CONTRACT REMEDIES AND OPTIONS PRICING

PAUL G. MAHONEY*

ABSTRACT

This article examines the choice between money damages and specific performance as the remedy for contract breach by drawing on the theory of options valuation. The ability to breach and pay money damages is analogous to granting the breaching party an option to buy back his performance for a strike price equal to the damages award. The option affects the parties' returns from the contract and the variance of those returns. The parties' ex ante preference for money damages or specific performance should therefore depend, among other things, on their ability to value the option and their attitudes toward risk. The article examines the parties' ability to determine the option value and the effects of that value on their preferences under various assumptions. It concludes that the options analogy helps to explain the common law's choice of money damages as the normal remedy and the most common exceptions.

I. INTRODUCTION

One of the most interesting questions in contract law is also one of the most basic: what is the appropriate remedy for breach of contract? The common law's answer is fairly simple. Money damages is the favored remedy, and specific performance is reserved for particular types of cases in which money damages are thought to be inadequate.¹

This remedial pattern is easier to describe than to explain. The most widely used explanation is that the choice between money damages and specific performance turns on the transaction costs associated with each.²

* Associate Professor of Law, University of Virginia School of Law. I thank Barry Adler, Saul Levmore, Roberta Romano, Paul Stephan, Rip Verkerke, and an anonymous referee for comments and Roger Disker and Maura Perry for research assistance.

¹ See, for example, American Brands, Inc. v. Playgirl, Inc., 498 F.2d 947 (2d Cir. 1974); Restatement (Second) of Contracts § 359(1) (1981).

Specifically, damage awards may be systematically undercompensatory, leading to excessive breach and causing us to prefer specific performance. Other types of transaction costs, including the cost of negotiating around a specific performance award when nonperformance would be more efficient, lead to excessive performance and cause us to prefer money damages. Absent these particular transaction costs, the choice of remedy would not matter from an efficiency standpoint. The choice of remedy depends on which types of transaction costs dominate in particular situations.

Even when the choice of remedy has no allocative consequences, however, it has distributional consequences that may affect the risk borne by each of the contracting parties. This article attempts to determine how those distributional effects would influence the preferences of contracting parties between money damages and specific performance. It does so by characterizing money damages as an option. Specifically, the availability of money damages is tantamount to granting the promisor (or Seller) an option to buy back his performance by paying an amount of money awarded by the court. Where specific performance is awarded, Seller lacks this option. The benefit of the option approach is that it provides a framework for considering the extra value of the contract to Seller when the remedy will be money damages rather than specific performance. To the extent the parties can quantify that extra value, they can adjust the contract price depending on the remedy in such a way as to make risk-neutral parties indifferent between the two remedies. Risk-averse parties, however, would not be indifferent, because the two remedies introduce different levels of variability into the parties' returns from the contract. Where transaction costs are low or nonexistent, the variability associated with money damages will be less than that associated with specific performance for both parties, and risk-averse parties will therefore prefer money damages. The same result holds, with some exceptions, when more substantial transaction costs are introduced, so long as neither type

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4 This convention is for ease of reference only, as the same analysis could be applied to buyers' breaches. In options jargon, under a money damages rule a breaching Buyer would have a put option under which it could sell back the Seller's performance for a price equal to the damages remedy. An action for the price, see Uniform Commercial Code (UCC) § 2-709 (1991), is the Seller's equivalent to the Buyer's specific performance remedy.

5 Alan Schwartz points out that the cost of a contract to the promisee (here, Buyer) is increasing in the damage measure. Alan Schwartz, The Myth That Promisees Prefer Supracompensatory Remedies: An Analysis of Contracting for Damage Measures, 100 Yale L. J. 369, 375 (1990). The options methodology permits us to quantify that increase.
of transaction cost dominates. The option approach, I will argue, provides a plausible explanation for the common law's choice of money damages as the usual remedy, as well as for some of the significant exceptions to that rule.

Section II briefly describes the transaction costs approach. Section III sets out the option framework. It considers first a situation in which there are no transaction costs of the type that create an excessive breach problem or an excessive performance problem. It then examines situations in which such transaction costs are present. Section IV argues that the results reached using the option framework are broadly consistent with the choice of remedy in reported cases. Section V concludes.

II. The Transaction Costs Framework

The choice between money damages and specific performance may have efficiency consequences when it is possible that terminating the contract at some point prior to performance would be efficient. Efficient termination is possible when the amount of money, $Y$, that Seller would pay to escape performance at a particular point in time is greater than the amount of money, $Z$, that the promisee (or Buyer) would accept in lieu of performance. In that situation there is a potential gain of $Y - Z$ from terminating the contract.

Assuming that both parties as well as the courts know the value of $Y$ and $Z$ and bargaining is costless, the choice of remedy has distributional consequences but is irrelevant from an efficiency standpoint. The choice of remedy then simply allocates the right to receive the gain from termination between Buyer and Seller.

A money damages remedy permits Seller to appropriate the entire gain from termination; Seller receives something worth $Y$ to it and pays only Buyer's expectation, or $Z$. Specific performance, in contrast, permits Buyer to insist on performance. Because Buyer would prefer an amount of money greater than $Z$ to performance, and Seller would be willing to pay up to $Y$ to escape performance, Buyer and Seller may bargain for a payment of a sum greater than $Z$ and less than $Y$ in lieu of performance. In the limiting case, Buyer may receive the entire gain from termination.

Under the right set of assumptions, therefore, the choice of remedy has no efficiency consequences, as the contract will always be terminated if $Y > Z$. The prior literature on the choice of remedy has therefore

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focused on transaction cost justifications for money damages or specific performance. There are three important sources of transaction costs, described in detail by Bishop. First, it is generally believed that money damages awards systematically undercompensate promisees (that is, the award is generally less than Z). Second, when specific performance is awarded and Seller and Buyer subsequently attempt to negotiate a termination, imperfect knowledge of Y and Z coupled with bargaining costs can lead to the dissipation of a significant amount of the gain from termination and may even prevent an efficient termination. Third, when the choice between money damages and specific performance turns on the completeness of the nonbreaching party’s performance, the nonbreaching party will have an incentive to continue to perform even after the point at which it becomes clear that there are gains from termination, in hopes of obtaining specific performance. I refer to the latter two sources of inefficiency collectively, as does Bishop, as the “excessive performance” problem and the first source as the “excessive breach” problem.

