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 recently acquired the mobile division of *Nokia*
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  - In 1988 *Phillip Morris* entered the packaged-foods industry by acquiring *Kraft*
  - In 2011 *Microsoft* acquired *Skype* and recently acquired the mobile division of *Nokia*
- Similarly, firms can find it more convenient to enter a foreign market by taking over a local firm
  - 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 which incumbent to acquire?*
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  - asymmetric incumbents
  - target-specific synergies
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- 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:
  1. incumbents’ market shares
  2. synergies
  3. takeover price (that depends on the mechanism)

Due to synergies, entry imposes negative externalities on incumbents.

In an auction:
- Incumbents bid aggressively to prevent entry
- Price may exceed the target's reservation value
- Takeover premia (Molnar, 2002)

With bargaining, price is lower (for given target)
- Because independent of externalities
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Normative Results

- Takeovers with stronger externalities on incumbents also yield higher consumer surplus
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- Trade-off between target shareholders’ profit (higher with auction) and consumers’ surplus (higher with bargaining)
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
Cournot competition with homogeneous goods

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

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:

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

We assume that incumbents have no incentive to merge ex-ante (\( A \) and/or \( n \) large)
Potential entrant $E$ can take over either firm 1 or firm 2.

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

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
Model

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Model

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

1. **Bargaining** with take-it-or-leave-it offer by entrant
2. **Ascending auction** between entrant and other incumbents
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 **profit-maximizing target** iff $E$ obtains a higher profit by taking over 2 rather than 1

$$\pi_n (c_2 - s_2; \cdot) > \pi_n (c_1 - s_1; \cdot) \iff s_2 - s_1 > \frac{n + 1}{n} (c_2 - c_1)$$
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If $E$ takes over $i$, total output is

$$\frac{1}{n+1} (nA - \sum_k c_k + s_i)$$
Efficient and Profit-Maximizing Targets

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- The **efficient target** is the firm with the strongest synergies (that maximizes consumers’ surplus)
Efficient and Profit-Maximizing Targets
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\[ s_1 + \frac{n+1}{n} (c_2 - c_1) \]

1 is profit-maximizing

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

2 is profit-maximizing
Efficient and Profit-Maximizing Targets

2 is efficient and profit-maximizing

\[ s_2 = \frac{n+1}{n} (c_2 - c_1) \]

2 is efficient and

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

1 is profit-maximizing

1 is efficient and

45°
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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\( \equiv r^i \): 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)
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\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) = r^i: \text{reservation value}
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Proposition 1

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

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

- $E$ takes over 2 (efficient and profit-max)
- $E$ takes over 1 (not efficient)
- $E$ takes over 2 (not profit-max)
- $E$ takes over 1 (efficient and profit-max)

The diagram shows the relationship between $s_1$ and $s_2$ with an angle of 45°, indicating the conditions under which $E$ takes over different scenarios.
In an auction for $i$, firm $j$’s *willingness to pay for blocking* $E$ and merging with $i$ is

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

- $j$’s profit with merger
- $j$’s profit with entry
Takeover by Auction

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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, $v^2_1 > v^2_j$, $j > 2$

  $\Rightarrow$ Firm 1 bids up to its willingness to pay

  (If firm 1 loses at $v^2_1$, no other incumbent can 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)

- In an auction for firm 1, all incumbents have willingness to pay $v_2^1$

$\Rightarrow$ In any pure-strategy equilibrium, one incumbent bids up to $v_2^1$
Auction Price

- In an auction, $E$ pays the highest between other incumbents’ bids and the reservation value.

Lemma 1

To acquire firm $i \in \{1, 2\}$ in an auction, $E$ pays:

- $v^i_j$ if $s_i \geq \hat{s}_i$
- $r^i$ otherwise

Furthermore, $\hat{s}_1 > \hat{s}_2$
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**Lemma 1**

*To acquire firm $i \in \{1, 2\}$ in an auction, $E$ pays:*

- $v_i^j$ if $s_i \geq \hat{s}_i$
- $r_i$ otherwise

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

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

In an auction, $E$ takes over 1 iff:

(i) 
$$s_1^2 - s_2^2 > \frac{2}{n} (s_2 \Phi_2 - s_1 \Phi_1) \quad \text{when } s_1 \leq \hat{s}_1 \text{ and } s_2 \leq \hat{s}_2;$$

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

when $s_1 \leq \hat{s}_1$ and $s_2 > \hat{s}_2$;

(iii) 
$$s_1^2 - s_2^2 > 2 \left(\frac{ns_2 + s_1}{n^2 + 1}\right) \Phi_2 - 2 \left(\frac{ns_1 + s_2}{n^2 + 1}\right) \Phi_1 \quad \text{when } s_1 > \hat{s}_1$$
Proposition 2

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when \( s_1 \leq \hat{s}_1 \) and \( s_2 > \hat{s}_2; \)

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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 (efficient and profit-max)
- $E$ takes over 2 (not profit-max)
- $E$ takes over 1 (not efficient)
- $E$ takes over 1 (efficient and profit-max)

Diagram:
- $s_2$ vs. $s_1$
- $45^\circ$
- $\hat{s}_2$
- $\hat{s}_1$
Auctions vs. Bargaining

\[ s_2 \]

\[ \hat{s}_2 \]

\[ 45^\circ \]

\[ s_1 \]

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

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

Proposition 3

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

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

  (b) $s_1 \leq \hat{s}_1$ and
  
  \[
  \frac{s_2}{n^2} (2\Phi_1 - s_2) + \frac{\Phi_2}{n^4} \left[ \Phi_2 + n (2\Phi_1 - n\Phi_2) \right] > s_2^2 - s_1^2 - \frac{2}{n} \left( s_1 \Phi_1 - s_2 \Phi_2 \right) > 0
  \]

  
  (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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The entrant may choose the efficient target with bargaining and the profitable target with auction, but not vice versa.

Auctions discourage $E$ from acquiring targets with stronger synergies ... but stronger synergies imply higher consumer surplus.
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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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- Auctions increase competition for a given target
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  ... but the takeover mechanism also affects the target choice and auctions favour less efficient targets
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- Auctions increase competition for a given target
  ... 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

\[ s_2 \]

\[ s_1 \]

E takes over 2

E takes over 1

\( \hat{s}_2 \)

\( \hat{s}_1 \)

45°
Takeover by Auction

\[ s_2 \]

\[ s_1 \]

\[ \hat{s}_2 \]

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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

1. With bargaining, target choice is unaffected

2. \(E\) 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 (if 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 (if synergies are low)

\( \Rightarrow \) Auctions are more likely to reduce consumer surplus
Auctions vs. Bargaining
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
- Profit-maximizing and efficient targets may differ
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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 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)
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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

To take over firm \(i\), \(E\) pays

\[
\pi_n \left( \frac{C_i; \sum_{k \neq i} C_k}{r^i} \right) + \beta \left[ \pi_n \left( \frac{C_i - S_i; \sum_{k \neq i} C_k}{r^i} \right) - \pi_n \left( \frac{C_i; \sum_{k \neq i} C_k}{r^i} \right) \right]
\]

gains from trade
Generalized Nash Bargaining

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- Nash bargaining with disagreement points equal to current profits

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

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

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- Nash bargaining with disagreement points equal to current profits

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\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]
\]

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
Collusion among Incumbents