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Reliance Investments, Expectation Damages and Hidden Information

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Reliance Investments, Expectation Damages and Hidden Information

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Abstract

A setting of reliance investments is explored where one of the parties to a contract obtains private information concerning his utility or cost function that remains hidden to the other party and to courts. As a consequence, it will be a difficult task to award expectation damages corrrectly to a party with private information who sufffers from breach of contract. While a revelation mechanism would exist that leads to the first best solution, assessing expectation damages correctly turns out to be at odds with ex post efficiency. I conclude that, under asymmetric information, the performance of expectation damages falls short of what more general mechanisms could achieve.

Keywords: reliance investments, expectation damages, breach of contract, hidden information

JEL classification: K12, D82

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1 Introduction

Actions of a party to a contract are called *reliance investments* if they are taken in reliance on performance of the other party. Reliance investments enhance the value of performance but must be undertaken before the promisee knows whether the promisor will perform.

Suppose one of the parties fails to perform as specified in the contract. Then the other party may seek recovery by claiming expectation damages. If expectation damages are granted in the correct amount the party who suffers from breach will be made equally well off as if the breaching party had met his obligation.

It is a common tenet of the economic analysis of contract law that, under the expectation measure, there will be incentives toward excessive reliance. Shavell (1980) had established the overreliance result in a formal model (for a more recent statement of the result, see Shavell (2004)). Edlin and Reichelstein (1996), however, called the overreliance result in question. In a setting of quantity choice, they showed that the expectation measure provides efficient incentives if reliance investments are one-sided, if the contract specifies some suitable intermediate quantity of trade as performance obligation and if, ex post, inefficient performance choices are renegotiated.

Whether expectation damages provide efficient incentives or not, for being granted, they must be verified in front of courts. In particular, if asymmetric information is involved, this may be a difficult task. The party suffering from breach may be denied recovery just because courts feel unable to assess expectation damages correctly.

The present paper takes up the issue of assessing expectation damages under asymmetric information. A setting of one-sided reliance investments is explored where one of the parties receives information about his utility, profit or cost function that remains hidden to the other party and to courts. The setting is simple enough that a revelation mechanism of the Clarke-Groves type would easily generate the first best solution. Yet, as will be shown, the transfer payments arising from such a mechanism do not reflect expectation damages correctly.

For this reason, the paper rather examines the class of mechanisms that would assess expectation damages correctly. In its general form, such a mechanism defines a transfer schedule that specifies net payments due as a function of performance choice, of reliance investments (if verifiable) and of a message sent by the informed party. The transfer schedule is said to reflect expectation damages correctly if, along the equilibrium path, transfer payments are consistent with correct expectation damages, state by state.

As it turns out, assessing expectation damages correctly comes at a price in terms of efficiency loss. It is shown that mechanisms assessing expectation damages correctly will implement performance decisions only that are constant over states. Typically, such outcomes fail to be ex post efficient. Therefore, assessing expectation damages correctly is at odds with ex post efficiency.

Notice, in contrast to the informational setting of Edlin and Reichelstein, renegotiations would not offer an easy remedy for ex post efficiency in the present framework. In fact, as follows from the impossibility result of Myerson and Satterthwaite (1981), asymmetric information may be a source of transaction costs and, hence, the Coase Theorem may fail to hold. In any case, renegotiations under asymmetric information cannot be expected to restore ex post efficiency as would be the case under symmetric information.

Legal practice facing problems of hidden information usually takes resort to objective damage measures. Such measures are based on prudent or reasonable investment behavior and/or on the average type of a fictitious agent. By construction, these measures differ from subjective expectation damages that were required to compensate the promisee for her loss. Worse, while failing to assess expectation damages correctly, such schemes also fail to generate efficient performance outcomes.

Some legal systems allow the promisee to opt for recovery of reliance expenditures if expectation damages cannot be verified in front of courts. Unfortunately, in the setting of the present paper, this option also fails to restore ex post efficiency.

These findings support the following conclusion. While expectation damages seem to work well under symmetric information, at least if continuous performance choice is at stake, the performance of expectation damages under asymmetric information falls short of what more general mechanisms may achieve.

