Entry by Takeover: Auctions vs. Bilateral Negotiations

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Takeover as a Mode of Entry

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  - In 1988 *Phillip Morris* entered the packaged-foods industry by acquiring *Kraft*
  - In 2011 *Microsoft* acquired *Skype* and is currently acquiring the mobile division of *Nokia*
Firms often enter new markets by taking over an incumbent e.g., because of high costs for direct entry (Uetake and Watanabe '12)

- In 1988 *Phillip Morris* entered the packaged-foods industry by acquiring *Kraft*
- In 2011 *Microsoft* acquired *Skype* and is currently acquiring the mobile division of *Nokia*
- Hennart and Park (1993): 36% of U.S. market entries by Japanese companies in 1981-89 took place by merger
This Paper

*How does an entrant choose the incumbent to acquire?*
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  - asymmetric incumbents
  - target-specific synergies
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  - *auction* between the entrant and other incumbents
  - *bilateral bargaining* between the entrant and the target
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    (private negotiations whose terms cannot be observed by outsiders)

- In a sample of 400 major U.S. takeovers in the 1990s:
  - 50% of the targets were auctioned among multiple bidders;
  - 50% negotiated with a single buyer (Boone and Mulherin, 2007)
Positive Results

- The choice of the takeover target depends on:
  (i) incumbents’ market shares
  (ii) synergies
  (iii) takeover price (that depends on the mechanism)
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- With bargaining, price is lower (for given target) because independent of externalities
Normative Results

- Takeovers with stronger externalities on incumbents also yield higher consumer surplus
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  ⇒ An auction may induce the entrant to choose a less efficient target (with lower consumer surplus)
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- Trade-off between target shareholders’ profit (higher with auction) and consumers’ surplus (higher with bargaining)
Introduction

Related Literature

1. Auctions with downstream interaction among buyers

2. Direct entry vs. acquisition
   - Gilbert and Newbery (1992), McCardle and Viswanathan (1994)

3. Endogenous Mergers

4. Takeover premia (corporate finance)
Outline

1. Model
2. Takeover by Bargaining
3. Takeover by Auction
4. Auctions vs. Bargaining
Model

- Cournot competition with homogeneous goods
- Firms 2, ..., n have marginal cost $c_2 = ... = c_n$
- Firm 1 has marginal cost $c_1 < c_2$ (no fixed cost)
- Demand function is $P(Q) = A - Q$
Model

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- Firm 1 has marginal cost \(c_1 < c_2\) (no fixed cost)
- Demand function is \(P(Q) = A - Q\)
- Firm \(i\)'s profits:

\[
\pi_n \left( c_i; \sum_{k \neq i} c_k \right) = \left( \frac{A - nc_i + \sum_{k \neq i} c_k}{n + 1} \right)^2 \equiv \frac{\Phi_i^2}{(n + 1)^2}
\]
Cournot competition with homogeneous goods

Firms 2,...,n have marginal cost $c_2 = ... = c_n$

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We assume that incumbents have no incentive to merge ex-ante
Model

- Potential entrant $E$ can take over either firm 1 or firm 2.
- If $E$ takes over $i$, the resulting firm has cost $c_i - s_i$, $i = 1, 2$. 
Potential entrant $E$ can take over *either* firm 1 *or* firm 2

If $E$ takes over $i$, the resulting firm has cost $c_i - s_i$, $i = 1, 2$

If firms $i$ and $j$ merge, the resulting firm has cost $\min \{c_i, c_j\}$
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Costs and synergies are common knowledge
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Costs and synergies are common knowledge.

Two different takeover procedures:

1. **Bargaining** with take-it-or-leave-it offer by entrant.
2. **Ascending auction** between entrant and other incumbents.
**Timing**

*Period 1*: $E$ selects the takeover target

*Period 2*: Auction or bargaining for the target

*Period 3*: Market competition among the remaining firms
Timing

*Period 1:* $E$ selects the takeover target

*Period 2:* Auction or bargaining for the target

*Period 3:* Market competition among the remaining firms

($E$ can only select one target)
Firm 2 is the **profitable target** if $E$ obtains a higher profit by taking over 2 rather than 1

$$\pi_n (c_2 - s_2; \cdot) > \pi_n (c_1 - s_1; \cdot) \iff s_2 - s_1 > \frac{n + 1}{n} (c_2 - c_1)$$
Firm 2 is the **profitable target** if $E$ obtains a higher profit by taking over 2 rather than 1

