Bargaining and News

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Motivation

A **central issue** in the bargaining literature

- Will trade be (inefficiently) delayed?

What is usually ignored

- If trade is in fact delayed, **new information** may come to light...

This paper = Bargaining + News

A canonical setting

- An indivisible asset (e.g., firm, project, security)
  - Type of asset is either low or high
- One informed seller and one uninformed buyer
  - Buyer makes price offers
  - Common knowledge of gains from trade
  - Efficient outcome: trade immediately
- Infinite horizon; discounting; frequent offers; no commitment

\+ News: information about the asset is gradually revealed

Application 1: Catered Innovation

Consider a startup (the informed seller) that has "catered" its innovation to a large firm, say, Google (the uninformed buyer)

- This strategy has become increasingly common (Wang, 2015)
- The longer the startup operates independently, the more Google will learn about the value of the innovation
- But delaying the acquisition is inefficient because Google can leverage economies of scale and has a portfolio of complimentary businesses

Questions: How does Google's ability to learn about the startup affect

- the bargaining dynamics? their relative bargaining power?
- total surplus realized?

Application 2: Due Diligence

"Large" transactions typically involve a due diligence period:

- Corporate acquisitions
- Commercial real estate transactions

This information gathering stage is inherently dynamic.

Questions: How does the acquirer's ability to conduct due diligence and renegotiate the initial terms of sale influence

- Initial terms of sale? Eventual terms of sale?
- Likelihood of deal completion?
- Profitability of acquisition?

Preview of Results

- The buyer's ability to leverage the information to extract more surplus is remarkably limited.
  - A negotiation takes place and yet the buyer gains nothing from the ability to negotiate a better price.
  - Coasian force overwhelms access to information.

- Buyer engages in a form of costly experimentation
  - Makes offers that are sure to lose money if accepted, but generate information if rejected
  - Seller benefits from buyer's ability to renegotiate terms
  - Seller may also benefit from buyer's ability to learn

- Introducing competition among buyers can lead to worse outcomes.
  - Under certain conditions, seller's payoff is higher and/or the outcome is more efficient with a single buyer than with competing ones.

Literature

Bargaining with independent values

- Coase (1972), GSW (1985), FLT (1987), Ausubel and Deneckere (1989, 1992), Ortner (2014)

Bargaining with interdependent values

- Admati and Perry (1987), Evans (1989), Vincent (1989), Deneckere and Liang (2006), Fuchs and Skrzypacz (2010, 2012)

News in competitive markets with adverse selection

- Daley and Green (2012, 2015), Asriyan, Fuchs and Green (2016)

Setup: Players and Values

Players: seller and buyer

- Seller owns asset of type $\theta \in \{L, H\}$
- θ is the seller's private information

Values:

- Seller's reservation value is K_θ, where $K_H > K_L = 0$
- Buyer's value is V_θ, where $V_H \geq V_L$
  - Independent values: $V_H = V_L$
- Common knowledge of gains from trade: $V_\theta > K_\theta$
- "Lemons" condition: $K_H > V_L$

Setup: Timing and Payoffs

The model is formulated in continuous time.

- At every t buyer makes offer, w, to seller
- If w accepted at time t, the payoff to the seller is

$$e^{-rt}(w - K_\theta)$$

  and the buyer's payoff is

$$e^{-rt}(V_\theta - w)$$

- Both players are risk neutral

Complete Information Outcome

Suppose θ is public information.

- The buyer has all the bargaining power.
- The buyer extracts all the surplus.
- Offers K_θ at $t = 0$ and the seller accepts
- Payoffs:

$$\text{Buyer payoff} = V_\theta - K_\theta$$
$$\text{Seller payoff} = 0$$

Clearly, knowing θ is beneficial to the buyer.

- What happens if the buyer does not know θ but can learn about θ gradually?

Setup: News

- Represented by a publicly observable process:

$$X_t(\omega) = \mu_\theta t + \sigma B_t(\omega)$$

  where B is standard B.M. and without loss $\mu_H > \mu_L$

- The quality of the news is captured by the signal-to-noise ratio:

$$\phi \equiv \frac{\mu_H - \mu_L}{\sigma}$$

Equilibrium objects

1. Offer process, $W = \{W_t : 0 \leq t \leq \infty\}$
2. Seller stopping times: τ^θ
   - Access to private randomization for mixing
   - Endows CDF over acceptance times: $\{S_t^\theta : 0 \leq t < \infty\}$
3. Buyer's belief process, $Z = \{Z_t : 0 \leq t \leq \infty\}$

We look for equilibria that are stationary in the buyer's beliefs:

- Z is a time-homogenous Markov process
- Offer is a function that depends only on the state, $W_t = w(Z_t)$

Buyer's beliefs

Buyer starts with a prior $P_0 = \Pr(\theta = H)$

- At time t, buyer conditions on
  - (i) the path of the news,
  - (ii) seller rejected all past offers

- Using Bayes Rule, the buyer's belief at time t is

$$P_t = \frac{P_0 f_t^H(X_t)(1 - S_{t^-}^H)}{P_0 f_t^H(X_t)(1 - S_{t^-}^H) + (1 - P_0) f_t^L(X_t)(1 - S_{t^-}^L)}$$

- Define $Z \equiv \ln\left(\frac{P_t}{1-P_t}\right)$, we get that

$$Z_t = \underbrace{\ln\left(\frac{P_0}{1 - P_0}\right) + \ln\left(\frac{f_t^H(X_t)}{f_t^L(X_t)}\right)}_{\hat{Z}_t} + \underbrace{\ln\left(\frac{1 - S_{t^-}^H}{1 - S_{t^-}^L}\right)}_{Q_t}$$

Seller's problem

Given (w, Z), the seller faces a stopping problem

Seller's Problem

For all z, the seller's strategy solves

$$\sup_{\tau} E_z^{\theta}\left[e^{-r\tau}\left(w\left(Z_{\tau}\right)-K_{\theta}\right)\right]$$

Let $F_{\theta}(z)$ denote the solution.

Buyer's problem

In any state z, the buyer essentially has three options:

1. Wait: Make a non-serious offer that is rejected w.p.1.
2. Screen: Make an offer $w < K_H$ that only the low type accepts with positive probability
3. Buy/Stop: Offer $w = K_H$ and buy the regardless of θ

Let $F_B(z)$ denote the buyer's value function.