The paper is organized as follows. Section 2 introduces the basic reliance setting and derives the first best solution, as a reference point, by backwards induction. Section 3 contains the main findings of the paper. In particular, it is shown that transfer schedules reflecting expectation damages correctly provide incentives for outcomes that are constant over states and, hence, will typically fail to be ex post efficient. The overreliance result of Shavell is also briefly revisited. In a setting of complete information, overreliance is shown to be due to binary performance choice and not to a basic defect of the expectation measure as such. Section 4 investigates incentives arising from common methods of legal practice. Neither objectifying expectation damages nor allowing to opt for reliance instead of expectation damages would provide incentives for state-contingent outcomes. Section 5 concludes. The proof of the main result is relegated to the appendix.

2 The general setting

Two risk-neutral parties A and B – think of a buyer and seller – have signed a contract. Thereafter, party A chooses *reliance investments* $r \in R = [0, \infty)$ before nature reveals an *information parameter* θ from an interval $\Theta = [\theta_L, \theta_H]$ of the real line. Information, however, remains private to party A or, alternatively, to party B. Nature's move is purely random. At the final stage, the *performance decision* $q \in Q$ is due. Q is assumed to be a subset of the real line and may consist of an interval $Q = [q_L, q_H]$ or it may be just binary $Q = \{q_L, q_H\}$ with the interpretation perform (q_H) and not perform (q_L). In the case of continuous performance choice, think of q as the quantity or quality of a good to be exchanged or of the speed of delivery. Edlin and Reichelstein (1996) deal with continuous performance choice whereas Shavell (1980) examines binary choice. The present setting allows for both versions.

The social surplus amounts to $W(r, \theta, q)$. If it is party A who obtains private information then social surplus is assumed to be of structure $W(r, \theta, q) = V(r, \theta, q) - C(q) - r$ where $V(r, \theta, q)$ denotes A's utility or profit function and $C(q)$ party B's cost function. Similarly, if it is party B who obtains private information then the assumed structure of social surplus is $W(r, \theta, q) = V(r, q) - C(\theta, q) - r$. In either case, at the investment stage, the effect of reliance investments on social surplus is uncertain.

As a reference point, the first best solution is constructed by backwards induction. The socially best response

$$q^+(r, \theta) \in \arg\max_{q \in Q} W(r, \theta, q)$$

maximizes social surplus at the performance stage where reliance investments and the move of nature are given. Efficient reliance investments

$$r^* \in \arg\max_{r \in R} E[W(r, \theta, q^+(r, \theta))]$$

maximize the ex ante expected social surplus. Notice, here and elsewhere in the paper, the expectation operator is taken with respect to the distribution of nature's random move. Efficient performance

$$q^*(\theta) = q^+(r^*, \theta)$$

is the socially best response to efficient reliance investments. It then follows that

$$r^* \in \arg\max_{r \in R} E[W(r, \theta, q^*(\theta))]$$

must also hold. The following assumptions will be imposed.

Assumptions

(a) If $\theta < \theta'$ then the difference $W(r, \theta', q) - W(r, \theta, q)$ is strict monotonically increasing as a function of q.

(b) If $q < q'$ then the difference $W(r, \theta, q') - W(r, \theta, q)$ is monotonically increasing as a function of r.

(c) If $q < q'$ then $V(\cdot, q) < V(\cdot, q')$.

Notice, in a differentiable setting, (a) would hold if the second derivative $W_{q\theta} > 0$ is positive. This condition is well-known from mechanism design as the single-crossing property. Similarly, (b) would hold, if the second derivative $W_{qr} > 0$ is positive, which means, that, net of investment costs, the marginal social product is an increasing function of investments. Assumption (c) requires utility or profit of party A net of investment costs to be strict monotonically increasing as a function of performance choice.[1]

[1] While some readers may feel more familiar with the differentiable version of the above assumptions, to avoid mathematical subtleties of mechanism design and to treat binary and continuous performance choice in an unified framework, I prefer the version that avoids calculus.

The following two auxiliary results are established for later reference. Under the single-crossing property, the socially best response is a monotonically increasing function of private information. Moreover, there exist constant performance decisions such that the ex ante optimal reliance investments are lower and higher, respectively, as compared to efficient investments.

Lemma 1 *Suppose assumption (a) is met. If $\theta < \theta'$ then $q^+(r,\theta) \leq q(r,\theta')$.*

Notice, in a differentiable setting where the socially best response is an interior solution, the socially best response will be even strict monotonically increasing as a function of private information. In particular, ex post efficient performance choice will typically be state-contingent.