The transaction costs approach yields no conclusion when transaction costs are nonexistent and no persuasive conclusion when transaction costs are low (unless we can measure them with extreme precision). For the transaction costs approach to explain the common law’s remedial pattern, therefore, we must conclude that transaction costs are generally substantial and that the excessive performance problem is dominant except in limited circumstances. It is far from obvious that both propositions are accurate, as the prior literature demonstrates. Kronman and Schwartz, for example, reach quite different conclusions about the efficacy of specific performance as the favored remedy, at least in part because Kronman believes that the second of the costs identified above—the deadweight loss that arises when Buyer and Seller negotiate a payment in lieu of performance—is high in the typical case, while the first cost—the possibility of undercompensation—is smaller. Schwartz, however, believes that the costs arising from undercompensation are generally more substantial than the losses associated with postbreach bar-

8 Bishop, supra note 2, at 302–4.
11 See Bishop, supra note 2, at 303–4.
12 See Kronman, supra note 2, at 363.
gaining. Bishop argues that the choice between specific performance and money damages varies depending on the type of contract, the identity of the breaching party (Seller or Buyer), and the alternatives available to Seller and Buyer. The resulting matrix, and the conclusion whether the excessive breach problem or the excessive performance problem dominates for any given entry in the matrix, rests, like Kronman and Schwartz’s analyses, on assumptions about the relative magnitudes of the three costs identified above in each context.

A better solution to the remedy problem may emerge from an examination of the distributional consequences of the two remedies. Where efficient termination is possible, a contract that calls for a specific performance remedy is worth more to Buyer, and less to Seller, than an otherwise identical contract that calls for a money damages remedy. Seller would accordingly demand a higher price to enter into the former contract than the latter. A central issue, therefore, is whether the parties can quantify the difference in value between the two contracts. Either party could be induced to favor either remedy for some price. The important question is whether there is a price or range of prices at which both parties would prefer the same remedy. Characterizing money damages as a call option provides a framework for answering that question.

III. THE OPTION FRAMEWORK

Were Buyer to make a spot purchase of goods from Seller, Buyer would of course gain title promptly. If Seller later decided he wanted the goods back, he would have to negotiate a repurchase. As Kronman points out, a specific performance remedy also gives Buyer something analogous to a property right in goods that are the subject of a contract for future delivery. A Seller that regrets the bargain prior to performance must buy back his performance. To continue the analogy, a contract with a money damages remedy is similar to a spot sale of goods from Seller to Buyer coupled with the sale of an option on the goods from Buyer to Seller. The terms of the option are straightforward: it is a call option under which Seller may, at any time on or prior to the expiration date (the date specified for performance in the contract), buy the underlying asset (Seller’s performance) by paying Buyer the strike price (the damage

13 See Schwartz, supra note 2, at 284–87.
14 Bishop’s conclusions are nicely summarized in a table. Bishop, supra note 2, at 306.
15 See Craswell, supra note 3, at 642.
16 Kronman, supra note 2, at 352.
award, which will equal Buyer's expectation, or Z, assuming the court applies the normal damages measure).\textsuperscript{17}

If Seller and Buyer can determine the value of the option, each can compare directly the value of a contract with a money damages remedy and the identical contract with a specific performance remedy. There is a substantial body of learning on options valuation.\textsuperscript{18} Options-pricing techniques proceed from the observation that one can generally create a hedge, or a combination of long and/or short positions in the underlying asset and a risk-free asset, that will provide the same payoff as the option for all future states. In a frictionless market, the value of the option must equal the value of the hedge.\textsuperscript{19}

The ability to create a hedge, and therefore the applicability of standard options-pricing models, is obvious when the underlying asset is a share of stock, but less so when the asset is a contractual performance. Nevertheless, the option approach is useful for an important class of cases. Many contracts involve a good or service for which there is a market. The performance may not be as fungible as a share of stock, nor the market for it as liquid as a securities market. This is, however, a matter of degree and not kind. All that is required for present purposes is that the parties be able to form a sufficiently precise estimate of the value of the option to enable them to express a preference for money damages or specific performance.

Fortunately, the class of contracts that meets this criterion—contracts involving a marketable good or service—is of particular interest to a study of the relative merits of money damages and specific performance. The courts show a strong preference for money damages in such cases on the grounds that money damages should be sufficient to permit the purchase of substituted performance.\textsuperscript{20} This strong preference is difficult to explain using the transaction costs approach. Absent transaction costs, current theory suggests that either remedy would work equally well, and therefore the preference for money damages must reflect the relevant transaction costs. Yet there is no persuasive evidence that the excessive performance problem is so persistently greater than the excessive breach problem as to justify the current state of the law.

\textsuperscript{17} For an accessible discussion of options terminology, see Stephen A. Ross, Randolph W. Westerfield, & Jeffrey F. Jaffe, Corporate Finance 561–68 (2d ed. 1990).

\textsuperscript{18} An overview of options-pricing theory can be found in John C. Cox & Mark Rubinstein, Options Markets (1985).

\textsuperscript{19} See id. at 166–67.

\textsuperscript{20} See, for example, Weathersby v. Gore, 556 F.2d 1247, 1257 (5th Cir. 1977) (specific performance not available where cover was possible); see generally E. Allan Farnsworth, Contracts 852 (2d ed. 1990).
To show how the option approach can advance understanding of the choice of remedy for these cases, I analyze a simple model in which both parties can determine the value of the money damages "option." The model demonstrates that where there exists neither an excessive breach nor an excessive performance problem and both parties are risk averse, both parties would ex ante prefer a money damages remedy. I then examine the extent to which this result holds once transaction costs are introduced.

A. The No Transaction Costs Case

Consider a situation in which (1) both parties are perfectly informed about the distribution of $Y$ and $Z$, (2) courts always award damages equal to $Z$ except to the extent described in assumption 4 below, (3) both pre- and postcontractual bargaining between Buyer and Seller are costless, and (4) courts can always identify instances of inefficient performance or other reliance undertaken by Buyer in hopes of satisfying conditions for an award of specific performance and refuse to provide compensation for such reliance.\(^{21}\)

Now assume that Seller and Buyer are permitted to negotiate at the time of contract formation over the remedy that will apply to a breach by Seller. The parties expect that at the time of performance the realized value of $Z$, $Z_p$, will be greater than the realized value of $Y$, $Y_p$—this is the whole point of entering into the contract. The possibility exists, however, that $Y_p$ could exceed $Z_p$, and it will then become efficient to terminate the contract. This could be because Seller's cost of performance has risen, because Seller has received a better offer (that is, his opportunity cost of performance has increased), or because the product that Buyer intends to produce using Seller's performance as an input has declined in value. In any event, $Y_p$ and $Z_p$ are exogenous variables that depend on the costs and benefits associated with performance but not on the legal rules regarding remedies.