Details

Buyer's problem

Lemma

For all z, $F_B(z)$ satisfies:

Option to wait: $$rF_B(z) \geq \frac{\phi^2}{2}\left(2p(z)-1\right)F_B'(z) + \frac{\phi^2}{2}F_B''(z)$$

Optimal screening: $$F_B(z) \geq \sup_{z'>z}\left\{\left(1-\frac{p(z)}{p(z')}\right)(V_L - F_L(z')) + \frac{p(z)}{p(z')}F_B(z')\right\}$$

Option to buy: $$F_B(z) \geq E_z[V_\theta] - K_H$$

where at least one of the inequalities must hold with equality.

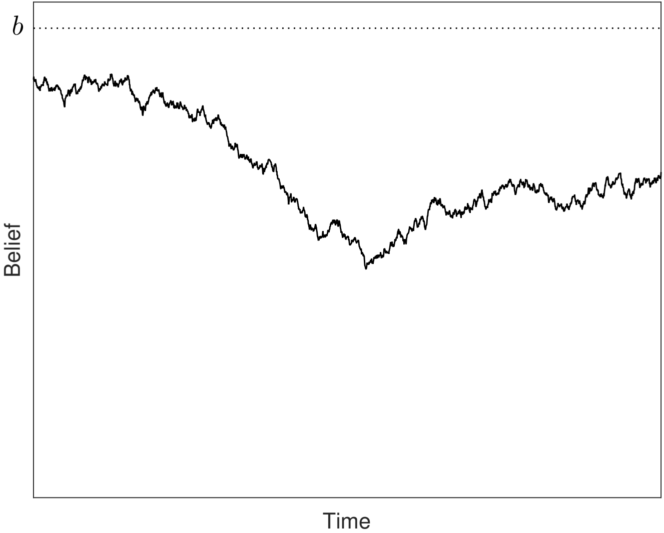
Equilibrium

Theorem

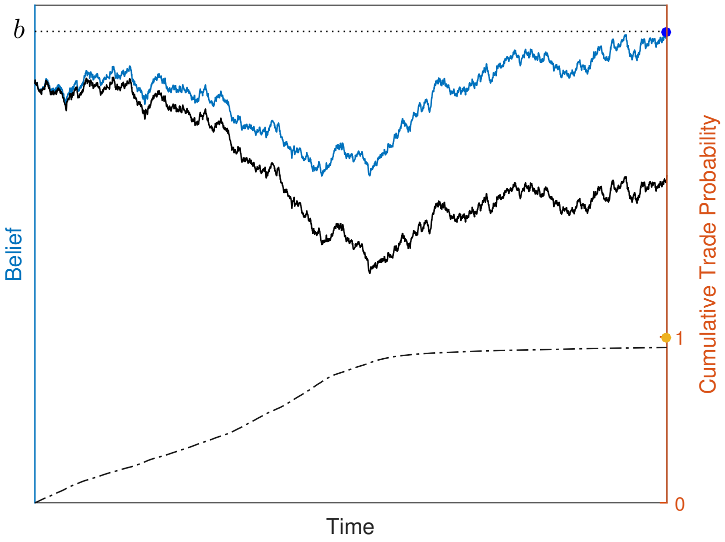
There exists a unique equilibrium. In it,

- *For $P_t \geq b$, trade happens immediately: buyer offers K_H and both type sellers accept*
- *For $P_t < b$, trade happens "smoothly": only the low-type seller trades and with probability that is proportional to dt.*

Equilibrium: sample path



Equilibrium: sample path



Equilibrium construction: sketch

1. Buyer's problem is linear in the rate of trade: $\dot{q}$
   - Derive F_B (independent of F_L)

2. Given F_B, what must be true about F_L for smooth trade to be optimal?
   - Derive F_L, which implies w

3. Low type must be indifferent between waiting and accepting
   - Indifference condition implies $\dot{q}$ and therefore low-type acceptance rate.

Summary: Smooth $\implies F_B \implies F_L \implies \dot{q}$

▸ Details

A bit more about Step 1

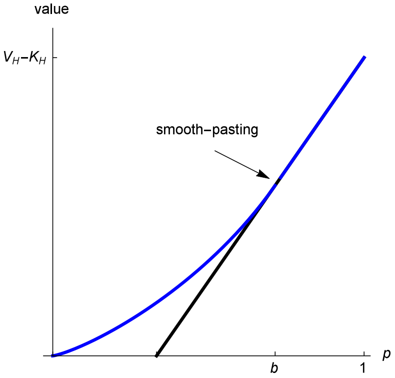
For $z < \beta$,

$$rF_B(z) = \underbrace{\frac{\phi^2}{2}\left(2p(z)-1\right)F_B'(z) + \frac{\phi^2}{2}F_B''(z)}_{\text{Evolution due to news}}$$

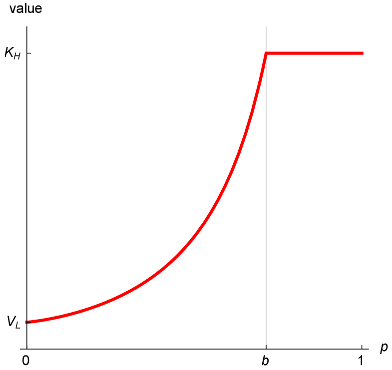
$$+ \dot{q}(z)\underbrace{\Big(\big(1-p(z)\big)\big(V_L - F_L(z) - F_B(z)\big) + F_B'(z)\Big)}_{\Gamma(z)=\text{net-benefit of screening at } z}$$

- Buyer's value is linear in $\dot{q}$
- For "smooth" trade to be optimal, it must be that $\Gamma(z) = 0$
  $\rightarrow$ F_B does not depend on $\dot{q}$ (and has simple closed-form solution)
- Therefore, buyer does not benefit from screening!
  $\rightarrow$ Otherwise, she would want to trade "faster"
  $\rightarrow$ Pins down exactly how expensive it must be to buy L, i.e., $F_L(z)$

Equilibrium payoffs

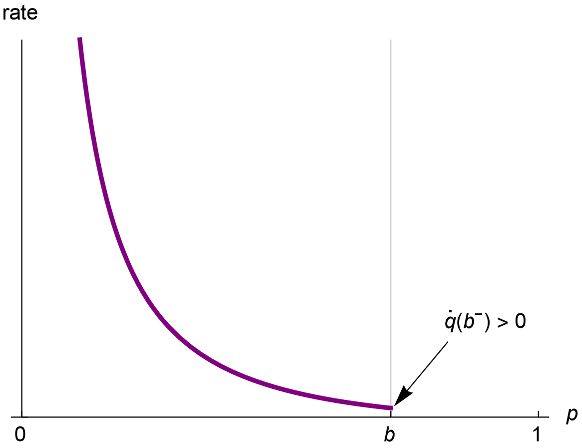


Buyer value, F_B



Low-type value, F_L

Equilibrium rate of trade



Interesting Predictions?