Lemma 2 *Suppose assumption (b) is met. Then, for $i = L, H$, there exists*

$$r_i \in \arg\max_{r \in R} E[W(r,\theta,q_i)]$$

such that $r_L \leq r^* \leq r_H$.

Notice, in a differentiable setting with continuous performance choice, it follows from Lemma 2 that an intermediate performance decision $q^{oo} \in Q$, $q_L < q^{oo} < q_H$, exists such that

$$r^* \in \arg\max_{r \in R} E[W(r,\theta,q^{oo}]$$

holds. Moreover, it follows from the assumed structure of social surplus that

$$\arg\max_{r \in R} E[W(r,\theta,q^{oo})] = \arg\max_{r \in R} E[V(r,\theta,q^{oo})] - r$$

must hold if it is party A who obtains private information whereas

$$\arg\max_{r \in R} E[W(r,\theta,q^{oo})] = \arg\max_{r \in R} V(r,q^{oo}) - r \tag{1}$$

must hold if it is party B who obtains private information.

Proof of Lemma 1.

Take any performance decision $q > q^+(r,\theta')$. Then, by assumption (a),

$$W(r,\theta',q^+(r,\theta')) - W(r,\theta,q^+(r,\theta')) < W(r,\theta',q) - W(r,\theta,q)$$

and, hence,

$$\begin{aligned} W(r,\theta,q) &< W(r,\theta,q^+(r,\theta')) - \Big[W(r,\theta',q^+(r,\theta')) - W(r,\theta',q)\Big] \leq \\ &\leq W(r,\theta,q^+(r,\theta')). \end{aligned}$$

It follows that no performance decision in the range above $q^+(r, \theta')$ maximizes $W(r, \theta, q)$ and, hence, Lemma 1 is established. ■

Proof of Lemma 2.

Take any reliance investment $r > r^*$. It then follows from assumption (b) that

$$W(r^*, \theta, q^*(\theta)) - W(r^*, \theta, q_L) \leq W(r, \theta, q^*(\theta)) - W(r, \theta, q_L)$$

and, hence, that

$$\begin{aligned} E\left[W(r, \theta, q_L)\right] &\leq E\left[W(r^*, \theta, q_L)\right] - E\left[W(r^*, \theta, q^*(\theta)) - W(r, \theta, q^*(\theta))\right] \\ &\leq E\left[W(r^*, \theta, q_L)\right] \end{aligned}$$

must hold. Therefore, $E\left[W(r, \theta, q_L)\right]$ attains a maximum in the range $r \leq r^*$ and the first claim of Lemma 2 is established. The second claim of Lemma 2 can be established similarly. ■

Observe, if the difference in assumption (b) is strictly monotonically increasing in r and if efficient performance is inner (i.e. $q^*(\theta) \in (q_L, q_H)$) with positive probability then the claims of Lemma 2 would hold for any $r_i \in \arg\max_{r \in R} E[W(r, \theta, q_i)]$.

3 Mechanisms reflecting expectation damages

This section presents the main results of the paper. Since private information is involved it may be difficult for courts to award the correct amount of damages. To cope with such problems of hidden information, parties may take resort to sophisticated revelation mechanisms. In fact, the general setting as introduced in the previous section would allow implementing the first best solution with a mechanism of the Clarke-Groves type. Yet, transfer payments under efficient revelation mechanisms turn out to differ from correct expectation damages significantly.

Therefore, in the following, rather provisions are examined that would allow awarding correct expectation damages even under asymmetric information. More precisely, I shall investigate the class of mechanisms that are reflecting expectation damages along the equilibrium path correctly. Similar to Shavell (1980) and Edlin and Reichelstein (1996), the initial contract

$[q^o, T^o]$ specifies party B's constant performance choice $q^o \in Q$, in consideration of which party A must pay T^o to B. Four cases will be distinguished according to which party obtains private information and which party is considering to breach the contract.

3.1 Case AB

In case AB it is party A who obtains private information but party B who considers to breach. By deciding $q \neq q^o$, party B is neglecting his obligation and, in principle at least, owes expectation damages in the amount of

$$D(r, \theta, q) = \max[V(r, \theta, q^o) - V(r, \theta, q), 0] \tag{2}$$

to party A. If party A were awarded such damages then she would be at least as well off as if B had met his obligation. More precisely, if $V(r, \theta, q^o) - V(r, \theta, q) \geq 0$ then she would be exactly as well off, well in line with expectation damages, whereas, if $V(r, \theta, q^o) - V(r, \theta, q) < 0$ she even enjoys a windfall gain from B's neglecting his obligation. Following common legal practice, it is assumed that A may keep such windfall gains for free. Yet, as θ remains private information of the buyer, courts may not be able to award state-contingent damages $D(r, \theta, q)$ correctly.