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If $E$ takes over $i$, total output is

$$\frac{1}{n+1} (nA - \sum_k c_k + s_i)$$
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The **efficient target** is the firm with the strongest synergies (that maximize consumers’ surplus)
Efficient and Profitable Targets

Firm 1 is efficient

Firm 2 is efficient

45°
Efficient and Profitable Targets

Firm 2 is profitable

\[ s_2 \]

Firm 1 is profitable

\[ s_1 + \frac{n+1}{n} (c_2 - c_1) \]

\[ \frac{n+1}{n} (c_2 - c_1) \]
Efficient and Profitable Targets

Firm 1 is profitable and efficient

\[ s_1 + \frac{n+1}{n} (c_2 - c_1) \]

Firm 2 is profitable and efficient

\[ \frac{n+1}{n} (c_2 - c_1) \]

Firm 1 is profitable and firm 2 is efficient

\[ 45^\circ \]
Takeover by Bargaining

- With bargaining, takeover of firm $i$ yields

$$\pi_n \left( c_i - s_i; \sum_{k \neq i} c_k \right) - \pi_n \left( c_i; \sum_{k \neq i} c_k \right) \equiv r^i \text{: reservation value}$$
Takeover by Bargaining

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\]

Proposition 1

With bargaining, \( E \) takes over firm 1 rather than firm 2 if and only if

\[
s_1^2 - s_2^2 > \frac{2}{n} \left( s_2 \Phi_2 - s_1 \Phi_1 \right)
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\[
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\( \equiv r^i \): reservation value

**Proposition 1**

*With bargaining, \( E \) takes over firm \( 1 \) rather than firm \( 2 \) if and only if*

\[
s_1^2 - s_2^2 > \frac{2}{n} (s_2 \Phi_2 - s_1 \Phi_1)
\]

- \( E \) takes over firm \( 2 \) if and only if \( s_2 \gg s_1 \)
Takeover by Bargaining

- E takes over 2 (profitable and efficient)
- E takes over 2 (not profitable)
- E takes over 1 (profitable and efficient)
- E takes over 1 (not efficient)
In an auction for $i$, firm $j$’s *willingness to pay for blocking* $E$ and merging with $i$ is

$$v^i_j \equiv \pi_{n-1} \left( \min \{c_i, c_j\} ; \sum_{k \neq i,j} c_k \right) - \pi_n \left( c_j ; \sum_{k \neq j} c_k - s_i \right)$$

- $j$’s profit with merger
- $j$’s profit with entry
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$j$’s profit with merger

$j$’s profit with entry

Two effects:

1. Profit increase if $i$ and $j$ merge

$$\pi_{n-1} \left( \min \{c_i, c_j\} ; \sum_{k \neq i,j} c_k \right) - \pi_n \left( c_j ; \sum_{k \neq j} c_k \right)$$

2. **Externality**: profit reduction if $E$ enters

$$\pi_n \left( c_j ; \sum_{k \neq j} c_k \right) - \pi_n \left( c_j ; \sum_{k \neq j} c_k - s_i \right)$$
Incumbents’ Bids

- Assume arbitrarily small probability that \( E \) drops out at a "low" price (to avoid indifference and induce incumbents to bid)

- With externalities, bid may differ from willingness to pay (e.g., each incumbent prefers another incumbent to win)
Incumbents’ Bids

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- In an auction for firm 2, $v_1^2 > v_j^2$, $j > 2$

  $\Rightarrow$ Firm 1 bids up to its willingness to pay
  (If firm 1 loses at $v_1^2$, no other incumbent can win)
Incumbents’ Bids

- Assume arbitrarily small probability that $E$ drops out at a "low" price (to avoid indifference and induce incumbents to bid)

- With externalities, bid may differ from willingness to pay (e.g., each incumbent prefers another incumbent to win)

- In an auction for firm 2, $v_1^2 > v_j^2$, $j > 2$
  \[ \Rightarrow \text{Firm 1 bids up to its willingness to pay} \]
  \[ \text{(If firm 1 loses at } v_1^2, \text{ no other incumbent can win)} \]

- In an auction for firm 1, all incumbents have willingness to pay $v_2^1$
  \[ \Rightarrow \text{In any pure-strategy equilibrium, one incumbent bids up to } v_2^1 \]
In an auction, $E$ pays the highest between other incumbents’ bids and the reservation value.