1. Buyer does not benefit from the ability to negotiate the price.
   - Though she *must* negotiate in equilibrium.
2. The buyer is guaranteed to lose money on any offer below K_H that is accepted.
   - A form of costly experimentation.
3. The low-type seller may actually benefit from buyer's ability to learn his type.

Who Benefits from the Negotiation?

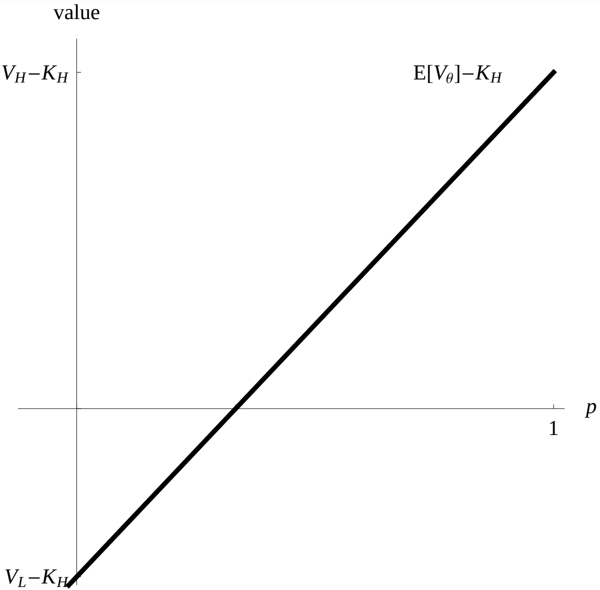
Suppose the price is exogenously fixed at the lowest price that the seller will accept: K_H (e.g., initial terms of sale).

- The buyer conducts due diligence (observes $\hat{Z}$) and decides when and whether to actually complete the deal.
- Buyer's strategy is simply a stopping rule, where the expected payoff upon stopping in state z is

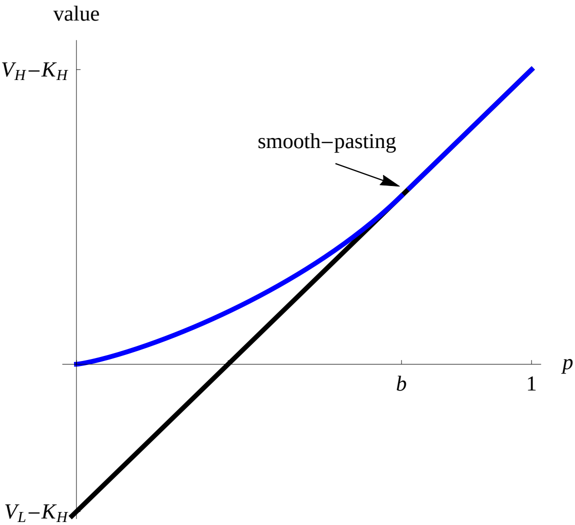
$$E_z[V_\theta] - K_H$$

- Call this the due diligence game.
    - NB: it is not hard to endogenize the initial terms.

Due Diligence Game



Due Diligence Game



Who Benefits from the Negotiation?

Result

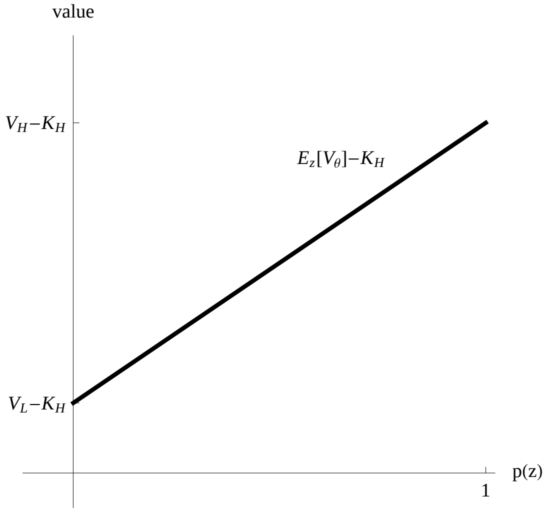
In the equilibrium of the bargaining game:

1. The buyer's payoff is identical to the due diligence game.
2. The (L-type) seller's payoff is higher than in the due diligence game.

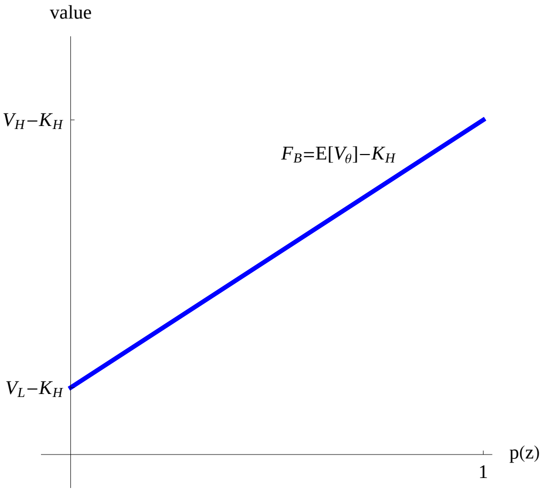
Total surplus higher with bargaining, but fully captured by seller.

- Despite the fact that the buyer makes all the offers.

No Lemons $\implies$ No Learning



No Lemons $\implies$ No Learning



No Lemons $\implies$ No Learning

Result

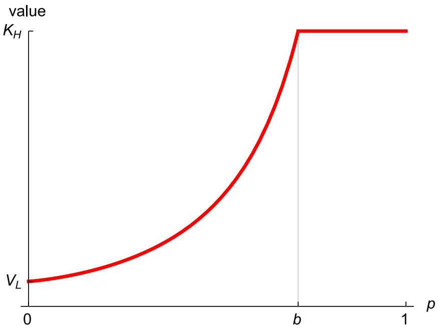
When $V_L \geq K_H$, unique equilibrium is immediate trade at price K_H.

- Absent a lemons condition, the Coasian force overwhelms the buyer's incentive to learn.

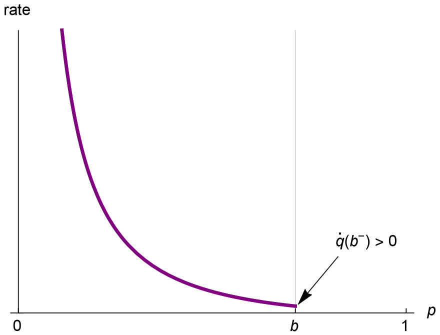
Experimentation and regret

For all z, the buyer offers $F_L(z)$, which is strictly greater than V_L.