To cope with hidden information, imagine that the informed party A is required to communicate a message m out of a set of alternative messages M. Party A must send her message after she has obtained private information $\theta \in \Theta$ but before performance choice $q \in Q$ is due. The message is known to affect the net payment, which A owes to B and which may further depend on party A's actual reliance investments as well as on B's performance decision. This *transfer schedule* is denoted by $T(r, m, q)$ if reliance investments can be verified in front of courts and by $T(m, q)$ if investments are hidden action.

Such a transfer schedule provides incentives that can be calculated by backwards induction. At the performance stage, where actual reliance investments and the message are known, party B will choose his performance decision according to

$$q_B(r, m) \in \arg\max_{q \in Q} T(r, m, q) - C(q).$$

Anticipating B's performance choice and having obtained private information

θ, party A sends message

$$m_A(r,\theta) \in \arg\max_{m \in M} V(r,\theta,q_B(r,m)) - T(r,m,q_B(r,m)).$$

Therefore, along the equilibrium path, performance choice as a function of reliance investments and private information

$$\eta(r,\theta) = q_B(r, m_A(r,\theta))$$

will result and the net transfer will amount to

$$\tau(r,\theta) = T(r, m_A(r,\theta), \eta(r,\theta))$$

such that the informed party A's net payoff will be

$$I(r,\theta) = V(r,\theta,\eta(r,\theta)) - \tau(r,\theta) - r.$$

This state-contingent payoff (and the underlying transfer schedule) is said to reflect expectation damages correctly if

$$I(r,\theta) = \max\left[V(r,\theta,q^o), V(r,\theta,\eta(r,\theta))\right] - T^o - r$$

holds for all information parameters θ. In fact, buyer A would then be awarded correct expectation damages, at least along the equilibrium path.

Reflecting correct expectation damages comes at a cost, as the following proposition shows. While it may still be feasible to provide efficient reliance incentives, in the light of Lema 1, the solution will typically fail to be ex post efficient.

Proposition 1 *Suppose assumptions (a) and (c) are met. If the transfer schedule $T(r,m,q)$ is reflecting correct expectation damages along the equilibrium path then party B will meet his obligation, i.e. $\eta(r,\theta) \equiv q^o$ even if it were efficient to breach. Moreover, party A has the incentive for reliance investments*

$$r_A \in \arg\max_{r \in R} E[V(r,\theta,q^o)] - r,$$

which are efficient under a contract stipulating $q^o = q^{oo}$ (if q^{oo} exists).

Recall from the previous section that, under suitable differentiability, q^{oo} will exist if performance choice is of continuous type. If, however, performance choice is binary then underinvestment and overinvestment would result from a contract specifying $q^o = q_L$ and $q^o = q_H$, respectively, as follows from Lemma 2.

The proof of the above proposition combines the incentive constraints that result from rational play with A's net payoff if correct legal damages were awarded. Details are provided in the appendix.

The next proposition shows a transfer schedule $T^*(m, q)$ to exist that leads to the first best solution even if reliance investments are hidden action. However, as follows from Proposition 1, the efficient transfer schedule $T^*(m, q)$ cannot reflect expectation damages correctly.

Proposition 2 *A message space M and a transfer schedule $T^*(m, q)$ exists that lead, in equilibrium, to the first best solution.*

The proof of Proposition 2 will be given at the end of the next subsection. The efficient price schedule will be based on the direct, incentive-compatible mechanism that follows from the analysis of case AA as a by-product.

To conclude this subsection, let me briefly compare the present findings that were derived under asymmetric information with those that would hold if the information parameter could be verified and, hence, correct damages (2) could be administered by courts. Suppose, assumptions (b) and (c) are met. If the contract specifies high performance $q^o = q_H$ then party B has the incentive to take the socially best response as his performance choice. Ex post efficiency would be ensured. Yet, party A's net payoff would then amount to $V(r, \theta, q_H) - T^o - r$ such that A is facing excessive incentives for reliance investments as follows from Lemma 2 and (1).