\(^{21}\) Although I routinely use the phrase "no transaction costs" to refer collectively to the above assumptions, those assumptions are not as stringent as the typical Coasian "no transaction costs" assumption. In particular, Coase assumed that the price system operates costlessly, which implies the existence of a complete set of markets, including insurance markets. See Ronald H. Coase, The Problem of Social Cost, 3 J. Law & Econ. 1, 2 (1960). Where that assumption holds, risk aversion would be irrelevant, as each party could always purchase insurance against any risk it did not wish to bear. The assumptions stated in the text ensure that there are no transaction costs of the type that could create either an excessive breach problem or an excessive performance problem and, consequently, no transaction costs justification for the automatic application of specific performance or money damages, respectively.
The parties would begin by considering the value to Seller of the option represented by a money damages remedy. In order to permit the use of a standard options-pricing model for expositional purposes, I will make several additional simplifying assumptions. The method of pricing the option, however, is unimportant—the analysis of the parties’ likely choice of remedy requires only that they be able to determine the value of the option using some method. For simplicity, I will use the binomial options-pricing model described by Cox, Ross, and Rubinstein.\(^{22}\) I will use a 2-period model in which the parties enter into the contract at \( t_0 \) and Seller either breaches or performs at \( t_p \). At the time of contracting, \( t_0 \), the expected cost of performance to Seller is \( Y_0 \), which is less than the value of the contract to Buyer (\( Z_0 \)) and is also less than the negotiated contract price, \( k \). One period later, at \( t_p \), \( Y_p \) will have a value either of \( Y_u \) or \( Y_d \), where \( Y_u > Y_0 > Y_d \). I will also assume that \( Z \) remains constant throughout the period, and so the subscript will be dropped from \( Z_0 \) and \( Z_p \).\(^{23}\) and it will be assumed that \( Y_u > Z \), so that under some circumstances termination would be efficient. The risk-free interest rate for \( r \) period will be represented by \( r \). Finally, I will assume that under a specific performance remedy Buyer is able to appropriate the entire gain from termination, so that having the right to pay money damages rather than perform will be worth the full difference between \( Y_u \) and the damage payment, \( Z \), to a breaching Seller.\(^{24}\)

Given these assumptions, both Buyer and Seller can determine at \( t_0 \) the price, \( c \), of an option on Seller’s performance with a strike price equal to \( Z \).\(^{25}\) The value to Seller of Seller’s performance and of the option on

\(^{22}\) John C. Cox, Stephen A. Ross, & Mark Rubinstein, Option Pricing: A Simplified Approach, 7 J. Fin. Econ. 229 (1979). The binomial options-pricing model is a discrete-time model. It accordingly differs from the more well-known Black-Scholes model, which is a continuous-time model. See Fisher Black & Myron Scholes, The Pricing of Options and Corporate Liabilities, 81 J. Pol. Econ. 637 (1973). As the number of time periods approaches infinity, however, the binomial options-pricing model converges to the Black-Scholes model. See Cox, Ross, & Rubinstein, supra, at 251–54.

\(^{23}\) This assumption is important, as most real-world options have a fixed exercise price, and the standard options-pricing methods are only valid for a fixed exercise price. However, it is possible to determine the value of a call option with a variable exercise price. See Stanley Fischer, Call Option Pricing When the Exercise Price Is Uncertain, and the Valuation of Index Bonds, 33 J. Fin. 169 (1978).

\(^{24}\) This assumption merely enables us to ignore the separate game theory issues that arise when the parties attempt to bargain around a specific performance award. If bargaining is costless, the parties will reach agreement on some termination price greater than \( Z - k \) and less than \( Y_u - k \); the precise size is unimportant for present purposes.

\(^{25}\) For the sake of clarity, I use \( c \) to represent the option value as of \( t_0 \). The same will be true of the variable representing the contract price, \( k \). This convention ensures that the time value of money is treated consistently throughout.
it are shown in Figure 1. Note that the entry in the lower-right-hand corner must be zero or the parties would not enter into the contract at all.

A value for \( c \) is arrived at by creating a risk-free hedge at \( t_0 \) and then recognizing that the hedged position must earn the risk-free return, \( r \), over the period from \( t_0 \) to \( t_p \). The hedge consists of a long position in Seller’s performance plus a short position of \( N \) call options on Seller’s performance, or \( Y_0 - Nc \), where \( N \) satisfies

\[
Y_u - N(Y_u - Z) = Y_d,
\]

or

\[
N = \frac{Y_u - Y_d}{Y_u - Z}.
\]

The value of \( c \) is then found by solving

\[
Y_0 - Nc = \frac{Y_d}{1 + r},
\]

or

\[
c = (Y_u - Z) \times \frac{Y_0 - [Y_d/(1 + r)]}{Y_u - Y_d}.
\] (1)

Because each party is assumed to know the value of \( Y_0, Y_u, Y_d, Z, \) and \( r \), each party can assign a precise dollar value to \( c \), the option value at \( t_0 \), and each party therefore knows that a contract that permits money damages on breach is worth more to Seller by that amount than a contract that requires specific performance on breach. Buyer, accordingly, will insist that the contract price be lower by an amount at least equal to \( c \) if
the remedy for breach will be money damages than if the remedy will be specific performance, and Seller would be willing to pay up to $c$ for the ability to breach and pay damages.

Risk-averse parties would be indifferent, then, between a contract providing for specific performance in which the contract price is $k$ and the otherwise identical contract providing for money damages in which the contract price is $k - c$. However, although the parties' expected outcomes under each contract are equivalent, the variability of those outcomes is not. It can be readily shown that by agreeing to money damages, the parties could reduce the variability of their returns. Assuming both parties are risk averse, both parties would prefer that the remedy for breach be money damages.

If Seller performs, Buyer's gain from agreeing to money damages is obvious—Buyer obtains the same goods for a lower price. If Seller breaches, Buyer never pays the (lower) contract price but receives an award of money damages. However, a court applying the normal damage measures will give Buyer the benefit of the lower contract price. Buyer's principal monetary remedies are to cover and receive the difference between the cost of cover and the contract price\textsuperscript{26} or to receive the difference between the market price and the contract price.\textsuperscript{27} In either event, Buyer will be better off by an amount $c$, even after a breach, by virtue of negotiating a lower contract price.

Compare the expected payoffs to Buyer and Seller from the contract where the remedy for breach is specific performance to the expected payoffs where the remedy is money damages. Beginning with specific performance, if $Y_p = Y_d$ and Seller performs, Buyer receives something worth $Z$ to it for a payment of a lesser amount $k$, the contract price, and Seller receives $k$ in return for a performance that it would pay only $Y_d$ to avoid, where $k > Y_d$. If $Y_p = Y_u$ and Seller seeks to terminate the contract, Buyer and Seller will negotiate a termination payment, which by hypothesis equals $Y_u$ (less the unpaid contract price). Buyer will receive, and Seller will pay, cash in the amount $Y_u - k$. The diagram of the payoffs appears in Table 1.

Applying the same analysis to money damages, in the event of performance, Buyer's and Seller's payoffs can be described as in the prior paragraph, except that the contract price is $k - c$. In the event of breach, Seller pays damages to Buyer of $Z$ less the unpaid contract price, or $Z - (k - c)$, which gives Buyer the benefit of his bargain. The diagram of these payoffs appears in Table 2.

\textsuperscript{26} \textit{UCC} § 2-712.