**Lemma 1**

*To acquire firm $i$ in an auction, $E$ pays:*

- $v^i_j$ if $s_i \geq \hat{s}_i$
- $r^i$ if $s_i < \hat{s}_i$, $i, j = 1, 2$

*Furthermore, $\hat{s}_1 > \hat{s}_2$*
Auction Price

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To acquire firm $i$ in an auction, $E$ pays:

- $v_j$ if $s_i \geq \hat{s}_i$
- $r^i$ if $s_i < \hat{s}_i$, $i, j = 1, 2$

Furthermore, $\hat{s}_1 > \hat{s}_2$

- High $s_i$ $\Rightarrow$ high externality $\Rightarrow$ high incumbent’s bid
Proposition 2

In an auction, (i) when \( s_1 \leq \hat{s}_1 \) and \( s_2 \leq \hat{s}_2 \), \( E \) takes over 1 iff

\[
s_1^2 - s_2^2 > \frac{2}{n} (s_2 \Phi_2 - s_1 \Phi_1)
\]

(ii) when \( s_1 \leq \hat{s}_1 \) and \( s_2 > \hat{s}_2 \), \( E \) takes over 1 iff

\[
s_1^2 - s_2^2 > \frac{2}{n} (s_2 \Phi_2 - s_1 \Phi_1) + \frac{s_2}{n^2} (s_2 - 2\Phi_1) - \frac{\Phi_2}{n^4} [\Phi_2 + n(2\Phi_1 - n\Phi_2)]
\]

(iii) when \( s_1 > \hat{s}_1 \), \( E \) takes over 1 iff

\[
s_1^2 - s_2^2 > 2 \left( \frac{ns_2 + s_1}{n^2 + 1} \right) \Phi_2 - 2 \left( \frac{ns_1 + s_2}{n^2 + 1} \right) \Phi_1
\]
Proposition 2

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\]

- \( E \) takes over firm 2 if and only if \( s_2 \gg s_1 \)
Takeover by Auction

- E takes over 2 (profitable and efficient)
- E takes over 2 (not profitable)
- E takes over 1 (not efficient)
- E takes over 1 (profitable and efficient)
Auctions vs. Bargaining
Auctions vs. Bargaining

E takes over 1 with auction, and 2 with bargaining (efficient)

\( S_2 \)

\( S_1 \)

\( \hat{S}_2 \)

\( \hat{S}_1 \)

45°
Proposition 3

- If a firm is profitable and efficient, E takes it over both with auction and with bargaining.

- If 1 is profitable and 2 is efficient:
  (i) E takes over 1 with auction and 2 with bargaining when:
    (a) $s_1 > \hat{s}_1$ and
    $$\frac{2}{1+n^2} (\Phi_1 s_2 - \Phi_2 s_1) - \frac{2}{n(1+n^2)} (s_1 \Phi_1 - s_2 \Phi_2) > s_2^2 - s_1^2 - \frac{2}{n} (s_1 \Phi_1 - s_2 \Phi_2) > 0$$
    (b) $s_1 \leq \hat{s}_1$ and
    $$\frac{s_2^2}{n^2} (2\Phi_1 - s_2) + \frac{\Phi_2}{n^4} [\Phi_2 + n (2\Phi_1 - n\Phi_2)] > s_2^2 - s_1^2 - \frac{2}{n} (s_1 \Phi_1 - s_2 \Phi_2) > 0$$

  (ii) E never takes over 2 with auction and 1 with bargaining.
Auctions vs. Bargaining

- When the target choice depends on the takeover mechanism, profitable and efficient targets differ.

- The entrant may choose the efficient target with bargaining and the profitable target with auction, but not vice versa.
Auctions vs. Bargaining

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- Auctions discourage $E$ from acquiring targets with stronger synergies.
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- Auctions discourage $E$ from acquiring targets with stronger synergies ... but stronger synergies imply higher consumer surplus.