And for $z < \beta$, only the low type trades.



Buyer's offer, $w = F_L$



Rate of trade

Experimentation and regret

So below b, the buyer is making an offer that:

(1) will ONLY be accepted by the low type

(2) will make a loss whenever accepted

Why?

- One interpretation: costly experimentation
- Buyer willing to lose money today (if offer accepted) in order to learn and reach β *faster* (if rejected)
- News is critical for this feature to arise

Effect of news quality

Proposition (The effect of news quality)

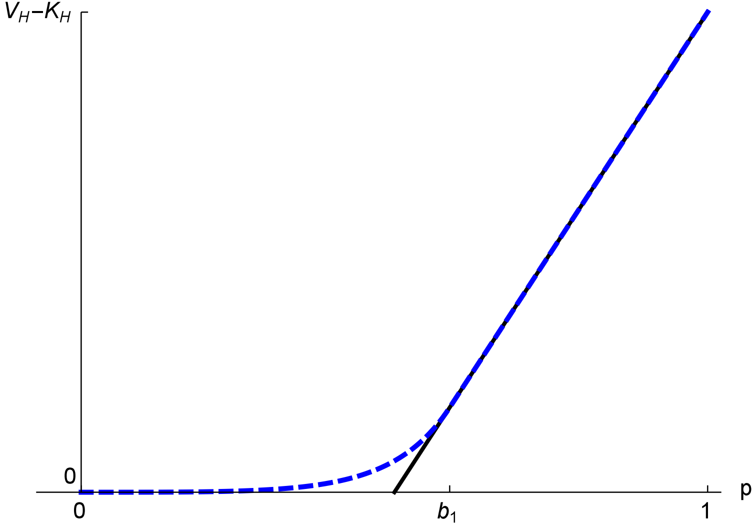
As the quality of news increases:

1. *Both β and F_B increase*
2. *The rate of trade, $\dot{q}$, decreases for low beliefs but increases for intermediate beliefs*
3. *Total surplus and F_L increase for low beliefs, but decrease for intermediate beliefs*

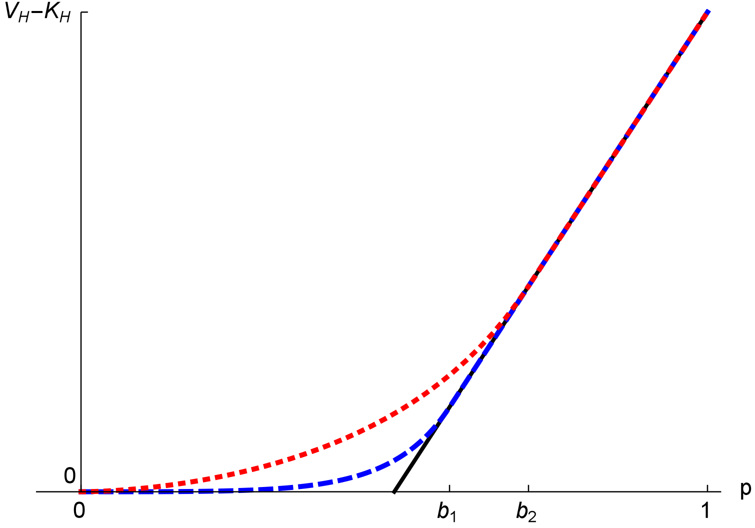
Two opposing forces driving 3.

- Higher ϕ increases volatility of $\hat{Z} \implies$ faster trade
- Higher β (and/or) lower $\dot{q} \implies$ slower trade

