Efficient Material Breach of Contract[1]

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Introduction

- Legal default rules enforce simple contracts by filling gaps when contracts are incomplete.
- *Remedies for breach of contract*:

  What is to happen when a party's performance does not conform to the contract?
- These remedies are not always exclusive, i.e., parties can sometimes *choose* between different remedies or *cumulate* them.

Non-Exclusive Remedies

1. Contract law allows the buyer to collect monetary compensation for defective delivery
   - predominantly "expectation damages" (to make the buyer whole)
   - in practice, expectation damages are imperfect (i.e., under-compensatory)
2. If the seller's delivery stays below a *minimum performance standard*, then contract law grants the buyer the right to reject the seller's delivery.
   - *substantial performance standard* ("doctrine of material breach"): Buyer's rejection is rightful only when delivery is *sufficiently* defective
   - *strict performance standard* ("perfect tender rule"): Buyer's rejection is rightful for *any* defect.

Questions and Main Results

Q: What is the optimal minimum performance standard?

A: A substantial performance standard helps restore the seller's incentives to avoid defects when enforcement of the contract is otherwise imperfect.

Q: Should the buyer be allowed to collect expectation damages after rightful rejection?

- Brooks-Stremitzer (2011a,b, 2012) in a series of papers argue against such *cumulative concurrence* (rejection with damages beyond restitution) and in favor of *alternative concurrence* (rejection without damages).

A: I find that cumulative concurrence is the better policy when combined with a substantial performance standard.

Model: Principal-Agent Framework

- Seller (Agent)
  - Production costs are normalized to zero
  - Costs $c(e)$ of quality-assurance effort $e \geq 0$
  - Good is delivered with a defect δ
  - Conditional distribution with pdf $f(\delta|e)$ and cdf $F(\delta|e)$ over unit support
  - Higher effort increases the probability of small defects and decreases the probability of large defects:

$$F(\delta|e') \succ_{fosd} F(\delta|e) \quad \text{for } e' < e$$

- Buyer (Principal)
  - Valuation of good with defect δ is $v - \ell(\delta)$; $\ell(0) = 0$ and $\ell(1) = v$.

Effort e is non-verifiable; defect δ is verifiable at zero cost.

Ex Post Efficient Trade

Because costs of production are zero and $v \geq \ell(\delta)$ for all δ, trade is always optimal ex post for any e and δ.

Ex Ante Efficient Effort/Investment

- First-best effort e^* maximizes

$$W(e) = v - \int_0^1 \ell(\delta) f(\delta|e) d\delta - c(e)$$

- First-order condition

$$c_e(e^*) = \int_0^1 \ell'(\delta) F_e(\delta|e^*) d\delta$$

Sequence of Events

$t = 1$	$\theta \in \Theta$	Buyer-seller match θ is realized.
$t = 2$	$\langle p, \mu \rangle$	Parties negotiate a contract.
$t = 3$	$e \geq 0$	Seller exerts effort e at cost $c(e\|\theta)$.
$t = 4$	$\delta \geq 0$	Output with defect δ is observed.
$t = 5$	$\bar{p}$	Parties renegotiate contract.
$t = 6$	A, R	Buyer has enforcement option before court.
$t = 7$		Payoffs are materialized.

Ex Ante Contracting

Two paradigms:

1. Optimal (complete) contracting:
   - For example: the price is a function of the defect
   - For illustrative purposes
2. Simple (incomplete) contracting
   - Here: a fixed price
   - Approach in this paper

Optimal Contracting Approach: Price Schedule

Buyer can offer a contract with price schedule $p(\delta)$:

$$\max_{p(\delta)} \quad v - \int_0^1 \left[\ell(\delta) + p(\delta)\right] f(\delta|e) d\delta$$

$$s.t. \quad \int_0^1 p(\delta) f(\delta|e) d\delta - c(e) \geq 0 \qquad \text{(IR)}$$

$$e \equiv \arg\max_{e'} \int_0^1 p(\delta) f(\delta|e') d\delta - c(e') \qquad \text{(IC)}$$

Price schedule $p(\delta)$ such that $-p'(\delta) = \ell'(\delta)$ for all δ solves this program:

- Seller internalizes the costs social costs of the defect and exerts efficient effort $\rightarrow$(IC)
- Buyer reaps expected gross surplus; an expected payment $\int p(\delta)f(\delta|e^*)d\delta = c(e^*)$ compensates seller for effort costs $\rightarrow$(IR)

- What if complete contracting is not available or too costly (Dye, 1985; Battigalli-Maggi, 2002) or parties deliberately choose simple contracts (Ayres-Gertner, 1989)?
- Literature:
    - Can a legal enforcement regime (as a set of default rules) mimic an optimal complete contract and implement the first-best outcome with incomplete contracts?