$\Rightarrow$ Takeovers by auction result in a (weakly) lower consumer surplus than takeovers by bargaining.
Takeover Policy

- *Delaware law*: targets’ boards of directors are required to act as “auctioneers charged with getting the best price for the stock-holders at a sale of the company”
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  ... but the takeover mechanism also affects the target choice and auctions favour less efficient targets

⇒ Trade-off between target shareholders’ profit (higher with auction) and consumers’ surplus (higher with bargaining)
Extensions

1. Generalized Nash bargaining
2. Collusion among incumbents to block entry
3. Small markets
Small Markets

- Assume incumbents have incentive to merge ex-ante
  \((n \text{ small and/or } c_2 \gg c_1)\)
  e.g., technology shock makes merger and entry profitable
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- With auctions (compared to main model):
  - incumbents’ willingness to pay is higher – direct effect
  - target’s reservation value never binds
Small Markets

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- With auctions (compared to main model):
  - incumbents’ willingness to pay is higher – direct effect
  - target’s reservation value never binds

  \(\Rightarrow\)  \(E\) is more likely to take over firm 1
  - i.e., even if it has lower synergy
Takeover by Auction

$E$ takes over 1
$E$ takes over 2

$45^\circ$

$\hat{s}_2$
$\hat{s}_1$
Takeover by Auction

\[ s_2 \]

\[ \hat{s}_2 \]

\[ 45^\circ \]

\[ \hat{s}_1 \]
Auctions vs. Bargaining

- With bargaining, target choice is unaffected
Auctions vs. Bargaining

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1. $E$ may take over firm 2 with bargaining (efficient) and firm 1 with auction, but not vice versa
Auctions vs. Bargaining

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2. Incumbents may outbid $E$ in auctions and block entry (when synergies are low)
Auctions vs. Bargaining

- With bargaining, target choice is unaffected

1. $E$ may take over firm 2 with bargaining (efficient) and firm 1 with auction, but not vice versa

2. Incumbents may outbid $E$ in auctions and block entry (when synergies are low)

$\Rightarrow$ Auctions are more likely to reduce consumer surplus
Auctions vs. Bargaining

$s_2$

$s_1$

$45^\circ$
Auctions vs. Bargaining

E takes over 1 with auction, and 2 with bargaining (efficient)
Auctions vs. Bargaining
Conclusions

- Entry by takeover with endogenous target choice
- Profitable and efficient targets may differ (w/asymmetric firms)
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- The negative externality imposed on incumbents by entry:
  - affects the takeover price with **auctions** (takeover premia)
  - but not with **bilateral negotiations**
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- With takeovers by auctions:
  - entrant may choose a less efficient target (than bargaining) because efficient ones are relatively more expensive
  - incumbents may prevent entry of a more efficient competitor (e.g., national champions blocking takeovers by foreign firms)
Conclusions

- Entry by takeover with endogenous target choice
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- Trade-off between target shareholders’ profit and consumers’ surplus
Generalized Nash Bargaining

- The entrant has bargaining power \((1 - \beta)\), where \(\beta \in (0, 1)\)
- Nash bargaining with disagreement points equal to current profits
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- Nash bargaining with disagreement points equal to current profits

\[ \pi_n \left( c_i; \sum_{k \neq i} c_k \right) + \beta \left[ \pi_n \left( c_i - s_i; \sum_{k \neq i} c_k \right) - \pi_n \left( c_i; \sum_{k \neq i} c_k \right) \right] \]

To take over firm $i$, $E$ pays gains from trade
Generalized Nash Bargaining

- The entrant has bargaining power \((1 - \beta)\), where \(\beta \in (0, 1)\)
- Nash bargaining with disagreement points equal to current profits

⇒ To take over firm \(i\), \(E\) pays

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\]

and obtains

\[
(1 - \beta) \left[ \pi_n \left( c_i - s_i; \sum_{k \neq i} c_k \right) - \pi_n \left( c_i; \sum_{k \neq i} c_k \right) \right]
\]
Generalized Nash Bargaining

- The entrant has bargaining power \((1 - \beta)\), where \(\beta \in (0, 1)\)
- Nash bargaining with disagreement points equal to current profits

\[ r^i = \pi_n \left( c_i; \sum_{k \neq i} c_k \right) + \beta \left[ \pi_n \left( c_i - s_i; \sum_{k \neq i} c_k \right) - \pi_n \left( c_i; \sum_{k \neq i} c_k \right) \right] \]

\( r^i \) gains from trade

and obtains

\[ (1 - \beta) \left[ \pi_n \left( c_i - s_i; \sum_{k \neq i} c_k \right) - \pi_n \left( c_i; \sum_{k \neq i} c_k \right) \right] \]

- Target choice as in our main model

Extension: Entry by Takeover: Auctions vs. Bilateral Negotiations
Collusion among Incumbents