If, at the other extreme, the contract specifies low performance $q^o = q_L$ then party B would stick to the contract. If such an outcome is anticipated under complete information, the parties would be able to renegotiate to a performance choice that is ex post efficient. Since party A would obtain only a fraction of, say, 50 percent of the renegotiation surplus, A's incentives for reliance investments would be suboptimal.

In Shavell's setting of binary performance choice, the high performance contract is the only one available (the low performance contract would be equivalent to no contract) and would provide excessive incentives for reliance investments indeed. In the Edlin and Reichelstein setting of continuous performance choice, however, there exist intermediate levels of performance choice that would provide efficient reliance incentives. In this sense, Shavell's overreliance result is due to binary performance choice and not to a basic defect of expectation damages.[2]

3.2 Case AA

In case AA, it is party A who obtains private information and who considers to breach. Since party A is thought of as a buyer, breach would probably be of the anticipatory type. After having obtained her private information, party A may announce that she is only going to accept delivery $q \neq q^o$. Since, at the time of announcement, B has not yet started production, to mitigate damages, B should deliver q but claim damages to compensate for profits lost from A's announcement. In any case, B must grant a reduction of payments in the amount of B's cost savings[3] $C(q^o) - C(q)$ such that B's final payoff amounts to

$$T^o - [C(q^o) - C(q)] - C(q) = T^o - C(q^o).$$

Party B is as well off as in the absence of anticipatory breach. Notice, in case AA where B does not obtain private information, this price reduction can easily be administered by courts.

If party A announces anticipatory breach $q \neq q^o$, her net payoff amounts to

$$\Phi(r, \theta, q) = V(r, \theta, q) - T^o + [C(q^o) - C(q)] - r = W(r, \theta, q) + C(q^o) - T^o$$

and is, up to terms independent of actual performance, equal to social surplus. Hence, party A's performance choice in equilibrium solves

$$q_A(r, \theta) \in \arg\max_{q \in Q} \Phi(r, \theta, q) = \arg\max_{q \in Q} W(r, \theta, q)$$

and coincides with the socially best response. Anticipating such choice at the investment stage, A would have the incentive for efficient reliance investments, as

$$r^* \in \arg\max_{r \in R} E\left[\Phi(r, \theta, q^+(r, \theta))\right] = \arg\max_{r \in R} E\left[W(r, \theta, q^+(r, \theta))\right]$$

[2] For details, the reader is referred to Edlin and Reichelstein (1996) and, even closer in line with the present setting, to Schweizer (2005).

[3] Notice, for ease of exposition, windfall gains arising from deviations are ruled out in the treatment of case AA.

would hold. In case AA, the first best solution can be implemented by just requiring the producer to mitigate damages resulting from anticipatory breach.

Such practice gives rise to a direct and efficient mechanism, which is incentive compatible and which works even if reliance investments are hidden action. Under this mechanism, the informed party A is directly asked to reveal his private information. Imagine that the true information is θ but A reports $\theta' \in \Theta$ which may be false. The direct mechanism then imposes the performance choice $\eta(\theta') = q^*(\theta')$ that would be the socially best response if A had invested efficiently and reported truthfully. Moreover, party A is required to pay $\tau(\theta') = C(q^*(\theta'))$ to party B. This direct mechanism is of the Clarke-Groves type. It provides the following incentives.

Suppose party A makes reliance investments r and plans to reveal information $\theta' = t(r, \theta)$ if she later obtains private information θ. At the investment stage, her expected payoff under the direct mechanism amounts to

$$E[V(r, \theta, q^*(\theta')) - C(q^*(\theta'))] - r \leq E[V(r^*, \theta, q^*(\theta)) - C(q^*(\theta))] - r^*$$

and cannot be higher than if A had invested efficiently and revealed truthfully. In this sense, the above direct mechanism is incentive compatible, assigns the social surplus to A and, as a consequence, provides efficient investment incentives to A. To gain the consent of B, A would have to make an up-front payment that, however, would not affect incentives. In fact, with up-front payment $T^o - C(q^o)$, the direct mechanism would lead to exactly the same solution as if the producer must grant a price reduction for anticipatory breach in the amount of cost savings.