\textsuperscript{27} \textit{UCC} § 2-713.
TABLE 1
PAYOFFS UNDER SPECIFIC PERFORMANCE RULE

<table>
<thead>
<tr>
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<th>$Y_p = Y_d$</th>
<th>$Y_p = Y_u$</th>
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<tr>
<td>(Seller Performs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buyer’s payoffs</td>
<td>$Z - k$</td>
<td>$Y_u - k$</td>
</tr>
<tr>
<td>Seller’s payoffs</td>
<td>$k - Y_d$</td>
<td>$k - Y_u$</td>
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TABLE 2
PAYOFFS UNDER MONEY DAMAGES RULE

<table>
<thead>
<tr>
<th></th>
<th>$Y_p = Y_d$</th>
<th>$Y_p = Y_u$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Seller Performs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buyer’s payoffs</td>
<td>$Z - (k - c)$</td>
<td>$Z - (k - c)$</td>
</tr>
<tr>
<td>Seller’s payoffs</td>
<td>$(k - c) - Y_d$</td>
<td>$(k - c) - Z$</td>
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</table>

Simple algebraic manipulation (see the Appendix) demonstrates that by agreeing to money damages rather than specific performance, Buyer receives $c$ with certainty in return for relinquishing the possibility of capturing the gain from termination, represented by $Y_u - Z$, in the event of a breach, and that the two payoffs have equal expected values. While this is obvious for the simple model used above, the same is true for more complicated options and more complicated pricing models. The entire point of determining a price for the specific performance “option” is to compensate Buyer for relinquishing the potential gain from termination, just as the purchaser of a call option on a security compensates the writer for relinquishing the upside potential of the underlying security.

Thus a money damages remedy permits each party to receive a fixed payoff rather than a risky payoff with the same expected value. Because a risk-averse Buyer would prefer to receive $c$ with certainty than to receive the larger sum $Y_u - Z$, but only in the event of breach, and a risk-averse Seller would prefer to pay $c$ with certainty rather than pay the larger amount $Y_u - Z$ to Buyer in the event of breach, both Buyer and Seller will prefer a money damages remedy to a specific performance remedy.\(^{28}\)

\(^{28}\) Under a money damages remedy, the variability of Buyer’s returns is zero, and the variability of Seller’s returns, while less than that under a specific performance remedy, is greater than zero. It is therefore possible that some other remedy with a value greater than $Z - k$ and less than $Y_u - k$ would be preferable to expectationary damages to equally risk-averse Buyers and Sellers, as such a remedy would permit some sharing of the risk. See Polinsky, supra note 3, at 430–33. Between the expectationary damages remedy and the specific performance remedy, however, risk-averse parties would have a clear preference for money damages. The goal of minimizing administrative cost probably explains...
This analysis does not prove that the parties would agree to a reduction in the contract price that is exactly equal to the option value but simply that they would agree to some reduction in return for a money damages remedy. A very risk-averse Buyer might be willing to accept something less than c in return for relinquishing his claim to the gain from termination, and a very risk-averse Seller might be willing to pay something more than c to escape the risk of paying Buyer the gain from termination. There may accordingly be a range of values around c that would satisfy both parties. However, the option value, c, would satisfy even a Seller and Buyer who were very slightly risk averse.

B. The Positive Transaction Costs Case

The above analysis demonstrates that risk-averse parties will prefer money damages to specific performance when none of the three types of transaction costs identified by Bishop is present. This section explores the extent to which that result holds when both an excessive breach and an excessive performance problem are introduced.

An excessive breach and an excessive performance problem can be introduced into the option model by relaxing, respectively, the assumption that courts always award damages equal to Z and the assumption of costless postcontractual bargaining. An excessive breach problem results when courts systematically award damages in an amount less than Z. Because the damage award is the strike price of Seller's option, an excessive breach problem can be modeled by substituting for the option described in Section A a new option with a lower strike price, Za, where Z > Za.

An excessive performance problem results when postcontractual bargaining is costly and some of the gain from termination, Yu - Z, is dissipated in the parties' negotiations over how that gain should be distributed. This is easily modeled as a tax in an amount v that is deducted from the termination payment. For low values of v, the contract will still be terminated, but Seller's loss will exceed Buyer's gain by v. For values of v above a critical point, the maximum payment that Seller would be willing to offer in return for terminating the contract, Yu - k, minus the tax, will be less than Z - k. In that case, Buyer will not be satisfied with Seller's maximum side payment but will instead insist on performance. In that event, Seller incurs costs of Yu - k and Buyer reaps a (lower) benefit of Z - k.

why courts have not developed a more variegated set of remedies tailored more carefully to the parties' risk preferences.
TABLE 3
PAYOFFS UNDER SPECIFIC PERFORMANCE RULE

<table>
<thead>
<tr>
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<th>( Y_p = Y_d ) (Seller Performs)</th>
<th>( Y_p = Y_u ) (Seller Breaches)</th>
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<tbody>
<tr>
<td>Buyer’s payoffs</td>
<td>( Z - k )</td>
<td>( \max(Y_u - k - v, Z - k) )</td>
</tr>
<tr>
<td>Seller’s payoffs</td>
<td>( k - Y_u )</td>
<td>( k - Y_u )</td>
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TABLE 4
PAYOFFS UNDER MONEY DAMAGES RULE

<table>
<thead>
<tr>
<th></th>
<th>( Y_p = Y_d ) (Seller Performs)</th>
<th>( Y_p = Y_u ) (Seller Breaches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyer’s payoffs</td>
<td>( Z - (k - c_a) )</td>
<td>( Z_a - (k - c_a) )</td>
</tr>
<tr>
<td>Seller’s payoffs</td>
<td>( (k - c_a) - Y_u )</td>
<td>( (k - c_a) - Z_a )</td>
</tr>
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</table>

Let us first assume that the parties can estimate the size of the relevant transaction costs. They can then determine the price, \( c_a \), of the money damages option with a strike price of \( Z_a \), and Tables 1 and 2 can be revised as Tables 3 and 4 to show the effects of the excessive breach and excessive performance problems.

It is straightforward to describe qualitatively how these changes would affect the parties’ ex ante preferences. Where the excessive breach problem is much larger than the excessive performance problem, both parties will prefer specific performance, and vice versa. The remaining discussion, therefore, will focus on situations in which neither type of transaction cost dominates.

From Seller’s perspective, the only change from the no-transaction-costs situation is that the strike price of the option is reduced and the price he must pay is accordingly higher. Nevertheless, a risk-neutral Seller would remain indifferent between money damages and specific performance, and a risk-averse Seller would prefer money damages.\(^{29}\) Buyer’s preferences are more complicated. If transaction costs are low, the riskiness of the money damages remedy will remain lower than that of the specific performance remedy. Although the variability of Buyer’s

\(^{29}\) This is not to say that the parties are indifferent between a transaction-cost-free world and one in which both undercompensation and costly postcontractual bargaining are present. Both types of transaction costs cause inefficient perform/breach decisions, thus reducing the joint value of the contract and resulting in too few contracts. See Craswell, supra note 3, at 636–40. If neither type of transaction cost dominates, however, this observation provides no basis for choosing one remedy over the other.
returns under a money damages rule increases as $Z - Z_a$ increases, for small values of $Z - Z_a$ the variability will still be less than that associated with specific performance. The Appendix quantifies this concept for the simple model used in Section A, but again the result holds so long as the parties can use some means of quantifying the value to Seller of money damages.

