Law and Economics

Contract Law II

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Efficient Breach

- Consider two parties that contract.
- When is it *efficient* to breach an enforceable contract?
  - Unforeseen changes can render the contract inefficient.

- Ideal contract law should generate incentives for parties to breach contracts only when it is efficient to do so.
  - We will focus on the design of *breach remedies*.

Reasons for Efficient Breach

- Consider a buyer and a seller that contract over the production and delivery of some good.

- Reasons for efficient breach:
  - Realized high cost of promise keeping.
    (Think of the hold-up model from before.)
  - Realized low value.
  - Third party that values more.
  - Third party that can produce cheaper.

The Efficient Breach Model

- In this model, we focus on uncertainty about costs.
  - Value for Buyer V (deterministic).
  - Cost for Seller C (random variable).

- Timing:
  - Parties contract: decide a price P.
  - **Reliance**: Buyer makes investment R that is not *salvageable*.
  - C is realized and publicly observable.
  - Seller decides to *perform* ($a = 1$) or *breach* ($a = 0$).

- The non-salvageable investment R is what makes contract useful.

Goal

- Let ψ be the damages that the seller must pay in the event of breach.

$$\begin{aligned} \text{Seller:} \quad & a(P - C) - (1 - a)\psi \\ \text{Buyer:} \quad & a(V - P) + (1 - a)\psi - R \\ \text{Society:} \quad & a(V - C) - R \end{aligned}$$

- **Goal**: determine a breach remedy function ψ that induces the seller to breach efficiently.
  - Efficient to breach when $C > V$.
  - What can ψ depend on? C, P (V and R are constants).

Seller's Decision

- The seller will choose to breach $(a = 0)$ when:

$$P - C < -\psi \qquad \Rightarrow \qquad \underbrace{C}_{\text{cost of performing}} > \underbrace{P + \psi}_{\text{cost of breaching}}$$

Trivial Implementation

- The seller is *"killed"* if she breaches inefficiently.

$$\psi = \begin{cases} \infty & C < V \\ 0 & C \geq V. \end{cases}$$

- Efficiency is achieved!
- Issue: The remedy rule depends on C.
  - Might be unobservable.
  - Seller might inflate costs.

Damages in Practice

- **Expectation damages**: ψ leaves the promisee as well of as if the contract had been performed.

$$\underbrace{V - P - R}_{\text{contract performed}} = \underbrace{\psi - R}_{\text{breach}} \qquad \Rightarrow \qquad \psi^{ED} = V - P$$

- **Reliance damages**: ψ that leaves the promisee as well of as if contract was never made.

$$\underbrace{\psi - R}_{\text{breach}} = \underbrace{0}_{\text{no contract}} \qquad \Rightarrow \qquad \psi^{R} = R$$

No Damages

$\psi^{ND} = 0$

- Seller chooses to breach ($a = 0$) iff

$$C > P + \psi^{ND} \qquad \Rightarrow \qquad C > P$$

- Efficiency is, in general, not achieved.
  - $P \leq V$. Why?
  - Whenever breach is efficient, the seller will breach.
  - Seller breaches inefficiently often.

Expectation Damages

$\psi^{ED} = V - P$

- Seller chooses breach ($a = 0$) iff

$$C > P + \psi^{ED} \qquad \Rightarrow \qquad C > P + V - P = V$$

- Efficiency is achieved!
- This remedy rule does not depend on C.

Reliance Damages

$\psi^R = R$

- Seller chooses breach ($a = 0$) iff

$$C > P + \psi^R \qquad \Rightarrow \qquad C > P + R$$

- Efficiency is, in general, not achieved.
- $P + R \leq V$. Why?
- Whenever breach is efficient, the seller will breach.
- The Seller breaches inefficiently often (although less than with no damages).
- Remedy rule does not depend on C or V.

Incentives for Efficient Reliance

- Suppose now that value V depends on the *level* of Reliance.
  - Value for Buyer $V(R)$ (deterministic concave function).
  - Cost for Seller C (random variable cdf F).

