Confidentiality and Sequencing in Bilateral Negotiations

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Introduction

Many bargaining problems involve one buyer and several sellers:

Real Est. Dev.	$\longrightarrow$	Land Owners
Econ. Dept.	$\longrightarrow$	Multiple Faculty
Home-owner	$\longrightarrow$	Multiple Contractors

Introduction

- In many applications, the buyer can choose between public and private negotiations.
  - Disney was very secret about purchases of Florida swamp land.
  - Duke was not as lucky in a small community.
- For government buyers, "sunshine" laws require transparency.

"[These laws] are the state and federal statutes requiring that government meetings, decisions and records be made available to the public."

- And sunshine laws have a bite.
- For instance, in July 2000, Motorola alleged that the state of Florida violated its own sunshine law by holding closed meetings with the rival Com-Net.

Introduction

- Exceptions, however, apply. For instance, during real property acquisitions by the state's water management districts,

  "...appraisal reports, offers, and counteroffers are confidential and exempt from the provisions of [sunshine law] until an option contract is executed." (Florida Statutes 373.139)

Introduction

- The buyer can also choose the sequence of negotiations.
- For example, is it better to start with
  - the weaker or stronger seller.
  - the more or less valuable item, etc.?

Related Literature

- **Confidential Negotiations**

Calzolari and Pavan (*JET*, 2006); Krasteva and Yildirim (*GEB*, 2012); Noe and Wang (*ReStud*, 2004); Taylor (*RAND*, 2004).

- **Buyer's Sequencing Preference**

Cai (*JET*, 2000); Marx and Shaffer (*IJIO*, 2007); Krasteva and Yildirim (*RAND*, Forth.); Li (2010); Marshall and Merlo (*IER*, 2004); Moresi, Salop, and Sarafidis (2010); Xiao (2010).

- **Seller's Sequencing Preference**

Arbatskaya (*RAND*, 2007); Marx and Shaffer (*IJIO*, 2010).

Model (w/ Perfect Complements)

Based on Krasteva and Yildirim (GEB, 2012)

- Three risk-neutral players: one buyer (b) and two sellers (s_i, $i = 1, 2$).
- Buyer's valuations are
  - $V = 1$ from a joint purchase,
  - $v_1 = v_2 = 0$ from each unit.
- $c_i = 0 \Longrightarrow$ *efficient* to purchase both.
- Bargaining over price, p_i:

$$\begin{cases} s_i, & \text{w/ prob.} \quad \alpha \\ b, & \text{w/ prob.} \quad 1-\alpha. \end{cases}$$

Public vs. Private Negotiations

eXploding offers (i.e., pay-as-you-go)

- **Public.** $p_1(s_1) = 1 - \alpha$ and $p_2(s_2) = 1 \Longrightarrow$ efficient trade.

And, the buyer's expected payoff is:

$$\begin{aligned}\pi^X(b) &= (1-\alpha)^2 + \alpha(1-\alpha)[1-(1-\alpha+0)] \\ &\quad +(1-\alpha)\alpha[1-(0+1)] + \alpha^2[1-(1-\alpha+1)] \\ &= (1-\alpha)^2.\end{aligned}$$

- **Private.** $p_1(s_1) = p_2(s_2) = \frac{1}{1+\alpha}$, and the buyer visits each seller w/ prob. $\frac{1}{2}$.

$\Longrightarrow$ efficient trade. And,

$$\overline{\pi}^X(b) = 1 - 2\alpha\frac{1}{1+\alpha} = \frac{1-\alpha}{1+\alpha} > (1-\alpha)^2 = \pi^X(b).$$

Public vs. Private Negotiations

Open-ended offers (i.e., decision at the end)

- **Public.** $p_1(s_1) = 1$ and $p_2(s_2) = 0 \Longrightarrow$ efficient trade.

And,

$$\pi^O(b) = (1-\alpha)^2.$$

- Assume $\alpha < \frac{1}{2}$.
- **Private.** $p_1(s_1) = p_2(s_2) = 1 \Longrightarrow$ inefficient trade.

And,

$$\overline{\pi}^O(b) = (1-\alpha)^2.$$

Implications

- Public neg. is efficient while private neg. can be inefficient.
- The buyer (weakly) prefers private neg.
- May explain the presence of "sunshine" laws.
- Extended return and cancellation policies, e.g., FTC's cooling-off rule may hinder efficiency.

Sellers' Incentives to Disclose

- Consider *eXploding* offers, and suppose sellers pre-commit to their disclosure policies.
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$s_i \backslash s_j$	dis	$\overline{dis}$
dis	$\alpha(1-\frac{\alpha}{2}); \alpha(1-\frac{\alpha}{2})$	$\alpha; \alpha(1-\alpha)$
$\overline{dis}$	$\alpha(1-\alpha); \alpha$	$\alpha\frac{1}{1+\alpha}; \alpha\frac{1}{1+\alpha}$

- Unique NE $= (dis, dis) \Longrightarrow$ public neg.

Strategic Sequencing

- Consider the sequence $s_i \longrightarrow s_j$.
- Let $v_1 = v_2 = v < \frac{1}{2}$.
- Assume fully contingent price contracts.
- Then, the buyer and s_i can always conspire to leave 0 surplus to s_j.
- But how?