This direct mechanism may also serve as a basis for the efficient transfer schedule $T^*(m, q)$, whose existence is claimed by Proposition 2. In fact, take as message space $M = \Theta$. If A has announced $m = \theta' \in M = \Theta$ and B takes performance choice $q \in Q$ then the payment schedule

$$T^*(\theta', q) = T^o + C(q) - [V(r^*, \theta', q) - V(r^*, \theta', q^*(\theta'))]^2$$

provides efficient incentives. Indeed, since B is compensated for actual production costs, he has the incentive to minimize the square term by deciding $q = q^*(\theta')$ at the performance stage. Party A's net payoff then amounts to

$$V(r, \theta, q^*(\theta')) - T^*(\theta', q) - r = V(r, \theta, q^*(\theta')) - T^o - C(q^*(\theta')) - r$$

and, obviously, provides incentives to report truthfully and to invest efficiently. The only difference with the direct mechanism arises from the fact that, under the efficient transfer schedule, the breach decision is inalienably assigned to party B whereas, under the direct mechanism, it is exogenously imposed by the operator of the mechanism. In equilibrium, however, the efficient price schedule and the direct mechanism are leading to the same outcome.[4] Proposition 2 is established.

3.3 Case BA

In case BA it is party B who obtains private information but it is party A who considers to breach. Again, breach is assumed to be of the anticipatory type. If A announces in time to accept delivery $q \neq q^o$ only, in principle, B must grant a reduction of payments in the amount of his cost savings $C(\theta, q^o) - C(\theta, q)$. Due to hidden information, however, courts may no longer be able to administer such a price reduction correctly.

As in case BA, to cope with hidden information, imagine that the informed party B is required to communicate a message m out of a set of alternative messages M. Party B must send his message after he has obtained private information $\theta \in \Theta$ but before the performance decision $q \in Q$ is due. The message is known to affect the net payment, which A owes to B and which may also depend on A's performance decision. The transfer schedule is denoted by $T(r, m, q)$ if reliance investments can be verified in front of courts and by $T(m, q)$ if investments are hidden action.

Case BA can now be handled along the same line as case AB. It turns out again that transfer schedules reflecting the price reduction correctly will lead party A to meeting her obligation even if breach were efficient. Moreover, under continuous performance choice, it may again be feasible to provide efficient incentives for reliance investments. Nonetheless, due to ex post inefficiencies, the first best will typically not be reached if the transfer schedule reflects the price reduction correctly.

By the appropriate revelation mechanism, however, the first best solution could easily be implemented as follows from adapting Proposition 2 to case BA. Details are left to the reader.

[4] For the general version of the taxation principle that is at stake, see Guesnerie (1995).

3.4 Case BB

In case BB, it is party B who obtains private information and who considers to breach. If B delivers $q \neq q^o$, then B owes damages

$$D(r, q) = \max\left[V(r, q^o) - V(r, q), 0\right]$$

to A. Since A does not obtain private information, such damages can be verified in front of courts provided that reliance investments are observable. B's net payoff then amounts to

$$\Psi(r, \theta, q) = T^o - C(\theta, q) - \max\left[V(r, q^o) - V(r, q), 0\right]$$

and, hence, B takes performance decision

$$q_B(r, \theta) \in \arg\max_{q \in Q} \Psi(r, \theta, q).$$

If the contract specifies a delivery choice q^o such that, under the socially best response, windfall gains will never arise then B's net payoff

$$\Psi(r, \theta, q) = T^o + V(r, q) - C(\theta, q) - V(r, q^o)$$

would coincide, up to terms that do not depend on performance choice, with social surplus. As a consequence, party B would have the incentive to choose the socially best response.

In contrast to case AA, however, performance decisions q^o that avoid windfall gains may be at odds with efficient reliance incentives. In fact, A's payoff under the above scheme amounts to

$$V(r, q^o) - T^o - r$$

such that reliance incentives may be excessive if the contract specifies a performance choice that avoids windfall gains. Notice, a similar conflict between ex post efficiency and efficient reliance incentives did not arise in case AA where it was the investing party A who obtained private information and considered to breach.

4 Legal practice facing hidden information

Legal practice facing problems of asymmetric information either takes resort to objectifying damage measures or allows to opt for reliance damages. The present section examines such practice. The issue of verifiability arises in the two cases AB and BA where the uninformed party considers to breach such that expectation damages must be based on the informed party's profit or utility function. This function depends on the private information of that party and, hence, cannot be verified in front of courts.