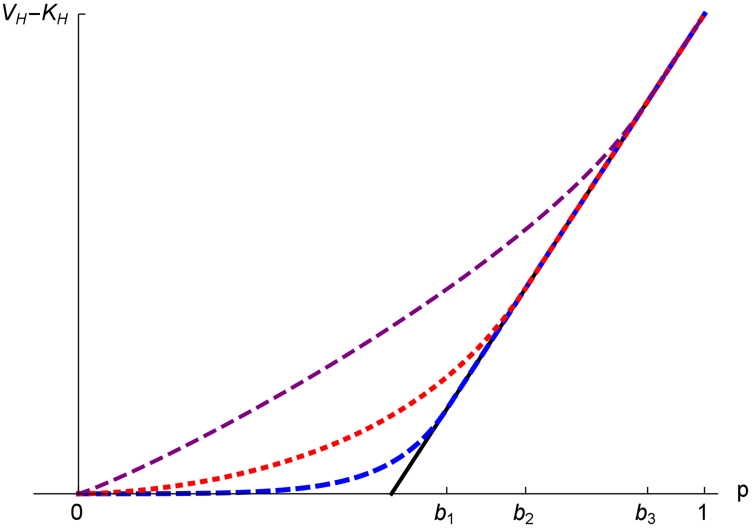
Effect of news on buyer payoff



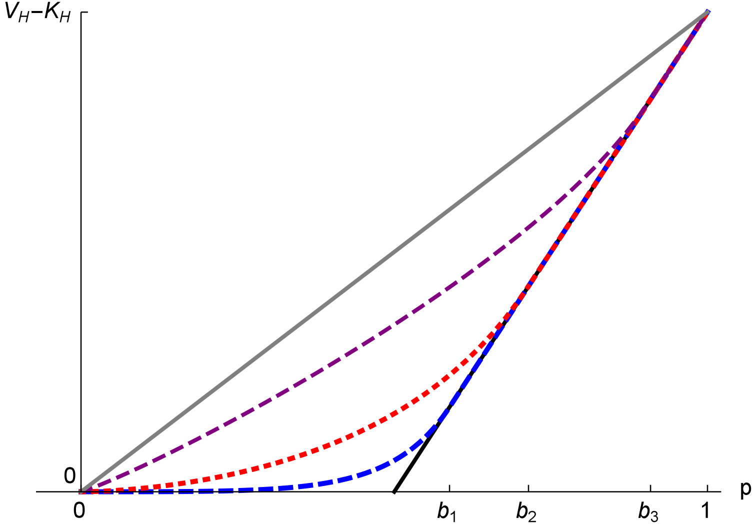
Effect of news on buyer payoff



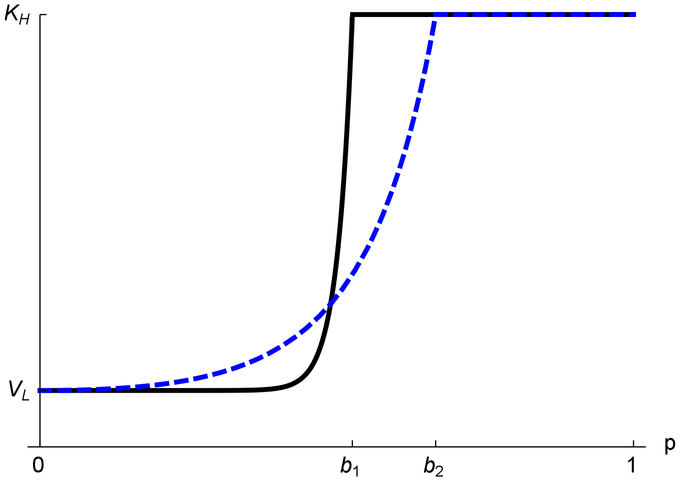
Effect of news on buyer payoff



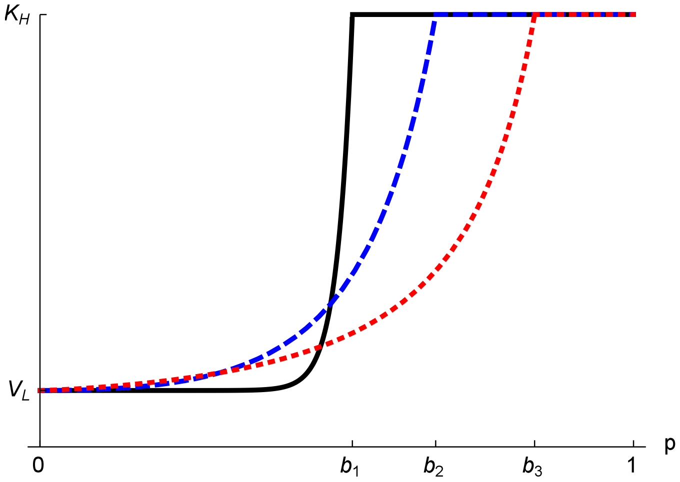
Effect of news on buyer payoff



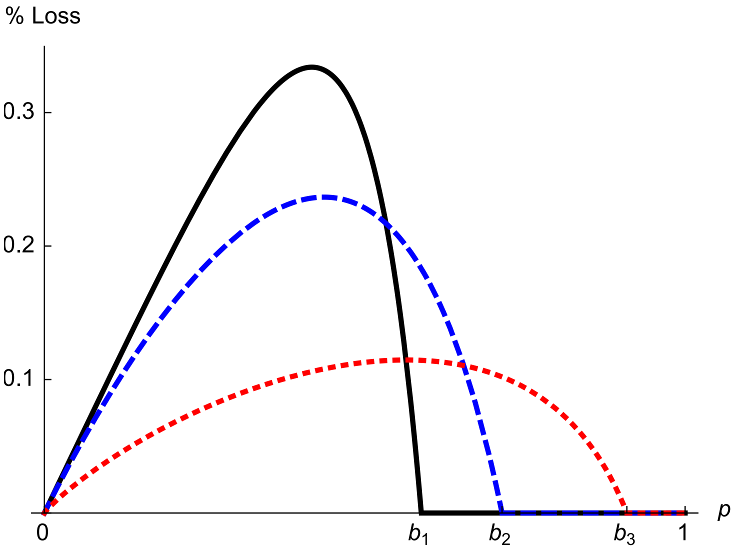
Effect of news on low-type payoff



Effect of news on low-type payoff



(In)efficiency



Competition and the Coase Conjecture

The buyer's desire to capture any future profits from trade leads to a form of intertemporal competition.

- Seller knows buyer will be tempted to increase price tomorrow
- Which increases the price seller is willing to accept today
- Buyer "competes" against future self

Coase Conjecture: Absent some form of commitment (delay, price, etc.), the outcome with a monopolistic buyer will resemble the outcome with competitive buyers.

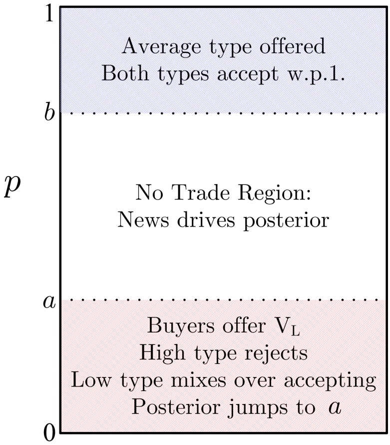
Question: How does news affect Coase's conjecture?

Competitive buyers

Theorem (Daley and Green, 2012)

There is a unique equilibrium satisfying a mild refinement on off-path beliefs. In it,

- *For* $P_t \geq b$: *trade happens immediately, buyers offer* $V(P_t)$ *and both type sellers accept*
- *For* $P_t < a$: *buyers offer* V_L, *high types reject w.p.1. Low types mix such that the posterior jumps to* a
- *For* $P_t \in (a, b)$: *there is no trade, buyers make non-serious offers which are rejected by both types.*



Intuition for equilibrium play

1. H-seller can get $V(p)$ whenever she wants it. For $p < b$, she does better by waiting for news.

2. For high enough p, H has little to gain by waiting, so exercises the option to trade at $V(p)$. The low type (happily) pools.

3. L can always get V_L. But for $p \in (a, b)$, he does better to mimic H.

4. L's prospects of reaching b decrease as p falls.
   - At $p = a$, she is indifferent $\implies$ willing to mix.

Buyer competition eliminates incentive for experimentation.

Effect of competition

Bilateral

Trade is efficient for $p \geq b_b$.

For $p < b_b$

- probability of trade is proportional to dt.
- rate is decreasing in p.

Competitive

Trade is efficient for $p \geq b_c$.