As transaction costs increase, the variability of Buyer's payoffs under money damages rises and the variability of his payoffs under specific performance falls. The intensity of Buyer's preference for a money damages remedy, therefore, is decreasing in the level of transaction costs. As transaction costs rise above a certain level, Buyer's preference shifts to specific performance, with the intensity of the preference increasing as transaction costs rise. The net effect is that when transaction costs are high, the likelihood that Buyer and Seller can agree to the same remedy is reduced, and fewer contracts will be formed, as we would expect.

Despite the hurdles created by high transaction costs, in some circumstances Buyer and Seller will be able to agree on a remedy, depending on their comparative levels of risk aversion. Given a level of transaction costs, if Buyer is sufficiently more risk averse than Seller, the parties will agree to specific performance, and if Seller is sufficiently more risk averse than Buyer, the parties will agree to money damages. Where Buyer and Seller have similar levels of risk aversion, they may escape the impasse by agreeing to a liquidated damages remedy, which can ameliorate the undercompensation problem without exposing Seller to the same level of risk as would a specific performance remedy. We would expect that where transaction costs are very high, risk-averse parties would select money damages and include a liquidated damages provision rather than selecting specific performance.

This analysis assumes that the parties can arrive at a reasonable estimate of $Z_a$ in order to determine the value of the money damages option. It is, of course, difficult to predict ex ante the extent of undercompensation, and accordingly the parties face a more difficult task than that outlined above. Nevertheless, the above observations remain relevant. If both parties believe that transaction costs are low, they will prefer money damages, and if both believe they are high, their preferences will depend on their comparative levels of risk aversion. To the extent they have inconsistent beliefs, they will find it more difficult to reach agreement. Uncertainty reduces the size of the set for which both parties can agree to the same remedy. In those situations where agreement is possible, however, the parties are more likely to select money damages.

To summarize, where transaction costs are low or nonexistent, both
parties will prefer money damages to specific performance. Where transaction costs are substantial, the parties will agree to specific performance if Buyer is much more risk averse than Seller. Otherwise, the parties will either agree to money damages (perhaps including a liquidated damages provision) or simply fail to agree to either remedy. In each case, the more difficult it is to estimate transaction costs, the less likely the parties are to agree on a remedy.

IV. SPECIFIC PERFORMANCE IN COMMERCIAL CONTEXTS

The option approach developed in Section III provides a basis for choosing a remedy in cases that cannot be usefully addressed using the transaction costs approach. By showing that in a large range of cases a hypothetical bargain between risk-averse parties would result in a money damages remedy, the option approach provides a plausible explanation for the courts’ use of money damages as the preferred remedy.

It would make sense for the courts to assume risk aversion when choosing the default remedy. Risk-neutral parties would in most cases be indifferent between the remedies. Risk-preferring parties and risk-averse parties would have a preference, but we do not typically observe contracting behavior that suggests that the parties are risk preferring.30 Thus a court can provide the greatest number of contracting parties with an acceptable remedial choice by assuming risk aversion.

The range of circumstances in which risk-averse parties can be induced to prefer money damages is greater than that in which they would agree to specific performance. In the class of contracts to which the options approach is most relevant—contracts for the purchase and sale of a marketable good or service—it is reasonable to assume that neither the excessive breach nor the excessive performance problem is massive, and in any event there is little reason to believe that either dominates. A court that wished to replicate the hypothetical bargain, therefore, would do best to use money damages as the remedy of choice but to use specific performance where it appears likely either that the excessive breach problem substantially outweighs the excessive performance problem or that the excessive breach problem is large and Buyer is significantly more risk averse than Seller.

In addition to providing an explanation for the prevalence of money damages, the options analysis helps explain the most significant category of cases in which specific performance is routinely granted, those involv-

30 Schwartz, supra note 5, at 392. See also Craswell, supra note 3, at 643–44 (noting alternative means available for risk-preferring parties to satisfy their preferences).
ing the sale of "unique" goods. Those cases depart from an assumption underlying the options analysis—the assumption that there is a market for the performance. The option model may also shed some light on the growing number of cases in which courts have granted specific performance of long-term requirements contracts. In a number of the reported cases, there appears to be a substantial disparity in the parties' probable attitudes toward risk, which weakens the argument for money damages.

A. Contracts for the Sale of Unique Goods

The most well-known class of cases in which specific performance is routinely granted are those that involve "unique" goods. The paradigmatic unique goods identified by the case law are real property\textsuperscript{31} and certain types of personal property, such as works of art, antiques, and so forth.\textsuperscript{32} The market for such items is thin, sporadic, and inefficient, which is a substantial departure from the assumption of marketability underlying the use of a standard options valuation model in Section III.

As previously noted, the conclusions of Section III do not depend on the use of any particular options-pricing methodology—they do not even require that the parties be able to use one of the standard models developed in the context of securities markets, which proceed from a "no arbitrage" insight. Nevertheless, the inefficiency of the market for a unique good will interfere with any attempt to put a dollar value on the difference between money damages and specific performance. The fact that the market is thin and sporadic means that it will be difficult for the parties to arrive at a shared estimate of Seller's opportunity cost of making the sale. It is possible that just after the sale, another potential buyer could come along who would be willing to pay much more than Buyer; at the same time, it is possible that Buyer is the highest-valuing user by

\textsuperscript{31} Contracts for the sale of real estate were the typical occasion for specific performance under the common law. Some courts stated that such contracts were specifically enforceable as a matter of right. See, for example, Kann v. Wausau Abrasives Co., 81 N.H. 335, 541, 129 A. 374, 378 (1925) (as to contract for sale of land, money damages are held inadequate as a matter of law); Tolbert v. Short, 150 Ga. 413, 414, 104 S.E. 245, 245 (1920) (specific performance of contracts for the sale of land granted as "a matter of course"); Belanewsky v. Gallaher, 55 Misc. 150, 150–51, 105 N.Y.S. 77, 78 (Sup. Ct. 1907) (contracts for sale of real estate specifically enforceable "even where . . . the vendee has an adequate remedy at law for damages"). Other courts contended that as to either real or personal property, specific performance was a matter for the court's equitable discretion. See, for example, Clifton Land Co. v. Reister, 186 Ky. 155, 160, 216 S.W. 342, 344 (1919) (specific performance of contract for the sale of land granted not as a matter of course, but in the court's discretion).

\textsuperscript{32} See Samuel Williston, 3 Williston on Sales 328 (rev. ed. 1948) (citing cases involving artworks, heirlooms, and vessels).
a large margin. It would accordingly be hard for the parties to determine what is an appropriate compensation to Buyer for agreeing to abandon the opportunity to share in the highly uncertain potential gain from termination.