- Timing:
  - Parties contract: agree on a price P.
  - **Reliance**: Buyer makes investment R that is not *salvageable*.
  - C is realized and publicly observable.
  - Seller decides if she performs ($a = 1$) or breaches ($a = 0$).

Buyer's Decision

- If performance was certain:

$$\max_{R} \quad V(R) - P - R$$

  - $V'(R) = 1$.

- When perfomance is uncertain (Probability p), investment is lower.

$$\max_{R} \quad p \cdot [V(R) - P] - R$$

- $V'(R) = 1/p$.

Efficient Reliance

- Suppose performance is efficient. Then efficient reliance solves:

$$\max_{R} \quad E[\max\{V(R) - C, 0\}] - R$$

  - Solution R^*.

- Would Expectation Damages implement R^*?

(Unlimited) Expectation Damages

$$\psi^{ED} = V(R) - P$$

- ED generates efficient breach. Why?
- Thus, Buyer's decision:

$$\max_R \quad F(V(R)) \cdot [V(R) - P] + (1 - F(V(R))) \cdot \underbrace{\psi^{ED}}_{V(R)-P} - R$$

- Solution: $\hat{R}$.
- There is over-investment in reliance.

Limited Expectation Damages

$\psi^{LED} = V(R^*) - P$

- Seller breaches if $C > P + \psi = P + V(R^*) - P = V(R^*)$.
- Thus $p = F(V(R^*))$.
- Buyer's decision:

$$\max_R \quad F(V(R^*)) \cdot [V(R) - P] + (1 - F(V(R^*)))[\underbrace{\psi^{LED}}_{V(R^*)-P}] - R$$

- It achieves efficiency!
  - Rule does not depend on R.
  - Rule depends on R^*, so implementation requires knowing something about distribution of costs.

Overview

Hard Information Model

- Model
  - Players: one **S**eller and multiple potential buyers.
  - Quality of the good $\theta \sim U[0, 10]$.
  - $E[\theta] = 5$.
  - **S** knows the quality of the good.
- Timing
  - Seller *discloses information* about the good.
  - Buyers observe disclosed information and simultaneously offer a price (Bertrand competition). Let p be the highest offer.
  - Final payoffs are:

$$\begin{aligned} \text{Buyer}: &\quad \theta - p \\ \text{Seller}: &\quad p \end{aligned}$$

Full Disclosure Theorem

- **Disclosure technology**: Report $r \in \{\emptyset, \theta\}$
  - This is *hard information*: If $r = 4$ then the buyers *know* that $\theta = 4$.
  - With $r = \emptyset$ not so clear.

- **Equilibrium price**: $p(r) = E[\theta | r]$

$$p(r) = r \qquad \text{for } r \neq \emptyset.$$

  - What about $p(\emptyset)$?

Full Disclosure Theorem

Claim

In equilibrium, $p(\emptyset) = 0$.

- Suppose that $p(\emptyset) > 0$. Then
  - All $\theta > p(\emptyset)$ disclose.
  - All $\theta < p(\emptyset)$ do not disclose.
- But then,

$$E[\theta|\emptyset] < p(\emptyset)$$

- This cannot be an equilibrium. Thus, it must be that $p(\emptyset) = 0$.

Intuition (discrete support)

- - Start from $\theta = 10$. He prefers to disclose since $E[\theta | r = \emptyset] \leq 10$.
  - So if a seller does not disclose, his quality must be at most 9.
  - Then $E[\theta | r = \emptyset] \leq 9$.
  - Consider $\theta = 9$. He prefers to disclose. and so on...

- - This is known as *unraveling*.
  - There is full disclosure of the private information.
  - ($\theta = 0$ is indifferent between revealing or not, but he is identified independently of that.)

Disclosure Laws

- Since there is full disclosure, there is no need for disclosure laws!

- Two variants that lead to imperfect disclosure:
  - Uninformed sellers.
  - Disclosure costs.

Uninformed Sellers

- In the benchmark model, **S** knows the quality of the good.

- Same model as before, but with one change:
  - With probability γ, the seller is uninformed.
    - This is independent of product quality.
    - Uninformed sellers can only send the message $\emptyset$.