This Paper: Incomplete Contracts

(1) Enforcement regime close to reality

- Buyer is (imperfectly) compensated for defective delivery.
- Buyer is granted the right to reject the seller's delivery if it is (sufficiently) defective.

(2) Simple ex ante contract with fixed price p

- Today: $p \leq v$

Part 1: Compensation for Defective Delivery

- If buyer accepts delivery (A), she collects monetary compensation for defect δ
- *Expectation damages*: the buyer is made whole so that

$$\text{compensation} \;=\; \ell(\delta)$$

- Literature: Expectation damages restore a seller's incentives and help implement the first best:

$$e \equiv \arg\max_{e'} \int_0^1 \underbrace{[p - \ell(\delta)]}_{p(\delta)} f(\delta|e') d\delta - c(e')$$

$$-p'(\delta) = \ell'(\delta) \quad \Rightarrow \quad \text{First-best outcome}$$

. . . With Enforcement Imperfections

- Defect δ is verifiable at zero cost, but loss $\ell(\delta)$ can be proven in court with *reasonable certainty* only with probability $\tilde{\alpha} < 1$.
- *Expected* expectation damages are

$$\tilde{\alpha}\ell(\delta) \equiv \ell(\delta) - \alpha(\delta)$$

- Extent of under-compensation is

$$\alpha(\delta) = (1 - \tilde{\alpha})\,\ell(\delta)$$

- Assumptions:
  - $\alpha(\delta) \in [0, v)$ and non-decreasing in δ
  - $\ell(\delta) > \alpha(\delta)$ for all δ and compensation $\ell(\delta) - \alpha(\delta)$ increases in δ

Legal Sources of Imperfections

- I take enforcement imperfections as given, a result of one of a number of restrictions:
  - Doctrine of certainty of damages *(previous slide)*
  - Doctrine of foreseeability
  - Lost goodwill, sentimental value and emotional distress, or general non-pecuniary losses are typically not recoverable.
  - Simple litigation costs result in under-compensation if they deter the buyer from suing for damages.
- Imperfections such that
  - the seller pays less
  - the buyer receives less

Seller's Effort with Imperfections

With enforcement imperfections:

- seller does not internalize the full costs of a defect
- and as a result exerts insufficient effort to avoid defects

- Seller's problem:

$$e \equiv \arg\max_{e'} \int_0^1 \underbrace{[p - (\ell(\delta) - \alpha(\delta))]}_{p(\delta)} f(\delta|e')d\delta - c(e')$$

- Then: $-p'(\delta) = \ell'(\delta) - \alpha'(\delta) < \ell'(\delta)$

Part 2: Right to Reject Defective Delivery

Contract law grants buyer right to reject delivery if it does not meet a minimum performance standard

1. Rightful rejection (R) if $\delta > \mu$; $\mu \in [0, 1]$.
2. If buyer rejects, the buyer can collect damages with under-compensation $\beta \in [0, v - p]$.

Two Rejection Regimes

- Cumulative concurrence: $\beta < v - p$
- Alternative concurrence: $\beta = v - p$

Three Outcomes From Seller's Delivery

- *No breach* if $\delta = 0$:

$$B_0 = v - p$$

- *Partial breach* if $0 < \delta \leq \mu$. Buyer must accept delivery and can collect (imperfect) compensation:

$$B_A(\delta) = v - \alpha(\delta) - p$$

- *Material breach* if $\delta > \mu$. Buyer can reject delivery and can collect (imperfect) compensation for rejected good:

$$B_R = \max\{v - \beta - p, 0\}$$

Summary of Contracting Environment

- Principal-agent framework
    - Seller exerts effort to reduce defects
- No optimal contracting but simple, non-contingent contract (fixed price)
- Simple contracts are (imperfectly) enforced by third parties
    - Under-compensatory expectation damages
- The buyer is granted the right to reject seller's delivery and collect (imperfect) compensation for non-delivery