The difficulty of valuing the money damages option weakens the argument for money damages, but it does not by itself justify the routine grant of specific performance in the unique goods cases. Commentators have generally concluded that specific performance is granted in these cases to protect the subjective value that Buyer sees in the good.33 A much simpler analysis becomes apparent, however, when we focus on uniqueness from Seller’s perspective. As a general proposition, unique and high-value items like land, art, and so forth, are sold in a different manner than are fungible goods, and specific performance plays an important role in the selling process to the ultimate benefit of Seller.

Real estate, works of art, and antiques are quite often sold through a process in which Seller or Seller’s agent shows the item to multiple potential purchasers and attempts to get them to make competing offers. That is, the sales process is effectively an auction. The offerors have a considerable incentive to make their initial offers low and delay raising the bid anywhere near their reservation prices for as long as possible in hopes of getting information, directly or indirectly, about the other offers and about Seller’s reservation price. There is a disadvantage to being the first offeror to make a “final” offer. The easiest way for Seller to force the offerors to make their best offers is to create a deadline at which the highest bidder will take the property (as an auctioneer does by dropping the hammer). If the resulting contract is not specifically enforceable, there is insufficient incentive for the offerors to make their “final” offers on the deadline. Instead, some offerors might wait to see the purchase price, then make further offers. Seller would remain free to accept a higher offer by paying damages to the first purchaser. A specific performance remedy is therefore in Seller’s best interest because it guarantees that Seller’s deadline is real.34 Another concern a bidder might have is that Seller could hold an auction merely for the purpose of extracting

33 See, for example, Kronman, supra note 2, at 360–65; Ulen, supra note 2, at 365; Schwartz, supra note 2, at 275–76.
34 This is not the only instance in which a remedy that seems on the surface to benefit only the nonbreaching party actually serves an important interest of the breaching party. Liquidated damages clauses that are substantial enough to constitute a “penalty” under current law may function as a means for a Seller with a low probability of breach to signal that low probability to Buyer. See Charles J. Goetz & Robert E. Scott, Liquidated Damages, Penalties and the Just Compensation Principle: Some Notes on an Enforcement Model and a Theory of Efficient Breach, 77 Colum. L. Rev. 554, 579–80 (1977).
information, without actually turning over the good to the winning bidder. A specific performance remedy precommits Seller not to do this and accordingly encourages bidders to participate. This is, accordingly, a situation in which Kronman's assertion that "[o]ther things equal, a promisor will always prefer a contract without [a specific performance remedy]" is incorrect.

B. Requirements Contracts

The attitude of courts toward output and requirements contracts and other long-term supply relationships has evolved significantly over the past century, influenced, probably substantially, by the Uniform Commercial Code's (UCC) approach. In contrast to the general willingness to order specific performance of contracts to convey real property, equity courts repeatedly noted that specific performance was an unusual remedy for breach of a contract for the sale of personal property. This state of affairs was altered to a limited extent by Section 68 of the Uniform Sales Act, which provided that "[w]here the seller has broken a contract to deliver specific or ascertained goods, a court having the powers of a court of equity may, if it thinks fit . . . direct that the contract shall be performed specifically." Although some courts and commentators viewed this provision as an attempt to liberalize the common law's very restrictive approach to specific performance in contracts for the sale of personal property, many courts continued to follow the restrictive route.

35 Kronman, supra note 2, at 366.
36 See cases cited in note 31 supra.
37 See, for example, Butler v. Wright, 186 N.Y. 259, 261–62, 78 N.E. 1002, 1003 (1906) ("as to contracts pertaining to personal property, a party should be confined to his action for damages, unless it appears that he is entitled to the thing contracted for in specie, which to him has some special value, and which he cannot readily obtain in the market, or in cases where it is apparent that compensation in damages would not furnish a complete and adequate remedy"); Williston, supra note 32, at 327 (noting common-law approach and arguing that "[i]t would sometimes promote justice if the courts were somewhat more ready to allow specific performance of contracts to sell goods").
38 See McCallister v. Patton, 214 Ark. 293, 300, 215 S.W.2d 701, 704 (1948) (some American and English courts have concluded that § 68 and its English counterpart, § 52 of the Sales of Goods Act, broaden the powers of courts to grant specific performance of contracts for the sale of personality, while others have concluded that it merely codifies the common law). For examples of the former approach, see Pittenger Equip. Co. v. Timber Structures, 189 Or. 1, 22, 217 P.2d 770, 779 (1950) ("We think that if the section was intended to do no more than codify the existing law, it would have employed the current equity terms, such as 'unique goods' or 'goods unavailable in the market.' "); Restatement of Contracts § 358, cmt. (d) (1932) (Uniform Sales Act § 68 cited as example of a more liberal approach than that of the common law).
39 See, for example, Glick v. Beer, 263 A.D. 599, 600, 33 N.Y.S.2d 833, 834 (1942) (§ 68 codifies the common law); Cohen v. Rosenstock Motors, Inc., 188 Misc. 426, 427, 65 N.Y.S.2d 481, 482 (Sup. Ct. 1946) (same).
Section 2-716(1) of the UCC replaced the Sales Act's language with the broader statement, "Specific performance may be [awarded to the buyer] where the goods are unique or in other proper circumstances." That language was clearly intended to liberalize the Sales Act's standard for granting specific performance.\(^{41}\) While contending that § 2-716(1) "continues in general prior policy as to specific performance," the drafters stated that the section "seeks to further a more liberal attitude than some courts have shown in connection with the specific performance of contracts of sale."\(^{42}\)

The draftsmen identified only one general category of cases—those involving output and requirements contracts—as candidates for more liberal treatment. Although there were pre-Code examples of specific performance decrees in cases involving long-term supply contracts,\(^{43}\) a plaintiff seeking specific performance of such a contract under the traditional view faced three obstacles. First, the goods themselves are typically not unique or unavailable, and a plaintiff must therefore make a more subtle argument as to the inadequacy of damages. Second, courts often read the "specific or ascertained" language of § 68 quite literally, refusing specific performance of contracts to sell goods that had not been identified to the contract at the time the contract was made.\(^{44}\) Finally, courts

\(^{41}\) As early as 1940, Karl Llewellyn's Special Committee on a Revised Uniform Sales Act expressed its concern that courts had denied specific performance in cases of goods not identified to the contract. Section 86 of its draft provided that specific performance was available "[w]here the goods are of a character not readily procurable on the market." Special Committee on a Revised Uniform Sales Act, Report on the Uniform Sales Act to National Conference of Commissioners on Uniform State Laws 84 (1940), reprinted in American Law Institute and National Conference of Commissioners on Uniform State Laws, Uniform Commercial Code Drafts 256 (Elizabeth Slusser Kelly comp. 1984). The accompanying comment explained that "in the bulk of the cases under this Section the goods have not been 'specific or ascertained' but have rather been from specific sources and not otherwise readily procurable. The language makes clear the availability of specific performance in such cases." \textit{Id.}

\(^{42}\) UCC § 2-716(1), Off. Cmt. 1.