For $p < b_c$

- $p \in (a_c, b_c)$, complete trade breakdown.
- $p < a_c$, atom of trade

Result

Efficient trade requires higher belief in the competitive market: $b_b < b_c$

Difference in the efficient-trade threshold

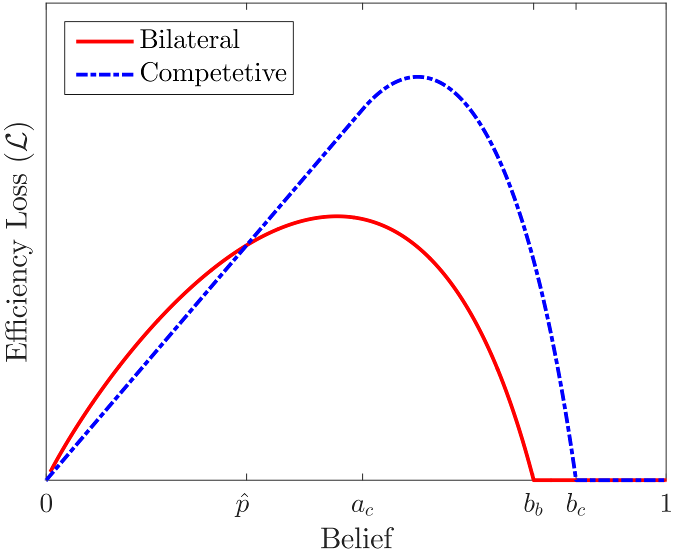
Intuition?

- Buyers and sellers differ in their expectations about the realization of future news.
- With competitive buyers, the high-type seller decides when to "stop" and net $E_z[V_\theta] - K_H$.
- With one buyer, the buyer decides when to "stop" and net $E_z[V_\theta] - K_H$.
- *But the high-type seller expects good news, while the buyer does not.*

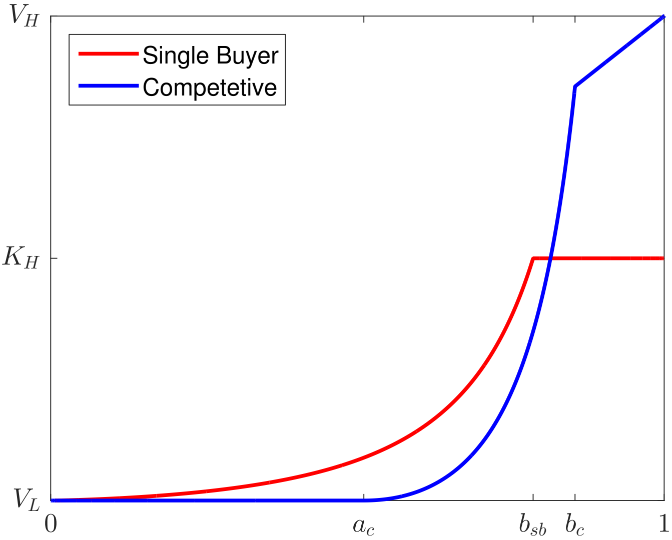
More generally: competition does not necessarily lead to more efficient outcomes in dynamic models with adverse selection

- Pushes prices up in later periods $\implies$ more incentive to wait
- See also Asyrian et al (2016)

Efficiency: bilateral vs competitive



Low-type value: bilateral vs. competitive



Implications

- Entrepreneurs who cater their innovation are more likely to have negative private information.
  - All else equal, catered innovations are less valuable innovations
- Acquisitions that take place at a price below the initial terms add less value for the acquirer.
  - In fact, they necessarily lose value for the acquirer.
  - A downward renegotiation of the acquisition price should negatively affect acquirer's share price.
  - E.g., when Verizon announced the Yahoo merger is going through but at a price $300M below the original bid.

Hot off the press

Suppose there is competition for the right to conduct due diligence.

- Multiple bidders submit bids in an auction at $t = 0$
- The seller selects a winner
- The winner can conduct due diligence
- No renegotiation of price allowed

Preliminary Result

A higher bid is not necessarily better for the seller because it induces stricter due diligence.

- The winning bid lies strictly between K_H and V_H
- The winning bidder makes strictly positive profit

To do list:

- Incorporate/allow for renegotiation
- Enrich the space of contracts

Summary

We explore the effect of news in a canonical bargaining environment

- Construct the equilibrium (in closed form).
- Show that uninformed player's ability to leverage news to extract surplus is remarkably limited.
  - Buyer negotiates based on new information in equilibrium, but gains nothing from doing so!
- More news does not necessarily lead to more efficient outcomes
  - Seller may actually benefit from buyer's ability to learn.
- Relation to the competitive outcome
  - Competition among buyers eliminates the Coasian force and may reduce both total surplus and seller payoff.

Additional Results

- Uniqueness
- The no-news limit
- Extensions
  1. Costly acquisition
  2. Arrival of “perfect” news

Other equilibria?

We focused on the (unique) smooth equilibrium. Can other stationary equilibria exist?

- No

By Lesbegue's decomposition theorem for monotonic functions

$$Q = Q_{abs} + Q_{jump} + Q_{sing}$$

To sketch the argument, we will illustrate how to rule out:

1. Atoms of trade with L (i.e., jumps)
2. Reflecting barriers (i.e., singular component)

Uniqueness

Suppose there is some z_0 such that:

- Buyer makes offer w_0
- Low type accepts with atom

Let α denote the buyer's belief conditional on a rejection. Then

- $F_L(z_0) = F_L(\alpha) = w_0$, by L-seller optimality
- $F_L(z) = w_0$ for all $z \in (z_0, \alpha)$, by Buyer optimality

Therefore, starting from any $z \in (z_0, \alpha)$, the belief conditional on a rejection jumps to α.

- If there is an atom, the behavior must resemble the competitive-buyer model...

Uniqueness

To rule out the dynamics of the competitive-buyer model:

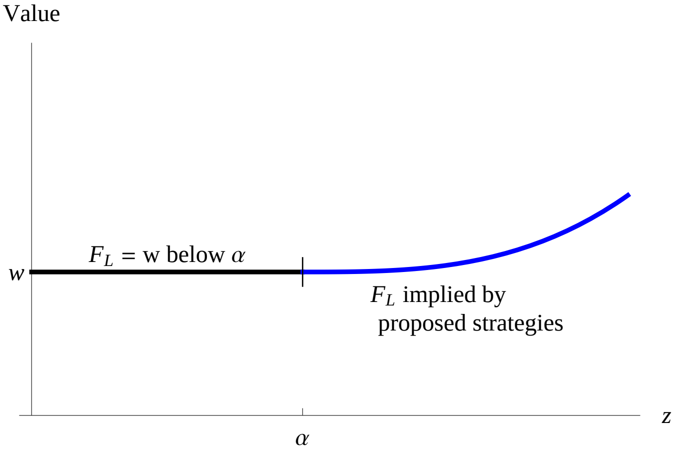
Suppose α is a reflecting barrier, such that

- for $z \leq \alpha$, the offer is w, and rejection jumps the belief to α,
- there is no trade on an interval $(\alpha, \bar{z})$,
- so, Z reflects upward at α (conditional on rejection).