In the setting of case AB, objectifying expectation damages would mean to fictitiously postulate an objective type $\theta^o \in \Theta$, based on which expectation damages amounting to

$$D^o(r,q) = \max\left[V(r,\theta^o,q^o) - V(r,\theta^o,q), 0\right]$$

would be awarded to party A. Of course, A's private information may actually differ from the objective type.

Objectified expectation damages are leading to an effective transfer schedule

$$T(r,q) = T^o - D^o(r,q)$$

that does not depend on any message from the informed party. Such schedules must necessarily lead to an outcome that fails to be state-contingent. In fact, party B would choose performance decision

$$q_B(r) \in \arg\max_{q\in Q} T(r,q) - C(q),$$

independent of the actual state θ. Anticipating B's performance choice, party A makes reliance investments

$$r_A \in \arg\max_{r\in R} E\left[V(r,\theta,q_B(r))\right] - T(r,q_B(r) - r.$$

While it may still be feasible to generate efficient reliance incentives, the solution typically fails to be ex post efficient because performance choice is constant, no matter which move of nature has materialized.

Some legal systems including the German[5] one allow the promisee to opt for recovery of reliance expenditures instead of expectation damages. Allegedly, the option was introduced to accommodate promisees that have difficulties to verify their true expectation damages in front of courts. Yet, since reliance damages are also leading to an effective transfer schedule $T(r,q)$ that does not depend on nature's move, ex post efficiency would neither be restored.

[5] See § 284 BGB (German Civil Code).

To sum up, practical solutions of awarding damages under asymmetric information seem defective on two accounts. First, they fail to assess expectation damages correctly. If granted such damages, the promisee need not be equally well off as if the promisor had met his obligation. Second, the outcome will be constant over states and, as such, will typically fail to be ex post efficient.

5 Conclusion

For a reliance setting with hidden information, the present paper has established that a trade-off exists between providing efficient incentives and assessing expectation damages correctly. Provisions that would allow to assess expectation damages correctly prevent efficient breach of contract whereas revelation mechanisms leading to the first best solution would fail to assess damages correctly.

Legal practice seems to be relying on two remedies. First, damages may be awarded that are of an objective type. This approach is shown to be defective as it neither assesses expectation damages correctly nor does it provide incentives for efficient breach. Second, the party suffering from breach and failing to verify her expectation damages in front of courts may opt for recovery of reliance damages instead. The outcome, again, cannot be state-contingent and, hence, ex post efficiency will not be achieved.

Since revelation mechanisms were available that would generate the first best solution, at least for the present setting, justifying such legal practice from the economic perspective remains a challenging task for future research.

6 References

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7 Appendix

In this appendix, the proof of Proposition 1 is presented. The proposition deals with case AB where it is party A who obtains private information but party B who has the option to breach. Suppose the transfer schedule $T(r, m, q)$ gives rise, in equilibrium, to the performance choice $\eta(r, \theta)$ and the transfer payment $\tau(r, \theta)$ as explained in the subsection on the case AB. The informed party's equilibrium payoff then amounts to

$$I(r, \theta) = V(r, \theta, \eta(r, \theta)) - \tau(r, \theta) - r.$$

The following lemma is well-known from mechanism design: The incentive constraints are met and equilibrium performance is a monotonically increasing function of private information.

Lemma 3 *Suppose assumption (a) is met. Then, for all $\theta, \theta' \in \Theta$, it holds that*

$$\begin{aligned} V(r, \theta', \eta(r, \theta)) - V(r, \theta, \eta(r, \theta)) &\leq I(r, \theta') - I(r, \theta) \leq \\ &\leq V(r, \theta', \eta(r, \theta')) - V(r, \theta, \eta(r, \theta')). \end{aligned}$$

Moreover, if $\theta < \theta'$ then $\eta(r, \theta) \leq \eta(r, \theta')$.

Proof. Since the message sent maximizes the informed party A's payoff it follows that

$$\begin{aligned} I(r, \theta) &= V(r, \theta, q_B(r, m_A(r, \theta)) - T(r, m_A(r, \theta), q_B(r, m_A(r, \theta))) - r \\ &= V(r, \theta, \eta(r, \theta)) - \tau(r, \theta) - r \\ &\geq V(r, \theta, q_B(r, m)) - T(r, m_A(r, \theta, q_B(r, m))) - r \end{aligned}$$

must hold for any other message $m \in M$. In particular, this must be true for the message $m = m_A(r, \theta')$ that A would have sent in equilibrium after having obtained private information θ'. It follows that

$$\begin{aligned} I(r,\theta) &\geq V(r,\theta,q_B(r,m_A(r,\theta'))) - T(r,m_A(r,\theta'),q_B(r,m_A(r,\theta'))) - r = \\ &\quad V(r,\theta,\eta(r,\theta')) - \tau(r,\theta') - r, \end{aligned}$$

from which the second inequality of the lemma follows easily.