\(^{43}\) See, for example, Morgan v. Patillo, 297 F. 140 (5th Cir. 1924) (contract for sale of output of timber on lands owned by defendant); Michigan Sugar Co. v. Falkenhagen, 243 Mich. 698, 220 N.W. 760 (1928) (contract for sale of output of sugar beets may be specifically enforced); \textit{Wausau Abrasives Co., supra} note 31 (contract for sale of output of crystalline garnet from defendant's mine in excess of defendant's requirements; defendant's motion to dismiss denied).

\(^{44}\) See, for example, Gellis v. Falcon Buick Co., 191 Misc. 566, 76 N.Y.S.2d 94 (Sup. Ct. 1947) (denying specific performance of contract to purchase automobile which had become scarce because of the war on the grounds that the contract was not for a particular car identified at the time of the contract); \textit{Rosenstock Motors, supra} note 40 (same). For cases reaching the same result on identical facts under the common law, see, for example, \textit{McCallister, supra} note 39 (car does not possess any unique qualities that would make specific performance appropriate); Poltorak v. Jackson Chevrolet Co., 322 Mass. 699, 79 N.E.2d 285 (1948). But see DeMoss v. Conant Motor Sales, Inc., 72 N.E.2d 158 (Ohio Ct. C.P. 1947) (specific performance of contract for sale of car granted).
were generally reluctant to decree specific performance of long-term contracts, fearing the necessity of ongoing supervision.\(^{45}\)

Nevertheless, the Code's drafters contended that "[o]utput and requirements contracts involving a particular or peculiarly available source or market present today the typical commercial specific performance situation, as contrasted with contracts for the sale of heirlooms or priceless works of art which were usually involved in the older cases."\(^{46}\) While this may even today be an exaggeration, courts applying the UCC have frequently awarded specific performance in cases involving long-term requirements contracts.\(^{47}\)

Part of the explanation for these cases may be the comparative attitudes of Seller and Buyer toward risk—in particular, the risk that the price of the goods will change between the time of contracting and the time of performance. Many of the long-term supply contracts that have been specifically enforced involve a Seller who likely is nearly risk neutral with respect to changes in the price of the goods and a Buyer who is probably very risk averse with respect to such changes. Assuming the presence of significant transaction costs, that combination of attitudes toward risk would provide an argument in favor of specific performance. It may be appropriate to assume somewhat higher transaction costs in these cases than in the typical sale of goods case because the contracts are complicated, long-term relationships. The courts' ability to determine the value of the contract, as well as the parties' ability to agree to an appropriate termination payment, is probably less than it would be with respect to a simpler sales contract.

The cases at issue usually involve a contract whereby Buyer agrees to purchase its requirements of a particular raw material, typically a petroleum or mineral product, from Seller.\(^{48}\) In each case, Seller is a widely

\(^{45}\) See, for example, Long Beach Drug Co. v. United Drug Co., 13 Cal. 2d 158, 171–72, 88 P.2d 698, 704–5 (1939); Elliott v. Cline, 184 Ga. 393, 395–96, 191 S.E. 372, 374 (1937). Although most of the cases so holding involve services contracts for which the standards of performance may be complex, it could also be said of many output and requirements contracts that the overall rights and obligations of the parties are sufficiently complex as to present a problem of ongoing judicial supervision. The court in the *Laclede Gas* case, cited in note 48 *infra*, was forced to rely on a "public interest" exception to get around that argument.

\(^{46}\) UCC § 2-716(1), Off. Cmt. 2. This comment is unchanged from the May 1949 draft of the UCC presented to the American Law Institute and the National Conference of Commissioners on Uniform State Laws. See American Law Institute and National Conference of Commissioners on Uniform State Laws, 7 Uniform Commercial Code Drafts, *supra* note 41, at 264.

\(^{47}\) See cases cited in note 48 *infra*.

\(^{48}\) See, for example, *Laclede Gas* Co. v. Amoco Oil Co., 522 F.2d 33 (8th Cir. 1975) (requirements contract for propane gas); Eastern Air Lines, Inc. v. Gulf Oil Corp., 415 F. Supp. 429 (S.D. Fla. 1975) (requirements contract for airline fuel); Kaiser Trading Co. v.
held corporation.\textsuperscript{49} There would appear to be little reason for the Seller in these cases to be willing to pay much for the opportunity to avoid the risk of rising commodity prices. It is a large seller of the commodity in question, with a substantial number of contracts of sale. Over time its gains and losses from price moves should roughly cancel out. Its shareholders are subject only to limited liability and, in most cases, diversified. They would presumably view commodity price fluctuations as diversifiable risks that they would not wish the firm to spend money to avoid. Seller is therefore likely to be nearly indifferent between money damages and specific performance, absent some compelling transaction costs justification for one remedy or the other.

In most of these cases the plaintiff/Buyer is a regulated public utility and would have a very different attitude toward the risk of commodity price fluctuations than would Seller.\textsuperscript{50} Public utilities are normally subject to price regulation that permits prices to equal a designated margin over costs, meaning that increased costs arising from termination of the contract would be passed through to end users.\textsuperscript{51} Under such circumstances, it makes sense for the utility to be risk averse with respect to the price of its principal fuels. Its customers are likely risk averse on average. Indeed, many of a public utility’s customers are households whose demand for electricity, gas, and so forth, is fairly inelastic in the short run. These customers would place a very high value on low price variability. The utility’s ability to sell at stable prices depends on reasonable stability in the price of its inputs, given its need to convince a regulator that its prices are closely related to the price of inputs. In order to satisfy both its customers and its regulator, therefore, the utility must act in a risk-averse

\textsuperscript{49} The defendants in the cases cited in note 48 supra consist principally of publicly traded integrated oil companies, oil production and refining companies, and mining companies.

\textsuperscript{50} This is the case in each of the cases cited in note 48 supra, with the exception of \textit{Eastern Air Lines} and \textit{Kaiser Trading Co}. At the time of the \textit{Eastern Air Lines} case, however, Eastern was, like a public utility, subject to comprehensive price regulation and accordingly was in a similar position to the utility plaintiffs.

\textsuperscript{51} See \textit{Missouri Public Service Co.}, supra note 48, at 725 ("[plaintiff] is a utility impressed with public interest and any increase in its cost ... would reflect in its rates to its public and private consumers"); \textit{Orange & Rockland Utilities}, supra note 48, at 499 (increased cost resulting from breach would be passed through to consumers).
manner with respect to the price of its energy inputs. Buyer’s attitude toward this particular risk will lead it both to enter into long-term supply contracts and to seek a high degree of certainty that it will retain the economic benefits of these contracts. It would demand a very high price to grant Seller the option to get out of the contracts by payment of damages, given the possibility that those damages will be undercompensatory. Seller, however, will not be willing to pay a high price to escape the risk associated with fluctuations in the price of the raw material. The parties may both conclude that specific performance is the better remedy.