Literature

- Broader literature in law & economics on properties of breach remedies
  - General: Shavell (1980, 1984), Rogerson (1980), ...
  - Under-compensatory damages: Jackson (1978), Farber (1980), Eisenberg (2005)
  - Relationship-specific investment (this paper: *cooperative investment*): Che-Chung (1999), Che-Hausch (1999), Schweizer (2006), Stremitzer (2012a,b)
- Non-exclusive remedies:
  - Priest (1978), Brooks-Stremitzer (2011a,b, 2012), Thomas (2012)
- Renegotiation design:
  - Aghion-Dewatripont-Rey (1990, 1994), Chung (1991), Nöldeke-Schmidt (1995), Plambeck-Taylor (2007), Willington (2013), Holden-Malani (2014)

Two Questions

1. What is the optimal minimum performance standard? If it exists, what is the optimal μ^* that solves the moral hazard problem and implements the first-best outcome?
   - Any rejection with $\mu < 1$?
   - A substantial performance standard with $\mu > 0$?
   - A strict performance standard with $\mu = 0$ (i.e., "perfect tender rule")?
2. Should the buyer be allowed to collect damages after rightful rejection (cumulative concurrence with $\beta < v - p$)? Is alternative concurrence with $\beta = v - p$ the better policy?

Renegotiation of the Simple Contract

- When renegotiations fail, buyer rejects delivery if
  - Rightful Rejection: $\delta > \mu$; and
  - Profitable Rejection: $B_R > B_A(\delta)$ or $\delta > \bar{\delta}(\beta)$ with $\bar{\delta}(\beta) \nearrow \beta$
- Renegotiations: Buyer has credible threat of rejection iff

$$\delta > \max\{\mu, \bar{\delta}(\beta)\} =: \kappa(\mu)$$

Renegotiated Prices

Suppose buyer makes ex post price offer.

$$\bar{p}(\delta) = \begin{cases} \bar{p}_A(\delta) = p - [\ell(\delta) - \alpha(\delta)] & \text{if } \delta \leq \kappa(\mu) \\ \bar{p}_R(\delta) = p - [v - \beta] & \text{if } \delta > \kappa(\mu) \end{cases}$$

with $\bar{p}_A(\delta) > \bar{p}_R(\delta)$ if $\delta > \kappa(\mu)$.

Seller's Effort Choice

- Anticipating ex post renegotiation of the contract, seller chooses effort to maximize his expected profits:

$$e(\mu) \equiv \arg\max_{e} \mathbb{E}_\delta \left[\bar{p}_A(\delta) | \delta \leq \kappa(\mu)\right] + \mathbb{E}_\delta \left[\bar{p}_R(\delta) | \delta > \kappa(\mu)\right] - c(e)$$

- Seller maximizes price minus *expected effective costs* of effort
  - direct costs of effort $c(e)$
  - expected liability from defective delivery

    (with shared bargaining power, some of this will be rolled over to buyer)

$$\pi^S = p - c(e) - \int_0^1 \ell(\delta) f(\delta|e) d\delta + \underbrace{\int_0^{\kappa(\mu)} \alpha(\delta) f(\delta|e) d\delta - \int_{\kappa(\mu)}^1 \left[v - \beta - \ell(\delta)\right] f(\delta|e) d\delta}_{\sigma(\mu|e)}$$

- If $\sigma(\mu|e) = 0$, then $e(\mu) = e^*$
- If $\sigma'(\mu|e^*) = 0$, then $e(\mu) = e^*$

$\Rightarrow$ Find μ such that $\sigma'(\mu|e^*) = 0$

Optimal Minimum Performance Standard

Proposition

Let $\alpha(\delta)$ increase in δ and let $\beta \geq 0$. In a regime without rejection so that $\mu = 1$, the seller's effort is suboptimal, $e(1) < e^*$.

This is just the result for under-compensatory expectation damages without the right to reject.

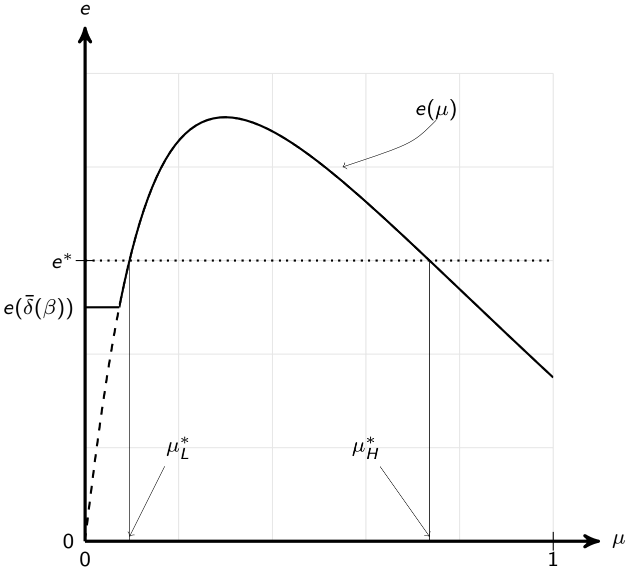
Optimal Minimum Performance Standard

Threshold of Efficient Material Breach

Proposition

Let $\alpha(\delta)$ increase in δ and let $\beta \geq 0$. Given $\alpha(\delta)$, for β not too high there is a $\mu^* \in (0, 1)$ such that the seller exerts first-best effort. More specifically:

1. *For low values of β, the optimal satisfaction clause is $\mu^* \in \{\mu_L^*, \mu_H^*\}$ with $0 < \mu_L^* < \mu_H^* < 1$.*
2.
3.



e
$e(\mu)$
e^*
$e(\bar{\delta}(\beta))$
μ_L^*
μ_H^*
0
0
1
μ

Optimal Minimum Performance Standard

Threshold of Efficient Material Breach

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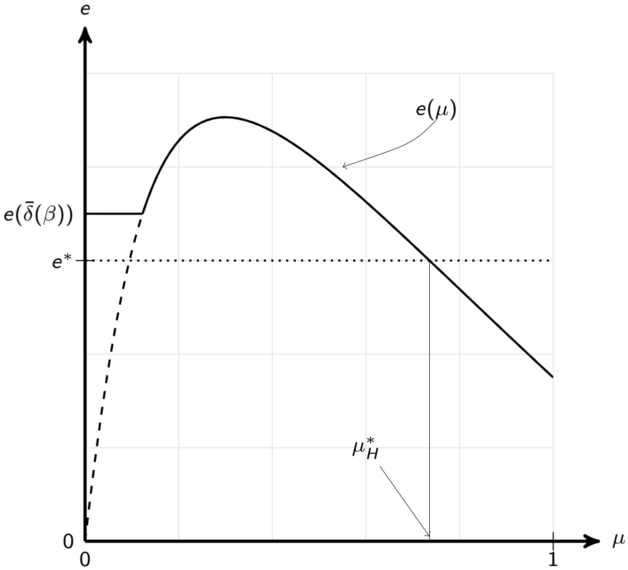
2. *For intermediate values of β, the optimal satisfaction clause $\mu^*(\theta) = \mu_H^*$ is unique.*
3.



e
$e(\mu)$
$e(\bar{\delta}(\beta))$
e^*
μ_H^*
0
0
1
μ

Optimal Minimum Performance Standard

Threshold of Efficient Material Breach

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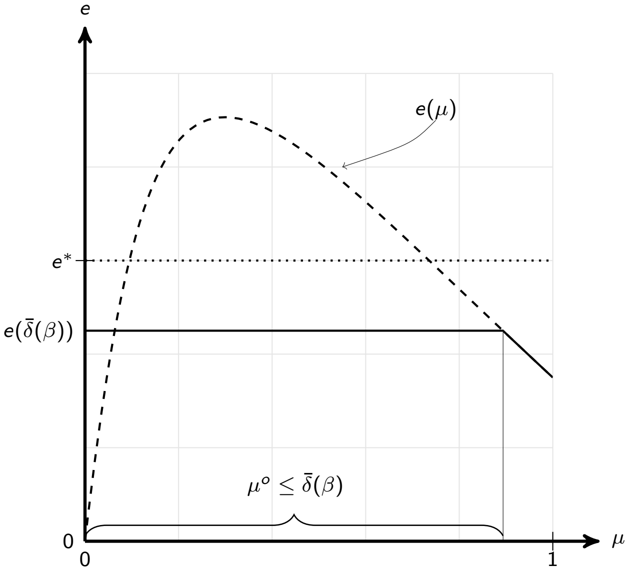
1. *For low values of β, the optimal satisfaction clause is $\mu^* \in \{\mu_L^*, \mu_H^*\}$ with $0 < \mu_L^* < \mu_H^* < 1$.*
2. *For intermediate values of β, the optimal satisfaction clause $\mu^*(\theta) = \mu_H^*$ is unique.*
3. *For high values of β such that $\bar{\delta}(\beta) \geq \mu_H^*$, there is no satisfaction clause that implements first-best effort. The optimal threshold is any $\mu^o \leq \bar{\delta}(\beta)$.*