The first inequality follows from a similar argument for the situation where the true information is θ' but the informed party has revealed θ instead. Moreover, the monotonicity of performance choice as a function of private information follows from the single-crossing property (assumption (a)) and the two inequalities that have just been established. ■

Proof of Proposition 1. Let

$$\theta^o = \sup\{\theta \in \Theta : \eta(r,\theta) \leq q^o\}$$

denote the supremum of all moves of nature, under which the performance choice does not exceed the quantity specified in the contract. It then follows from the monotonicity established in Lemma 3 that, for $\theta < \theta^o$, $\eta(r,\theta) \leq q^o$. Moreover, if $\theta' < \theta'' < \theta^o$, then

$$\begin{aligned} V(r,\theta'',\eta(r,\theta')) - V(r,\theta',\eta(r,\theta')) &\leq V(r,\theta'',q^o) - V(r,\theta',q^o) \\ &\leq V(r,\theta'',\eta(r,\theta'')) - V(r,\theta',\eta(r,\theta'')) \end{aligned}$$

because, in this range of information parameters, A's payoff is the same as if B had met his obligation. It then follows from the single crossing property that $\eta(r,\theta') \leq q^o \leq \eta(r,\theta'')$ must hold for any two information parameters $\theta' < \theta'' < \theta^o$.

For any $\theta < \theta^o$, consider two information parameters $\theta' < \theta < \theta'' < \theta^o$ from this range and apply the above findings pairwise. In particular, $\eta(r,\theta') \leq q^o \leq \eta(r,\theta)$ and $\eta(r,\theta) \leq q^o \leq \eta(r,\theta'')$ must both hold, from which it follows that $\eta(r,\theta) = q^o$ must be constant over the range (θ_L, θ^o).

Next, consider information parameters from the range $\theta^o < \theta < \theta_H$. For such parameters, $q^o < \eta(r,\theta)$ must hold as follows from the monotonicity of the equilibrium performance choice. Moreover, in this range, the net payoff of party A amounts to

$$I(r,\theta) = V(r,\theta,\eta(r,\theta)) - r - T^o,$$

which, combined with the incentive constraints from Lemma 3, is leading to

$$\begin{aligned} V(r,\theta'',\eta(r,\theta')) - V(r,\theta',\eta(r,\theta')) &\leq V(r,\theta'',\eta(r,\theta'')) - V(r,\theta',\eta(r,\theta')) \\ &\leq V(r,\theta'',\eta(r,\theta'')) - V(r,\theta',\eta(r,\theta'')) \end{aligned}$$

for any two information parameters in the range $\theta^o < \theta' < \theta'' < \theta_H$ and, hence, to

$$V(r,\theta'',\eta(r,\theta')) \leq V(r,\theta'',\eta(r,\theta''))$$

and

$$V(r,\theta',\eta(r,\theta'')) \leq V(r,\theta',\eta(r,\theta')).$$

It then follows from the monotonicity of utility as a function of performance choice (assumption (c)), that equilibrium performance choice

$$\eta(r,\theta') = \eta(r,\theta'') = q'$$

will be constant in this range as well.

Consider, finally, an information parameter $\theta < \theta^o < \theta'$ from each range. It then follows from the monotonicity of performance choice that

$$\eta(r,\theta) = q^o \leq \eta(r,\theta') = q'$$

and from the incentive constraints that

$$\begin{aligned} I(r,\theta') - I(r,\theta) &= V(r,\theta',q') - V(r,\theta,q^o) \leq \\ V(r,\theta',\eta(r,\theta')) - V(r,\theta,\eta(r,\theta')) &= V(r,\theta',q') - V(r,\theta,q') \end{aligned}$$

and, hence, that $V(r,\theta,q') \leq V(r,\theta,q^o)$ must hold. By making use of the monotonicity of utility as a function of performance choice, it follows that $q^o = q'$ must hold. Proposition 1 is established. ■