Uninformed Sellers

- We construct an equilibrium with price $p(\emptyset) = \bar{p}$.
  - Who would disclose? Informed seller with $\theta > \bar{p}$.
  - If **S** doesn't disclose it might be for two reasons:
    - **S** is uninformed.
    - **S** is informed, but $\theta \leq \bar{p}$.
  - Let q be the probability of uninformed given $r = \emptyset$. Note that this is not necessarily equal to γ!

$$E[\theta | r = \emptyset] = q \cdot E[\theta] + (1 - q) \cdot E[\theta | \theta \leq \bar{p}]$$

Uninformed Sellers

- Computing q using Bayes' rule:

$$q = \Pr(\text{uninformed}|r = \emptyset) = \frac{\Pr(r = \emptyset|\text{uninformed}) \cdot \Pr(\textit{uninformed})}{\Pr(r = \emptyset)}$$
$$= \frac{1 \cdot \gamma}{\gamma + (1-\gamma) \cdot \frac{\bar{p}}{10}}$$

- Buyers' zero-profit condition: $\bar{p} = E[\theta|r = \emptyset]$.

$$\bar{p} = \frac{\gamma}{\gamma + (1-\gamma) \cdot \frac{\bar{p}}{10}} \cdot 5 + \frac{(1-\gamma) \cdot \frac{\bar{p}}{10}}{\gamma + (1-\gamma) \cdot \frac{\bar{p}}{10}} \cdot \frac{\bar{p}}{2}$$

- **Solution**: $\bar{p} = \frac{10 \cdot \sqrt{\gamma}}{1+\sqrt{\gamma}}$.

Uninformed Sellers

- There is imperfect disclosure in equilibrium:
  - **S** hides the quality if she knows it is below $\bar{p}$.
- There is scope for requiring mandatory disclosure.
  - Sellers are mandated to disclose quality before they sell.

Effect of Mandatory Disclosure

- **Buyers**: unaffected (in expectation).
- **Sellers**:
  - Uninformed types are better off.
  - Informed types above $\bar{\theta}$ are unaffected.
  - Informed types below $\bar{\theta}$ are worse off.
  - Overall, sellers are unaffected in expectation.
- **Reason**: the object is always sold, and this allocation is efficient.

Uninformed sellers with inefficiencies

- Same model as before (with uniformed sellers) but
  - The seller values the good 2, independently of the quality.

- **Efficient allocation**:
  - Good should be sold if $\theta > 2$.
  - **S** should keep the good if $\theta < 2$.

Uninformed sellers with inefficiencies

- Suppose $\gamma > 1/16$, so that

$$\bar{p} = \frac{10 \cdot \sqrt{\gamma}}{1 + \sqrt{\gamma}} > 2$$

- Then it is an equilibrium:
  - **S** discloses and sells when informed and sells for θ when $\theta > \bar{p}$.
  - **S** sends the empty message and sells for $\bar{p}$ when $\theta \leq \bar{p}$.
  - **S** sends the empty message and sells for $\bar{p}$ when uninformed.

- This equilibrium is inefficient!
  - Mandatory disclosure leads to better allocation.

Cost of Information

- Before, we assumed that some sellers were informed (exogenously).
- Now we consider a model similar to the benchmark, but with endogenous information acquisition.
  - To obtain quality information, the seller needs to pay a cost $c > 0$.
- Always inefficient to acquire information!
  - Purely wasteful.

Costly Information Acquisition

- Let's consider the equilibrium behavior of sellers under voluntary disclosure.

- **Claim**: When $c < 5$, there is an equilibrium in which all sellers acquire information.
  - This would correspond to $\gamma = 1$.
  - Thus, $p(\emptyset) = 0$.
  - The value of information for a seller is 5!

Mandatory Disclosure

- Suppose we mandate information disclosure, meaning that
  - Informed sellers have to disclose before the transaction.
  - Uninformed sellers don't have to disclose.

- If seller acquires info he <u>has</u> to disclose. He will sell for θ.
- When seller is uninformed, $p(\emptyset) = 5$.
- The private value of information is 0. We recover efficiency.