Hence, the low type is mixing at α, implying the boundary condition:

$$F_L'(\alpha^+) = 0.$$

Uniqueness


Value
F_L = w below α
w
F_L implied by
proposed strategies
z
α

Uniqueness

Consider now the buyer's incentives.

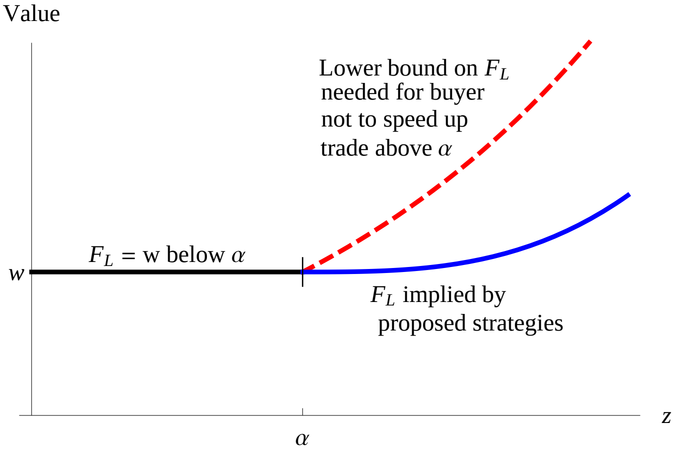
On $(\alpha, \bar{z})$, he is not screening, so:

- F_B evolves according to the "waiting" ODE,
- It must be that $\Gamma \leq 0$. Hence,

$$F_L(z) \geq V_L - F_B(z) + \frac{1}{1 - p(z)} F_B'(z)$$

which must hold with equality at $z = \alpha$.

Uniqueness



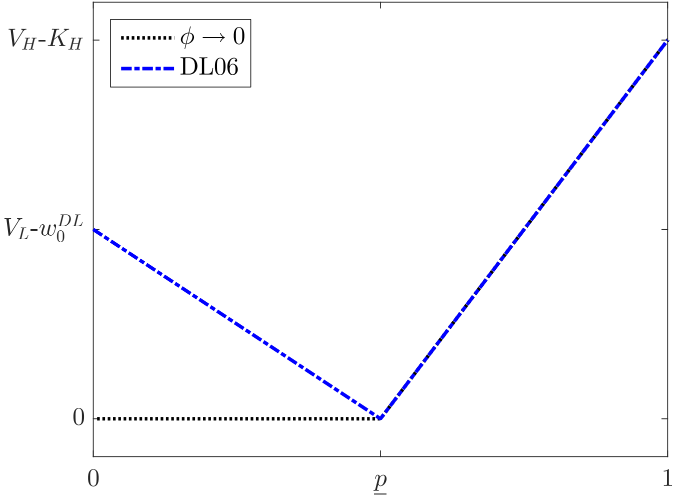
Value
Lower bound on F_L
needed for buyer
not to speed up
trade above α
F_L = w below α
w
F_L implied by
proposed strategies
z
α

Uniqueness

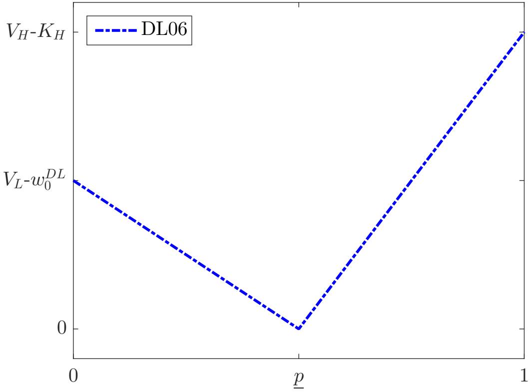
Intuitively,

- The low type is no more expensive to trade with at $z = \alpha + \epsilon$ than at $z = \alpha$.
- If the buyer wants to trade with the low type at price w at $z = \alpha$, he will want to extend this behavior $z = \alpha + \epsilon$ as well.

Our $\phi \to 0$ limit differs from Deneckere and Liang (2006)



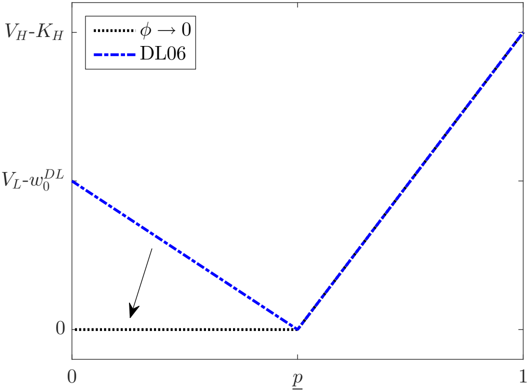
Effect of news



Intuition for DL06:

- Coasian force disappears at precisely $Z_t = \underline{z}$
- Buyer leverages this to extract concessions from low type at $z < \underline{z}$

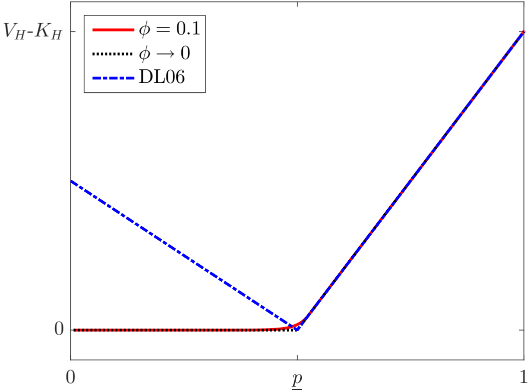
Effect of news



With news, his belief <u>cannot</u> just "sit at $\underline{z}$", so this power evaporates.

- Even with arbitrarily low-quality news!

Effect of news



With news, his belief <u>cannot</u> just "sit at $\underline{z}$", so this power evaporates.

- Even with arbitrarily low-quality news!

Stochastic control problem

The buyer must decide:

- How quickly to trade with only the low type (i.e., choose Q given F_L)
- When to "buy the market" (i.e., choose T at which to offer K_H)

Buyer's Problem

Choose (Q, T) to solve, for all z,

$$\sup_{Q,T} \Big\{ (1-p(z)) E_z^L \Big[\int_0^T e^{-rt}(V_L - F_L(\hat{Z}_t + Q_t)) e^{-Q_{t-}} dQ_t + e^{-(rT+Q_T)}(V_L - K_H) \Big] + p(z) E_z^H \left[e^{-rT}(V_H - K_H) \right] \Big\}$$

Let $F_B(z)$ denote the solution.

