Disclosure Services and Welfare Gains in Takeover Markets

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Motivation

- **M&A markets** are large and economically important.

- **Fees** are also large.
  - 85% of deals (by values) used advisers. (Golubov et al. 2012).

Q. Effects of fees on M&As **at the aggregate level**?
Q. Should we regulate investment banks? How?
M&A markets: three features

1. Heterogeneous firms, each facing (at least) 3 options.
   Model: Bidder / Target / Stand-alone.

2. Information friction.
   Model: Costly disclosure by target firms.

3. Intermediation by large investment banks.
   Model: Monopoly intermediary.
Literature: 3 views of M&As

IO. Market-power motives. Industry structure.


   - Nocke and Yeaple (2007,8), David (2021), this paper.
Matching model of M&As subject to...

- Two-dimensional heterogeneity + info friction (disclosure) + trading costs (intermediary).
- Target firms need to disclose the quality of what they sell.

Compare the following scenarios:

1. **No disclosure** (a welfare benchmark).
2. **Minimum disclosure** v.s. **full disclosure**.
3. Firms choosing between the two modes of disclosure.
Three takeaways

#1. Fees and characteristics of matched firms.

Intuition. Fees distort matching, making targets smaller.

#2. Full disclosure offered by a monopolist makes firms worse off than no disclosure.

Intuition. A fee proportional to prices with a fixed fee is highly distortionary.

#3. Monopolist’s power is weakened by adding the option of minimum disclosure and a cap on a proportional fee.

Intuition. An active coarse matching market makes demand for full disclosure more elastic to fees.
• Firms heterogeneous in non-tradeable $X$ and tradeable $A$.
• Full disclosure of $A$ is possible by paying fees.
• Each firm has 3 options \{Stand-alone, Target, Bidder\}:

SA. Use initial \textbf{skill} $X$ and \textbf{project} of quality $A$:

$$\Pi_{SA} (A, X) = AX.$$  

Target. Pay \textbf{fees} $f (A, P)$ to disclose $A$ and sell it for $P$, and exit:

$$\Pi_T (A) = P (A) - f (A, P(A)).$$

Bidder. Buy a new $\tilde{A}$ and abandon $A$:

$$\Pi_B (X) = \max_{\tilde{A}} \left\{ \tilde{AX} - P (\tilde{A}) \right\}. $$

• $P (A)$ is determined by a market-clearing condition.
Discussion of the model setup

Firms heterogeneous in \((A, X)\) solve

\[
\max \begin{cases}
AX, & P(A) - f(A, P(A)), \\
\text{Target} & \max_{\tilde{A}} \{\tilde{A}X - P(\tilde{A})\}, \\
\text{Bidder} &
\end{cases}
\]

Interpretation of \(X\): **Non-tradeable organization capital**.
- Li et al. (2018) find only bidder OC matters for M&A.

Other (restrictive) features:
- \(f(A, P, AX)\) and fees for bidders can be studied.
- \(\langle \text{Sell } A \text{ and buy } \tilde{A} \rangle\) can be studied.
- Production technology \(A^\alpha X^\beta\) can be studied.
- \((A, X)\) independent uniform. This is hard to dispense with.
Welfare benchmark: no disclosure

- A single price $P$ must clear the market for all $A$ (i.e., pooling).
- Selection determines the average quality $a \equiv E \left[ \tilde{A} \mid \text{for sale} \right]$.

**SA.** $\Pi_{SA} (A, X) = AX$.

**Target.** Sell $A$ and exit: $\Pi_T (A) = P$.

**Bidder.** Buy a new $\tilde{A}$ with $E \left[ \tilde{A} \mid \text{for sale} \right] \equiv a$ and abandon $A$:

$$\Pi_B (X) = aX - P.$$
Benchmark: No disclosure

- Plot $AX \leq P$ and $AX \leq aX - P$.

(a) Sorting for a given $P$.

(b) Sorting in equilibrium.
#1 Positive analysis
Full disclosure equilibrium with fees

(1) \( \max_{\tilde{A}} \left\{ \tilde{A}X - P(\tilde{A}) \right\} \rightarrow \) \( A \) is matched to skill \( P'(A) \equiv m(A) \).

(2) Supply and demand for \( A = a \).

- Targets with \( A = a \) determine the supply density at \( a \)
  \[
  \Pi_{SA}(a, X) \leq \Pi_T(a) \iff X \leq \frac{P(a) - f(a, P(a))}{a} \equiv S(a).
  \]

- Bidders with \( X = m(a) \) determine the demand density at \( a \)
  \[
  \Pi_{SA}(A, m(a)) \leq \Pi_B(m(a)) \iff A \leq a - \frac{P(a)}{P'(a)} \equiv D(a).
  \]

- Market-clearing condition: for any \( a \in (0, 1] \),
  \[
  \int_0^a S(A) \, dA = \int_0^{m(a)} D(m^{-1}(X)) \, dX, \text{ or } S(a) = D(a) P''(a).
  \]
Full disclosure equilibrium with fees

- Plot $m(A)$, $AX \leq \Pi_T(A)$, and $AX \leq \Pi_B(X)$.

  Targets
  \[\{z\}\]

  Bidders

(a) $\tau$ only.

(b) $\phi$ only.
Empirical measures

- For a matched pair of $A$ (target) and skill $m(A)$ (bidder),

1. **Relative target value** $RV(A) \equiv \frac{\Pi_T(A)}{\Pi_B(m(A))}$.