e
e(μ)
e*
e(δ̄(β))
μᵒ ≤ δ̄(β)
0
0
1
μ

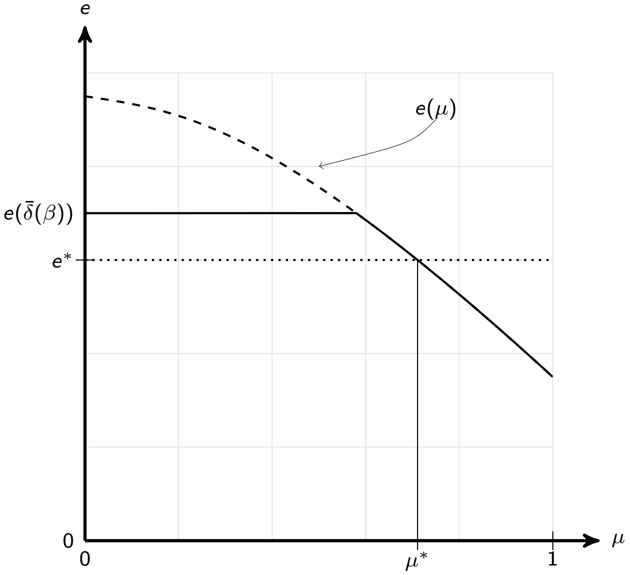
Extension: The Distribution of Defects

- Previous result assumes that there is always some defect and the probability of $\delta = 0$ is zero.
- Causes hump shape of $e(\mu)$
- Instead, suppose distribution has point mass at $\delta = 0$:

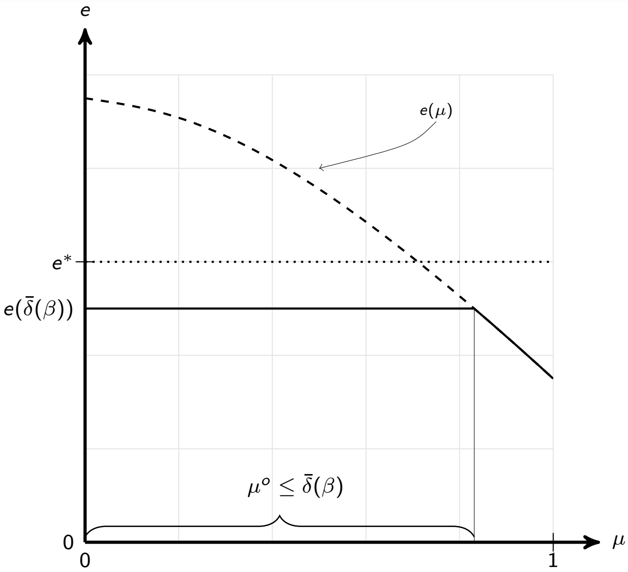
$$g(\delta|e) = \begin{cases} h(e) & \text{if } \delta = 0 \\ (1 - h(e))\, f(\delta|e) & \text{if } \delta > 0. \end{cases}$$

Proposition

For β low enough, if $h(e)$ and $h'(e) > 0$ are sufficiently large, then the optimal satisfaction clause $\mu^* \in (0, 1)$ is unique.



e
e(μ)
e(δ̄(β))
e*
0
0
μ*
1
μ


e
e(μ)
e*
e(δ̄(β))
μ^o ≤ δ̄(β)
0
0
1
μ

Answer: Question 1

Question 1

What is the optimal minimum performance standard? If it exists, what is the optimal μ^* that solves the moral hazard problem and implements the first-best outcome?

1. For low enough β (given $\alpha(\delta)$), an optimal μ^* can solve the moral hazard problem.
2. This optimal μ^* is strictly between 0 and 1.
   - $\mu = 1$: No-rejection regime is inefficient with under-compensatory expectation damages
   - $\mu = 0$: The "perfect tender rule" is generally not optimal; its performance depends on $h(e)$.
3. A higher degree of under-compensation (α/ℓ and β) implies a stricter optimal minimum performance standard with lower μ^*.

Legal Commentators

- Goetz-Scott (1983): limiting rejection to substantial performance standard restrains opportunistic claims by the buyer
- Gillette (1981): with perfect tender rule the seller might over-invest
- But Schwartz-Scott (2003): perfect tender rule reduces seller's expected payoffs, resulting in inefficient incentives to perform
- Scott (1990): a substantial performance standard results in better incentives for buyer to cooperate with the seller
- Dodge (1999): perfect tender provisions are modified in practice.
- Farnsworth (2004): higher degrees of under-compensation ought to result in stricter performance standards.