This disparity in attitudes toward risk is not generalizable to all output and requirements contracts, and accordingly the option model does not predict that courts will accept the Code’s invitation to grant specific performance routinely in cases involving output and requirements contracts. And, indeed, the results are much more mixed in cases that do not involve a Buyer that is much more risk averse than Seller. There are, for example, a number of cases in which a farmer agrees to sell his output to a middleman, only to breach when the price increases substantially, and the Buyer seeks specific performance. If there is a disparity in attitudes toward risk, we would expect the Buyer to be less risk averse than the Seller/farmer. These would not, accordingly, seem to be compelling cases for specific performance. The courts have sometimes followed, but often declined, the UCC’s invitation to grant specific performance in these cases.

V. Conclusion

The option model presented in this article is intended to serve as a supplement, rather than a replacement, to the transaction costs model that has informed most of the discussion of contract remedies to date. The option approach is particularly useful in situations where the transaction costs approach cannot be usefully applied—where transaction costs are low or nonexistent, and where neither the excessive breach nor the excessive performance problem dominates. In most cases that meet these criteria, parties bargaining ex ante would select money damages. The categories of cases in which that result holds seem broad enough to provide an explanation for the common law’s choice of money damages as


53 See, for example, Weatherby, supra note 20 (specific performance of contract for farmer’s output of cotton denied); Duval & Co. v. Malcolm, 233 Ga. 784, 214 S.E.2d 356 (1975) (same; cotton); Tower City Grain Co. v. Richman, 232 N.W.2d 61 (N.D. 1975) (same; grain).
the preferred remedy. Moreover, the conditions under which the result
does not hold coincide with cases in which the courts have frequently
granted specific performance.

APPENDIX

COMPARISON OF PAYOFFS IN THE 2-PERIOD BINOMIAL OPTIONS-PRICING MODEL

The first proof shows that, for the model presented in the text, the parties’
payoffs under a money damages remedy differ from those under a specific performance remedy by substituting payment from Seller to Buyer of a fixed amount, c, for a risky payment in an amount $Y_u - Z$. The latter payment is risky because it is received only in the event of breach. Furthermore, the expected values at $t_0$
of the two payments are equivalent.

Define $q$ as the probability that $Y_g = Y_d$. Starting from Tables 1 and 2, we can
determine (1) Buyer’s expected payoff from entering into the contract if the remedy
for breach is specific performance, $w_{b,s}$; (2) Buyer’s expected payoff if the remedy
is money damages, $w_{b,d}$; (3) Seller’s expected payoff if the remedy is specific performance, $w_{s,s}$; and (4) Seller’s expected payoff if the remedy is money
damages, $w_{s,d}$:

\[ w_{b,s} = q(Z - k) + (1 - q)(Y_u - k), \quad (A1) \]

\[ w_{b,d} = q(Z - (k - c)) + (1 - q)[Z - (k - c)] 
\quad = Z - k + c, \quad (A2) \]

\[ w_{s,s} = q(k - Y_d) - (1 - q)(Y_u - k), \quad (A3) \]

and

\[ w_{s,d} = q(k - c - Y_d) - (1 - q)[Z - (k - c)]. \quad (A4) \]

Manipulating equation (A1) and recalling that $Y_u > Z > k$,

\[ w_{b,s} = q(Z - k) + (1 - q)(Z - k) + (1 - q)(Y_u - Z) 
\quad = Z - k + (1 - q)(Y_u - Z). \]

Comparing this to equation (A2),

\[ w_{b,d} = w_{b,s} + c - (1 - q)(Y_u - Z). \]

Thus money damages permits Buyer to trade the possibility of receiving a windfall
of $Y_u - Z$ in the event of breach (which happens with probability $1 - q$) for the
certainty of receiving $c$.

Similarly, manipulating equations (A3) and (A4),

\[ w_{s,s} = qk + (1 - q)k - qY_d - (1 - q)Y_u 
\quad = k - qY_d - (1 - q)Y_u, \]

\[ w_{s,d} = q(k - c) + (1 - q)(k - c) - qY_d - (1 - q)Z 
\quad = k - c - qY_d - (1 - q)Z 
\quad = w_{s,s} - c + (1 - q)(Y_u - Z). \]
Thus money damages likewise permits Seller to pay a fixed amount, \( c \), in order to avoid the possibility of paying \( Y_0 - Z \) to Buyer in the event of breach. It can now be shown that at \( t_0 \), the option value equals the expected value of the gain from termination.

The distribution at \( t_0 \) of \( Y \) is \( Y_d \) with probability \( q \) and \( Y_u \) with probability \( (1 - q) \). To eliminate the possibility of risk-free arbitrage, \( Y_0 \) must equal the present value of

\[ qY_d + (1 - q)Y_u, \]

or

\[ Y_0 = \frac{qY_d + (1 - q)Y_u}{1 + r}. \]

Solving for \( (1 - q) \), we find that

\[ 1 - q = \frac{Y_0(1 + r) - Y_d}{Y_u - Y_d}, \]

or

\[ 1 - q = \frac{Y_0 - [Y_d/(1 + r)]}{Y_u - Y_d}. \]

Comparing this to equation (1) in the text, we see that

\[ c = (1 - q) \frac{Y_u - Z}{1 + r}. \]

Thus, the option value at \( t_0 \) equals the discounted expected value of the gain from termination.

The next proof demonstrates that for small values of \( Z - Z_a \), the variability of Buyer’s payoffs under money damages is lower than that under specific performance, but for large values of \( Z - Z_a \), the reverse is true. Because under each remedy there are two possible payoffs (one in the event of performance and the other in the event of breach), if we assume that the expected value of the payoff under either remedy is the same, the comparison of variability can be made simply by looking at the lowest possible outcome under either remedy.

Note first that \( c_a \) is a function of \( Z_a \) and can be found by substituting \( Z_a \) for \( Z \) in equation (1). Define

\[ \phi = \frac{Y_0 - [Y_d/(1 + r)]}{Y_u - Y_d}. \]

Then \( c_a = (Y_u - Z_a)\phi \).

Note further that \( \phi \) must be greater than zero and less than 1. This can be seen by rewriting \( \phi \) as

\[ \phi = \frac{Y_0(1 + r) - Y_d}{(Y_u - Y_d)(1 + r)} \]

and noting that \( Y_u \) must be greater than \( Y_0(1 + r) \), because \( Y \), representing a risky asset, must earn more than the risk-free rate of return.

Buyer’s lowest possible payoff under money damages is \( Z_a - k + c_a \), and his
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The lowest possible payoff under specific performance is $Z - k$. The former term exceeds the latter if

$$e_k > Z - Z_a,$$

or

$$\phi(Y_a - Z_a) > Z - Z_a. \quad (A5)$$

Inequality (A5) is satisfied for $Z - Z_a = 0$. Because $0 < \phi < 1$, as $Z - Z_a$ increases from zero, the left-hand side of inequality (A5) increases more slowly than the right-hand side. At some critical value of $Z_a$, which we can define as $Z^*$, Buyer’s lowest possible outcome under a money damages rule becomes equal to his lowest possible outcome under a specific performance rule, and for all $Z_a < Z^*$, Buyer’s lowest possible outcome under a specific performance rule exceeds that under a money damages rule.