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. Effcets 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.

- Kamien and Zang (1990), Loertscher and Marx (2019).

Finance. Managerial motives. Asset pricing.

- Roll (1986), Gorton et al. (2009).

Macro. Resource-based motives. Aggregate efficiency.

- 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 **skill** X and **project** of quality A:

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

Target. Pay **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 $\widetilde{A}$ and abandon A:

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

- $P(A)$ is determined by a market-clearing condition.

Discussion of the model setup

Firms heterogeneous in (A, X) solve

$$\max \left\{ AX, \quad \underbrace{P(A) - f(A, P(A)),}_{\textbf{Target}} \quad \underbrace{\max_{\widetilde{A}} \left\{ \widetilde{A}X - P\left(\widetilde{A}\right) \right\}}_{\textbf{Bidder}} \right\}.$$

Interpretation of X: **Non-tradeable organization capital**.

- Li et al. (2018) find only bidder OC matters for M&A.

Other (restrictive) features:

- $f(A, P, \mathbf{AX})$ and fees for bidders can be studied.
- $\left\langle \text{Sell } A \text{ and buy } \widetilde{A} \right\rangle$ 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 $\mathbf{a} \equiv E\left[\widetilde{A} | \textit{for sale}\right]$.

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

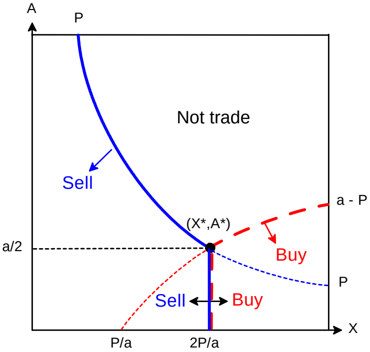
Target. Sell A and exit: $\Pi_T(A) = \mathbf{P}$.

Bidder. Buy a new $\widetilde{A}$ with $E\left[\widetilde{A} | \textit{for sale}\right] \equiv \mathbf{a}$ and abandon A:

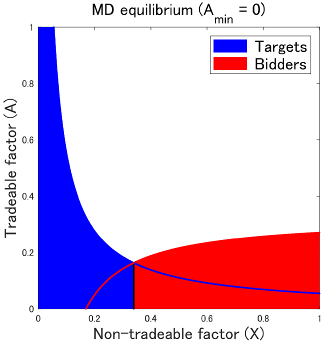
$$\Pi_B(X) = \mathbf{a}X - \mathbf{P}.$$

Benchmark: No disclosure

- Plot $\underbrace{AX \leq P}_{\text{Targets}}$ and $\underbrace{AX \leq aX - P}_{\text{Bidders}}$.



(a) Sorting for a given P.



(b) Sorting in equilibirum.

#1 Positive analysis

Full disclosure equilibrium with fees

(1) $\max_{\widetilde{A}} \left\{ \widetilde{A}X - P\left(\widetilde{A}\right) \right\} \rightarrow$ 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

$$\Pi_{SA}(a, X) \leq \Pi_T(a) \quad \Leftrightarrow \quad X \leq \frac{P(a) - f(a, P(a))}{a} \equiv \mathbf{S}(a).$$

- Bidders with $X = m(a)$ determine the **demand density at** a

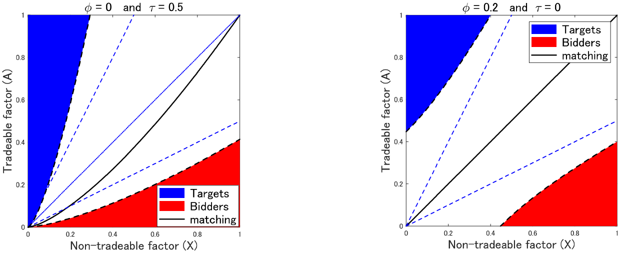
$$\Pi_{SA}(A, m(a)) \leq \Pi_B(m(a)) \quad \Leftrightarrow \quad A \leq a - \frac{P(a)}{P'(a)} \equiv \mathbf{D}(a)$$

- Market-clearing condition: for any $a \in (0, 1]$,

$$\int_0^a S(A)\, dA = \int_0^{m(a)} D\left(m^{-1}(X)\right) dX, \text{ or } \mathbf{S}(a) = \mathbf{D}(a)\, \mathbf{P}''(a).$$

Full disclosure equilibrium with fees

- Plot $m(A)$, $\underbrace{AX \leq \Pi_T(A)}_{\text{Targets}}$, and $\underbrace{AX \leq \Pi_B(X)}_{\text{Bidders}}$.



(a) τ only. (b) ϕ 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:

$$\frac{SG(A)}{m(A)} = 1 - \frac{RV(A)}{2}\frac{1-FR(A)}{RV(A)+1-FR(A)}.$$

Market-clearing condition with fees

- Rearranging $\mathbf{S}(a) = \mathbf{D}(a)\,\mathbf{P}''(a)$,

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

- 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).

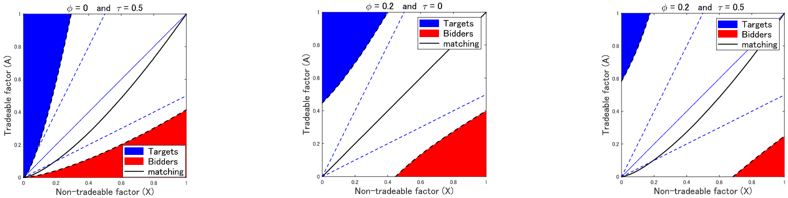
Proposition *Assume* $f(A,P)=\phi+\tau P$.

