - tPr\{c \mid r+k < c < v-2t\} - (r+k)Pr\{c \mid c \geqq v-2t\} + k.$$

Last, under the expectation measure, the situation depends on whether the court's estimate u is within $2t$ of v. If it is, there is never renegotiation, and the seller will default and pay u when $c > u$. However, if $u < v - 2t$, then Figure VIIa applies. Here, there will be renegotiation when $u < c < v - 2t$, and the buyer will pay the seller $c - u + \frac{1}{2}(v-c)$ to perform; when $c \geqq v - 2t$ the seller will commit breach and pay damages. On the other hand, if $u \geqq v - 2t$, then the relevant situation is shown in Figure VIIb. In this instance, there will be renegotiation when $v + 2t < c \leqq u$, and the seller will pay the buyer $v + \frac{1}{2}(c - v)$ to be released; when $c \geqq u$, the seller will default and pay u in damages. It follows from our description of behavior under the expectation measure that[34]

$$(38)\quad E_b(\exp) - k = v(Pr\{c \mid c \leqq v-2t\} + Pr\{c, u \mid v-2t < c \leqq v+2t,\ c \leqq u\}) - r - \iint_{\{u<c<v-2t\}} (c - u + \tfrac{1}{2}(v-c))\,q(c,u)\,dc\,du - tPr\{c, u \mid u < c < v-2t\} + \iint_{\{v+2t<c\leqq u\}} (v + \tfrac{1}{2}(c-v))\,q(c,u)\,dc\,du - tPr\{c, u \mid v+2t < c \leqq u\} + \iint_{\{c>u,\ c>v-2t\}} uq(c,u)\,dc\,du - k,$$

34. The terms on the right-hand side of (38) are the expected value of performance, reliance, expected payments made to the seller to induce him to perform (when the expectancy is significantly underestimated), the expected cost of such renegotiations, expected payments received from the seller for his release (when the expectancy is significantly overestimated), etc.

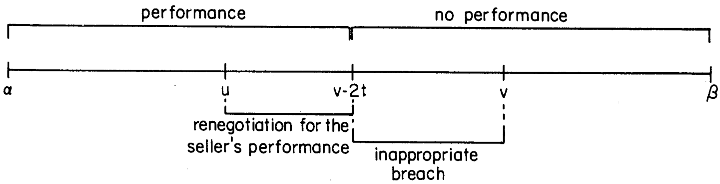

FIGURE VIIa
Performance, Breach, and Renegotiation When the Expectancy is Underestimated by at Least $2t$ (as a function of production cost or alternative bids)

and

$$
\begin{aligned}
(39)\qquad E_s(\exp) + k = &-\iint\limits_{\{c\leqq v-2t\}\cup\{v-2t<c\leqq v+2t,\ c\leqq u\}} cq(c,u)\,dc\,du \\
&+\iint\limits_{\{u<c<v-2t\}} (c-u+\tfrac{1}{2}(v-c))\,q(c,u)\,dc\,du \\
&-tPr\{c,u\,|\,u<c<v-2t\} \\
&-\iint\limits_{\{v+2t<c\leqq u\}} (v+\tfrac{1}{2}(c-v))\,q(c,u)\,dc\,du \\
&-tPr\{c,u\,|\,v+2t<c\leqq u\} \\
&-\iint\limits_{\{c>u,\ c>v-2t\}} uq(c,u)\,dc\,du + k.
\end{aligned}
$$

Using these formulas, we can easily verify that Proposition 4 remains true (see Shavell [1981]). As remarked, it is straightforward to determine the expected value formulas for contracts for transfer of possession and to check that Proposition 5 remains valid.

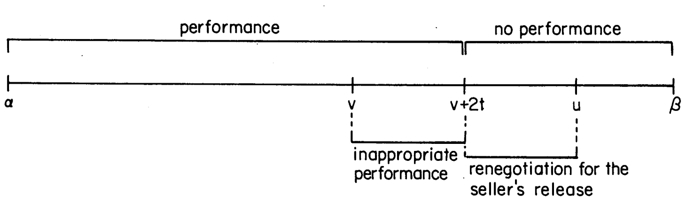

FIGURE VIIb
Performance, Breach, and Renegotiation When the Expectancy is Overestimated by at Least $2t$ (as a function of production cost or alternative bids)

B. Case Where Parties Are Risk Averse[35]

In considering the role of remedies for breach as implicit substitutes for well-specified contracts when one or both of the parties are risk averse, the allocation of risk must be taken into account along with incentives to perform. The general conclusions that emerge from considering this dual role of remedies are simple to state. First, suppose that the buyer is more risk averse than the seller. Then, other things equal, the case for specific performance is strengthened over that for the expectation measure, the case for it is in turn strengthened over that for the reliance measure, and the case for it is strengthened over that for the restitution measure. The reasons for these conclusions are of course that specific performance is by definition perfect insurance for the buyer; the expectation measure provides only imperfect insurance due to the courts' imperfect knowledge of the expectancy; and the reliance and restitution measures leave, respectively, greater gaps in coverage against loss of the expectancy (and create, respectively, greater probabilities of such loss).

Suppose, on the other hand, that the buyer is better able to bear risk than the seller. Then our conclusions depend on the type of contract in question. In production contracts specific performance appears to be least desirable, and the expectation measure, the reliance measure, and the restitution measures seem to be successively more desirable remedies on grounds of risk-sharing. Specific performance makes the seller absorb (or renegotiate to be released from) the potentially great risks associated with variation of the production cost; the expectation measure limits the risk to the (estimated) expectancy; the reliance and restitution measures limit the risk to lower amounts. Thus, what is a mutually desirable remedy from the point of view of risk-sharing may be an undesirable remedy from the point of view of the creation of incentives to perform. In regard to contracts for transfer of possession, the situation seems different; specific performance appears to be most desirable, and the expectation measure, the reliance measure, and the restitution measure seem to be successively less desirable remedies on grounds of risk-sharing. Under specific performance, there is, as is advantageous, no variability in the seller's position—he gets his payment and delivers the good that he has in his possession to the buyer. Under the expectation measure, there is variability in the seller's

35. On this case, see also Kornhauser [forthcoming], Polinsky [1983], and the remarks in Shavell [1980].

final position, for he might default, pay damages, and sell to a high bidder. Under the reliance and restitution measures, this variability is greater, since the difference between a bid and damages paid grows larger.

V. Comment

Our general point that it is in the mutual interests of parties to leave agreements incomplete and to rely instead on various substitutes for contingent terms is confirmed by consideration of a broad range of types of agreement. Certainly, parties making informal verbal contracts typically omit to mention possible contingencies unless these are very likely or very important; and even parties carefully drawing up formal contracts frequently do not provide explicitly for many contingencies. It is generally appreciated from the outset that if an unexpected event occurs leading a party to wish to default on his contractual obligation, the difficulties that then arise will usually be settled in a reasonably satisfactory way through use of recognized excuses, renegotiation, or remedies for breach of contract.

Moreover, our particular results concerning the relative desirability of remedies for breach of contract are consonant with two general facts about their actual use. First, the expectancy is the favored measure of damages, provided that it can be fairly accurately assessed. (This is, of course, in accord with our result that the expectation measure induces performance when it would be mutually desirable.) And second, specific performance (rather than a damage measure) is employed as the remedy for breach primarily for certain types of contracts for transfer of possession, notably for contracts for the conveyance of land. (This is in accord with our result on the mutual desirability of specific performance as a remedy for breach of contracts for transfer of possession when the buyer has access to bids made to the seller; and as was explained, it appears sensible also on grounds of the allocation of risk.)

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