Equilibrium Prices

Proposition. Given the sequence $s_i \rightarrow s_j$, the following prices constitute a SPNE:

- On-equilibrium path:
  - efficient trade; 0 profit for s_j (similar to Aghion and Bolton (*AER*, 1987)).

$$\begin{aligned} p_i^{ij}(s_i) &= 1-(1-\alpha_j)v \text{ and } p_j^{ij}(s_j)=0 \\ p_i^{ij}(b) &= p_j^{ij}(b)=0. \end{aligned}$$

- Off-equilibrium path:
  - likely below-cost pricing and "breakup" fee.

$$p_i^{i}(b) = -(1-v) \text{ and } p_i^{i}(s_i) = p_i^{-i}(s_i) = \alpha_j v.$$

Sequence Implication

1. The buyer receives expected payoff:

$$\pi_{ij}(b) = (1 - \alpha_i) + \alpha_i(1 - \alpha_j)v.$$

2. $\pi_{ij}(b) > \pi_{ji}(b) \iff \alpha_i < \alpha_j.$

$\Longrightarrow$ start with the *weaker* seller.

Non-contingent Prices

- The unique (equilibrium) prices are:

$$p_i^*(s_i) = 1 - v \text{ and } p_j^*(s_j|1 - v) = v.$$

- The buyer's payoff is:

$$\pi_{ij}(b) = (1 - \alpha_i)(1 - \alpha_j) + \alpha_i(1 - \alpha_j)v + (1 - \alpha_i)\alpha_j v.$$

- Indifference to the sequence!

Model (w/ Payoff Uncertainty)

Based on Krasteva and Yildirim (RAND, Forth.).

- $V = 1$ from a joint purchase.
- $v_i = \begin{cases} 0, & \text{w/ prob.} \quad q \\ \frac{1}{2}, & \text{w/ prob.} \quad 1-q. \end{cases}$

Equilibrium Prices

Proposition. *Fix the sequence $s_i \longrightarrow s_j$. In equilibrium, if s_i makes the offer for product i, then*

$$\left(p_i^*(s_i), p_j^*(s_j|s_i)\right) = \begin{cases} \left(1, \frac{1}{2}\right) & \text{if} \quad \alpha_j < \widehat{\alpha}(q) \\ \left(\frac{1+q}{2}, \frac{1-q}{2}\right) & \text{if} \quad \alpha_j \geq \widehat{\alpha}(q) \text{ and } q > \frac{\sqrt{5}-1}{2} \\ \left(\frac{1}{2}, \frac{1}{2}\right) & \text{if} \quad \alpha_j \geq \widehat{\alpha}(q) \text{ and } q \leq \frac{\sqrt{5}-1}{2}. \end{cases}$$

Efficiency and Indifference

Proposition. *Equilibrium trade is efficient irrespective of the sequence if and only if* $q \notin (\frac{1}{2}, 1)$*, or equivalently* $\widehat{\alpha}(q) = 0$*. In addition, if* $q \notin (\frac{1}{2}, 1)$*, then the buyer is indifferent to the sequencing.*

Strategic Sequencing

Proposition. *Let* $q \in (\frac{1}{2}, 1)$ *and* $\alpha_1 < \alpha_2$. *Then,*

$$\begin{cases} \text{is indifferent to the sequence} & \text{if} \quad \alpha_1 < \alpha_2 < \widehat{\alpha}(q) \\ \text{strictly prefers the sequence } s_1 \longrightarrow s_2 & \text{if} \quad \alpha_1 < \widehat{\alpha}(q) \le \alpha_2 \\ \text{strictly prefers the sequence } s_2 \longrightarrow s_1 & \text{if} \quad \widehat{\alpha}(q) \le \alpha_1 < \alpha_2. \end{cases}$$

Raising Own Cost of Acquisition

Minimum Purchase Price

Proposition. *Let $q_1 = q_2 = q$ and $\alpha_1 = \alpha_2 = \alpha$. Suppose that prior to negotiations, the buyer commits to pay at least $w \geq 0$ for each unit she purchases. Then,*

- *for $q \in (\frac{1}{2}, 1)$, there exists $\alpha^c(q) \in (0, \widehat{\alpha}(q))$ such that the buyer optimally sets $w > 0$ for all $\alpha \in [\alpha^c(q), \widehat{\alpha}(q))$;*
- *for $q \notin (\frac{1}{2}, 1)$, the buyer optimally sets $w = 0$ for all α.*

Proposition. *Let* $\alpha_1 = \alpha_2 = \alpha$, *and suppose that the buyer can costlessly make input 1 in-house, which has no stand-alone value,* $q_1 = 1$, *but she needs to outsource input 2 with* $q_2 \in (\frac{\sqrt{5}-1}{2}, 1)$. *Then, the buyer is strictly better off outsourcing both inputs than only input 2 if and only if* $\alpha > \frac{1+q_2^2}{1+q_2}$.

Implications

Two sets of observations.

1. Efficiency vs. Sequencing
   - Efficient trade implies indifference to sequencing
   - Under Inefficient trade, the sequence is important.
2. Raising own cost of acquisition
   - Setting a minimum purchase price
   - Outsourcing even when available in-house.