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

(b) *Target firm value is* $\Pi_T(A)=\frac{1-\tau}{1+\sqrt{1-\tau}}\left(\mathbf{A}^{\mathbf{1}+\sqrt{\mathbf{1-\tau}}}-\frac{\boldsymbol{\phi}}{\mathbf{1-\tau}}\right)$.

Positive implications #1 (fees and sorting)

- Plot $m(A)$, $\underbrace{AX \leq \Pi_T(A)}_{\text{Targets}}$, and $\underbrace{AX \leq \Pi_B(X)}_{\text{Bidders}}$.



(a) τ only. (b) ϕ only. (c) τ and ϕ.

- τ is more distortionary for better deals.
- τ with $\phi > 0$ is more distortionary than without.

Positive implications #2 (empirical measures)

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

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

(c2) $FR(A) \equiv \frac{f(A,P(A))}{P(A)}$ *is decreasing in* A *and increasing in* ϕ, τ.

(c3) $SG(A) \equiv m(A) - \frac{1}{2}S(A)$ *is increasing in* A, ϕ, τ.

(c4) $\frac{SG(A)}{m(A)}$ *is decreasing in* A *and increasing in* ϕ, τ.

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

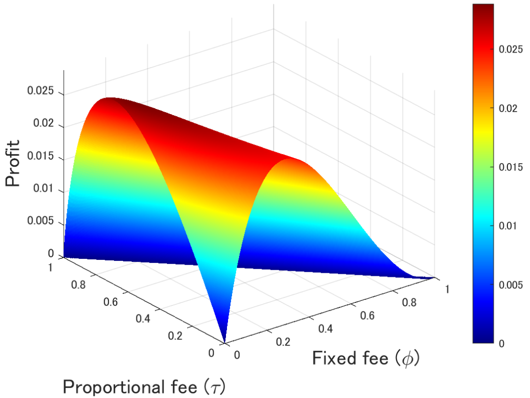
(c1) Moeller et al. (2005): **Cross-border** deals have low $RV(A)$.

(c1) Chang (1998): **Privately held targets** have low $RV(A)$.

(c3) Li et al. (2018): Higher **OC gap** $\rightarrow$ better deals.

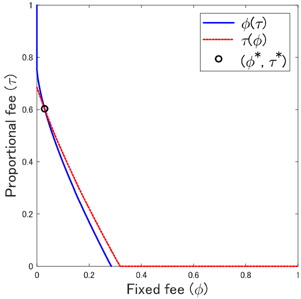
#2 Normative analysis

Intermediary's profit as a function of fees

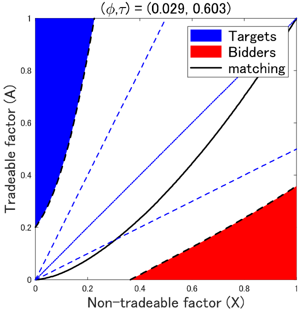


Intermediary's profit.

Monopoly choice of fees



(a) Optimal fees.



(b) Sorting with optimal fees.

Optimal choice of fees and sorting with (ϕ^*, τ^*).

Policy proposal

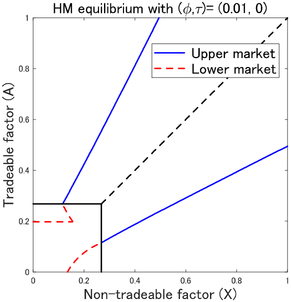
Trade-off:

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

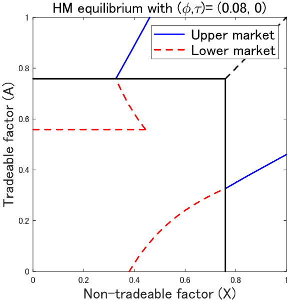
Policy proposal:

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

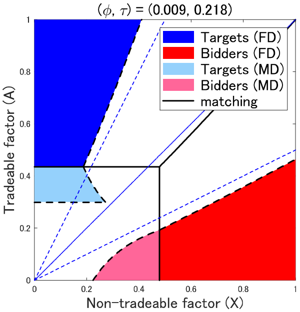
- $\phi > 0$ necessary to make the marginal target indifferent between full disclosure and pooling with lower types.

Regulation to support a hybrid market structure

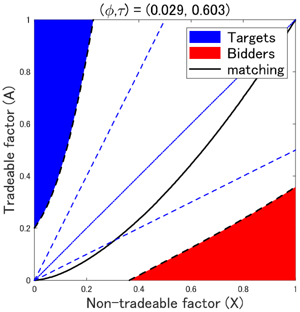
- The monopolist will set $\phi = 0$ to kill the lower market, and charges a high τ.

$\rightarrow$ Need to make it choose $\phi > 0$ so that the lower market is a viable competitor.

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



(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.

Table. The welfare gain with a monopoly intermediary

	Single market		Hybrid market	
	Welfare gain	Firms' gain	Welfare gain	Firms' gain
No regul.	253%	96%	253%	99%
Cap on τ.	252%	106%	**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?