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Buyer's problem

Lemma

For all z, $F_B(z)$ satisfies:

Option to wait: $$rF_B(z) \geq \frac{\phi^2}{2}\left(2p(z)-1\right)F_B'(z) + \frac{\phi^2}{2}F_B''(z)$$

Optimal screening: $$F_B(z) \geq \sup_{z'>z}\left\{\left(1-\frac{p(z)}{p(z')}\right)\left(V_L - F_L(z')\right) + \frac{p(z)}{p(z')}F_B(z')\right\}$$

Option to buy: $$F_B(z) \geq E_z[V_\theta] - K_H$$

where at least one of the inequalities must hold with equality.

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Equilibrium construction

1. For $z < \beta$, $w(z) = F_L(z)$ and the buyer's value is

$$F_B(z) = (V_L - F_L(z))\,(1 - p(z))\dot{q}(z)dt + \left(1 - \frac{\dot{q}(z)}{1 + e^z}dt\right) E_z\left[F_B(z + dZ_t)\right.$$

and $dZ_t = d\hat{Z}_t + \dot{q}(Z_t)dt$. So,

$$rF_B(z) = \underbrace{\frac{\phi^2}{2}\left(2p(z) - 1\right) F_B'(z) + \frac{\phi^2}{2} F_B''(z)}_{\text{Evolution due to news}}$$

$$+ \dot{q}(z) \underbrace{\Big((1 - p(z))\big(V_L - F_L(z) - F_B(z)\big) + F_B'(z)\Big)}_{\Gamma(z)=\text{net-benefit of screening at } z}$$

Equilibrium construction

2. Observe that the buyer's problem is linear in $\dot{q}$

$$rF_B(z) = \underbrace{\frac{\phi^2}{2}\left(2p-1\right)F_B' + \frac{\phi^2}{2}F_B''}_{\text{Evolution due to news}}$$

$$+ \sup_{\dot{q}\geq 0} \dot{q} \underbrace{\Big((1-p)\big(V_L - F_L - F_B\big) + F_B'\Big)}_{\Gamma(z)=\text{net-benefit of screening}}$$

Hence, in any state $z < \beta$, either

(i) the buyer strictly prefers $\dot{q} = 0$, or

(ii) the buyer is indifferent over all $\dot{q} \in \mathbb{R}_+$

Equilibrium construction

3. In either case

$$\dot{q}(z)\Gamma(z) = 0$$

4. This simplifies the ODE for F_B to just

$$rF_B = \frac{\phi^2}{2}(2p-1)F_B' + \frac{\phi^2}{2}F_B''$$

→ F_B does not depend on $\dot{q}$

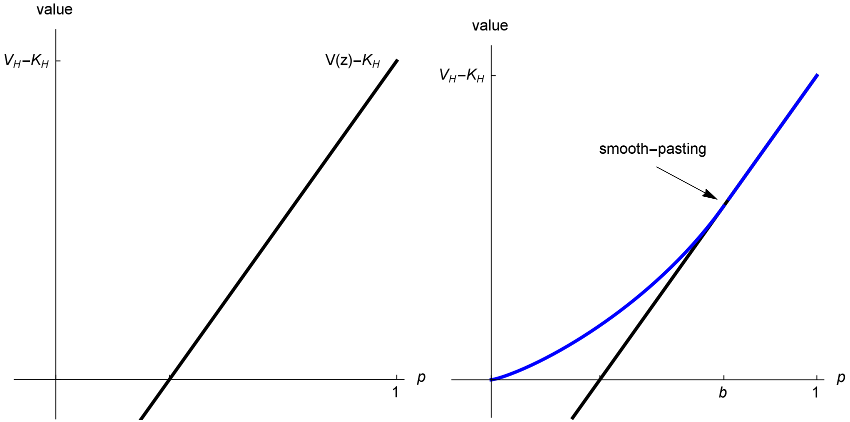
→ Buyer gets same value he would get from $\dot{q} = 0$

→ Buyer gains nothing from the ability to screen using prices!

Equilibrium construction

Using the appropriate boundary conditions, we find $F_B(z) = C_1 \frac{e^{u_1 z}}{1+e^z}$,

- where $u_1 = \frac{1}{2}\left(1 + \sqrt{1 + 8r/\phi^2}\right)$ and C_1 solves VM and SP at $z = \beta$.



Equilibrium construction

Next, conjecture that $\dot{q}(z) > 0$ for all $z < \beta$. Then, it must be that

$$\Gamma(z) = 0$$

Or equivalently

$$F_L(z) = (1 + e^z)F_B'(z) + V_L - F_B(z)$$

This pins down exactly how "expensive" the low type must be for the buyer to be indifferent to the speed of trade (i.e., F_L).

Equilibrium construction

For $z < \beta$, the low-type must be indifferent between accepting $w(z)$ and waiting.

The waiting payoff is

$$F_L(z) = \mathbb{E}_z^L \left[e^{-rT(\beta)} K_H \right]$$

which evolves as

$$rF_L(z) = \left(\dot{q}(z) - \frac{\phi^2}{2} \right) F_L'(z) + \frac{\phi^2}{2} F_L''(z)$$

So, $\dot{q}(z)$ must satisfy

$$\dot{q}(z) = \frac{rF_L(z) + \frac{\phi^2}{2} F_L'(z) - \frac{\phi^2}{2} F_L''(z)}{F_L'(z)}$$

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Equilibrium verification

Seller optimality ✓

- By construction, low type is indifferent between accepting and rejecting at all $z < \beta$.

Buyer optimality: Recall the three necessary conditions ✓

- By construction, option to wait holds with equality for all $z < \beta$.
- In addition, we verify directly that for all $z' > z$,

$$\underbrace{F_B(z)}_{\text{Eq payoff}} > \underbrace{\left(1 - \frac{p(z)}{p(z')}\right)(V_L - F_L(z')) + \frac{p(z)}{p(z')} F_B(z')}_{\text{Payoff from deviating to } w = F_L(z')}$$

- So buyer cannot benefit from deviating to a higher (or lower) offer.

No "no-trade" regions

We assumed $\dot{q} > 0$, could there exists an interval on which $\dot{q} = 0$?

- No.

If there was, the low-type's waiting payoff would be strictly lower:

$$E_z^L \left[e^{-rT(\beta)} K_H \right] = F_L(z) < (1 + e^z) F_B'(z) + V_L - F_B(z)$$

or, equivalently

$$\Gamma(z) > 0,$$

which means the buyer actually wants to *speed up* trade, a contradiction.

Intuition: If trade rate ever slows to zero, the low type becomes too cheap for the buyer not to want to trade (i.e., $\Gamma(z)$ turns positive).