Guess what: It's the settlements!

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Disclaimer

1 Question

- European securities trading and settlement infrastructure is highly segmented:
  Over 20 national exchanges and as many CSDs in the EU.

- Cost securities settlement in Europe $> 1.30\times$ US cost.
  Cross EU country settlement average cost = US$40.
  Cross US states settlement average cost = US$3.

- Consolidation of cross-border clearing and settlement systems is key to realize large efficiency gains.

- Consolidation is happening only slowly. Why?

- Giovannini reports (2001,03) highlight 15 barriers to efficiency. "The process of consolidation has so far been slow and sporadic, reflecting about the future regulatory, fiscal and legal environment".

- But, is there anything fundamental to the clearing and settlement industry that can slow down consolidation?

- **Result:**
  Vertical silos prevent **efficient** consolidation of trading and settlement platforms.

European Trading and Settlement Platforms:
A Drama in Five Acts

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***The stage*: Europe's financial market, XX century**

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<u>The stage</u>: ***Europe's financial market, XX century***

<u>The actors</u>:

European Trading and Settlement Platforms: A Drama in Five Acts

***The stage*: Europe's financial market, XX century**

***The actors*:**

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DB - Clearing	***(Deutsche Börse - clearing)***
CEDEL	***(International Central Securities Depositories)***
Clearstream	***(DB-Clearing + CEDEL)***

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Paris Bourse	*(France - trading)*
SICOVAM (Euroclear France)	*(France - clearing & settlement)*
Clearnet	*(France - central counterparty)*

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	(Euroclear France)	
	Clearnet	***(France - central counterparty)***
	....	
	Various CSDs	***(Belgian, Dutch, French)***
	Various SEs	***(Belgian, Dutch,...)***

European Trading and Settlement Platforms: A Drama in Five Acts

I.
Wishful
consolidation

SEs willing to consolidate

LSE & DB announces talks on iX

AMS, Brux, Mad, Mil, Paris, Swiss SE join talks

1998

European Trading and Settlement Platforms: A Drama in Five Acts

I.
Wishful
consolidation

II.
"Silosation"

SEs willing to consolidate

Germans build
a silo...

1998

1999

Silos: DB - Clearstream
(CEDEL+DB Clearing)

European Trading and Settlement Platforms: A Drama in Five Acts

I.
Wishful consolidation

II.
"Silosation"

III.
Rupture

SEs willing to consolidate

Germans build a silo...

...and cannot consolidate,

French and others break up silos...