Alternative vs. Cumulative Concurrence

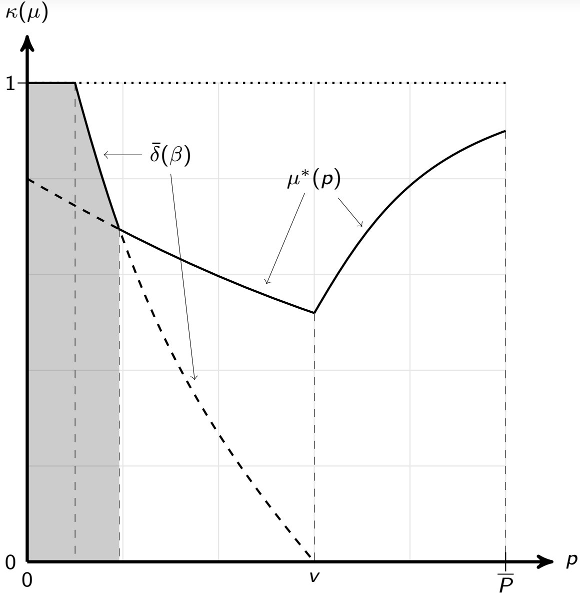
- Brooks-Stremitzer (2011a,b, 2012) argue in favor of alternative concurrence and against recent reform proposals that push toward cumulative concurrence.
- Their policy conclusions: Buyers should not be able to recover damages for non-delivery (after rejection) other than restitution.
- Alternative concurrence is a special case with $\beta = v - p$.

First Best Under Alternative Concurrence

Proposition

Suppose the buyer does not collect any expectation damages upon rejection of the seller's delivery so that $\beta = v - p$.

1. *If* $\alpha(\delta) > v - p$ *for some* δ *so that* $\bar{\delta}(v - p) < 1$, *then the threshold of efficient material breach* μ^* *implements first-best effort if* $\mu^* > \bar{\delta}(v - p)$. *If otherwise and* $\mu^* \leq \bar{\delta}(v - p)$, *then any sufficiently low threshold* $\mu^o \leq \bar{\delta}(v - p) < 1$ *mitigates the seller's moral hazard problem so that* $e(\mu^o) > e(1)$.
2. *If* $\alpha(\delta) \leq v - p$ *for all* δ, *then a threshold of material breach* $\mu \in [0, 1]$ *has no effect on the seller's effort and* $e(\mu) = e(1) < e^*$ *for all* μ.


$\kappa(\mu)$
1
0
$\bar{\delta}(\beta)$
$\mu^*(p)$
0
v
$\overline{P}$
p

- With alternative concurrence, first best cannot be implemented for all p
  - because for low prices, β is too high and buyer has credible threat insufficiently often ($\bar{\delta}(\beta) > \mu^*(p)$).
- With cumulative concurrence, first best can be implemented for all p if β is low enough
  - because μ^* does not depend on p (for low p); for sufficiently low β, $\bar{\delta}(\beta) \leq \mu^*$ for all p

Proposition

Cumulative concurrence dominates alternative concurrence when the right to reject is limited to the case of efficient material breach of contract.

Answer: Question 2

Question 2

Should the buyer be allowed to collect damages after rightful rejection?

1. If right to reject is restricted to the substantial performance standard, then cumulative concurrence increases the range of parameters for which the first-best outcome can be implemented.
2. The better policy:
   - substantial performance standard (material breach)
   - damages after rightful rejection

Summary

- Standard moral hazard problem: Principal (buyer) must incentivize agent (seller) to exert defect-reducing effort.
- Assumption: Optimal contracting is not possible. Instead, legal default rules enforce simple contracts.
- Enforcement regime is two-fold:
  1. Under-compensatory expectation damages
  2. Buyer is granted the right to reject for sufficiently defective delivery
- Simple contracts can implement first best even when enforcement regime is imperfect. Similar to Willington (2013), except that he *needs* imperfections.
- Right to reject assumes an important (i.e., problem-solving) role.

Summary (cont.)

- Positive results:
    - Right to reject introduces a discontinuity in seller's ex post payoffs. Affects seller's ex ante effort incentives.
    - The effect of rejection is non-monotonic if $h(e)$ and $h'(e)$ are too low.
- Normative results:
    - Right to reject is necessary for first best when enforcement is imperfect (and other solutions not available)
    - A strict performance standard is generally inefficient; the threshold of efficient material breach reflects a substantial performance standard.

Thank you!

Any comments or suggestions are very welcome!
Please send to ganglmair@utdallas.edu