2. **Fee ratio** $FR(A) \equiv \frac{f(A,P(A))}{P(A)}$.

3. **Skill gap** (bidder skill $m(A)$ minus average target skill $\frac{S(A)}{2}$).

   $$SG(A) \equiv m(A) - \frac{1}{2}S(A).$$

4. **Skill premium** $\frac{SG(A)}{m(A)} \in (0,1)$ can be identified by 1 and 2:

   $$\frac{SG(A)}{m(A)} = 1 - \frac{RV(A)}{2} \cdot \frac{1 - FR(A)}{RV(A) + 1 - FR(A)}.$$
Market-clearing condition with fees

• Rearranging $S(a) = D(a)P''(a)$,

$$\left( \frac{P'(A)}{P(A)} A - 1 \right) \frac{P''(A)}{P'(A)} A = 1 - \frac{f(A, P(A))}{P(A)} \quad (1)$$

• With $f(A, P) = 0$, $P(A) = \frac{1}{2}A^2$ solves this.
  • **efficient matching** $m(A) = P'(A) = A$.

• With $f(A, P) \neq 0$, $P'(A) \neq A$ and we must solve (1).
Proposition

Assume \( f (A, P) = \phi + \tau P \).

(a) The matching function is \( m (A) = A^{\sqrt{1-\tau}} \).

(b) Target firm value is \( \Pi_T (A) = \frac{1-\tau}{1+\sqrt{1-\tau}} \left( A^{1+\sqrt{1-\tau}} - \frac{\phi}{1-\tau} \right) \).
Positive implications #1 (fees and sorting)

- Plot $m(A)$, $AX \leq \Pi_T(A)$, and $AX \leq \Pi_B(X)$.

  Targets \hspace{1cm} Bidders

(a) $\tau$ only.

(b) $\phi$ only.

(c) $\tau$ and $\phi$.

- $\tau$ is more distortionary for better deals.
- $\tau$ with $\phi > 0$ is more distortionary than without.
Positive implications #2 (empirical measures)

Proposition \(\text{Assume } f(A, P) = \phi + \tau P.\)

\(\text{c1) } RV(A) \equiv \frac{\Pi_T(A)}{\Pi_B(m(A))} = \sqrt{1 - \tau}.\)

\(\text{c2) } FR(A) \equiv \frac{f(A, P(A))}{P(A)} \text{ is decreasing in } A \text{ and increasing in } \phi, \tau.\)

\(\text{c3) } SG(A) \equiv m(A) - \frac{1}{2}S(A) \text{ is increasing in } A, \phi, \tau.\)

\(\text{c4) } \frac{SG(A)}{m(A)} \text{ is decreasing in } A \text{ and increasing in } \phi, \tau.\)

Interpretations: **Deals with high disclosure cost** should have low \(RV(A),\) high \(FR(A),\) and high \(SG(A).\)

\(\text{c1) } \text{Moeller et al. (2005): Cross-border deals have low } RV(A).\)

\(\text{c1) } \text{Chang (1998): Privately held targets have low } RV(A).\)

\(\text{c3) } \text{Li et al. (2018): Higher OC gap } \rightarrow \text{ better deals.}\)
#2 Normative analysis
Intermediary’s profit as a function of fees

Intermediary’s profit.
Monopoly choice of fees

(a) Optimal fees. (b) Sorting with optimal fees.

Optimal choice of fees and sorting with $(\phi^*, \tau^*)$. 
Policy proposal

Trade-off:

- The intermediary has a valuable skill, but uses distortionary fees.

Policy proposal:

- Regulator offers a free, minimum disclosure service, and let firms match randomly.
- I construct an equilibrium, where firms choose between:
  - In the upper market, pay fees for a full disclosure service, and match assortatively.
  - In the lower market, use a free minimum disclosure service, and match randomly.
Hybrid market structure

(a) $(\phi, \tau) = (0.01, 0)$.

(a) $(\phi, \tau) = (0.08, 0)$.

- $\phi > 0$ necessary to make the marginal target indifferent between full disclosure and pooling with lower types.
Regulation to support a hybrid market structure

- The monopolist will set $\phi = 0$ to kill the lower market, and charges a high $\tau$.
  → Need to make it choose $\phi > 0$ so that the lower market is a viable competitor.

- We show that imposing a cap on $\tau$ does this.
- The welfare gains can be made quite close to the full disclosure case.
Motivation

Model

#1 Positive analysis

#2 Normative analysis

Conclusion

(a) With the optimal cap.

(b) Unregulated case.
Welfare gains relative to the no disclosure benchmark

- Full disclosure = 340%.
- Firms’ gain = Welfare gain - Intermediary’s profit.

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<tr>
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<th>Single market</th>
<th>Hybrid market</th>
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<tbody>
<tr>
<td></td>
<td>Welfare gain</td>
<td>Firms’ gain</td>
</tr>
<tr>
<td>No regul.</td>
<td>253%</td>
<td>96%</td>
</tr>
<tr>
<td>Cap on $\tau$</td>
<td>252%</td>
<td>106%</td>
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253%  | 99%
330%  | 256%
Concluding remark

- Tractable model of M&As, rich in its empirical implications and applications.

More works:
- Distribution and technology.
- Empirical evidence.
- Multiple intermediaries competing in disclosure design?
- Dynamics?