Sicovam - Clearstream break up merger talks

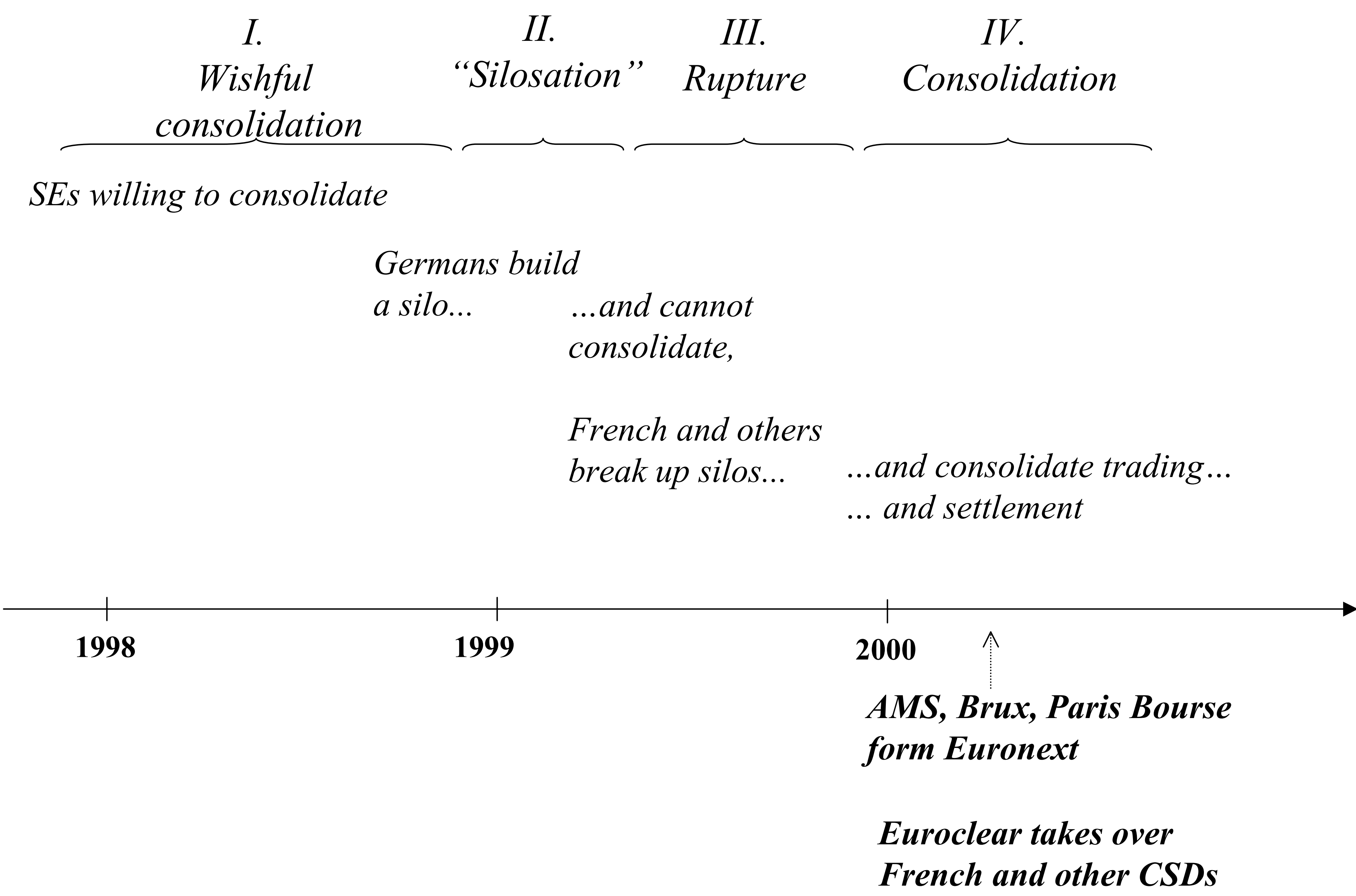
1998

1999

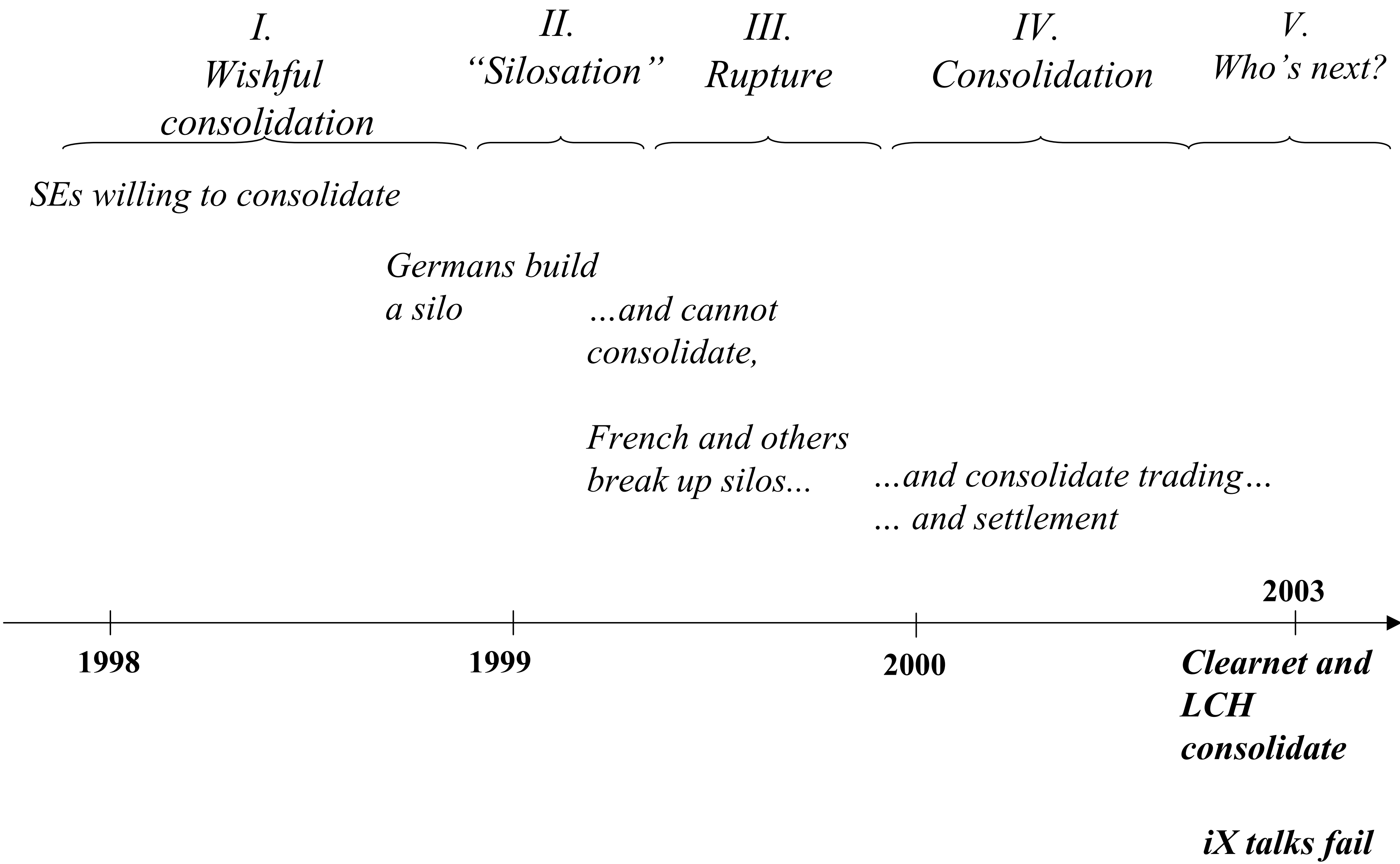
2000

AMS, Brux, Paris SE split up with back office

European Trading and Settlement Platforms: A Drama in Five Acts



European Trading and Settlement Platforms: A Drama in Five Acts



Results:

- Vertical silos prevent **efficient** consolidation of trading and settlement platforms.

- Two solutions:
  1. Subsidizing mergers (expensive).
  2. Market forces (cheaper):
     Breaking-up silos by delegating trading.

2 The Environment

- 2 firms, $i = 1, 2$.
- Each offers trading and settlement (silo structure).
- Trading costs: 0.
- Settlement costs: $\theta_i \in [0, 1]$.
- θ_i: private information, i.i.d. with density function $f(.)$.

No Consolidation:

- Demand faced by a single firm:

$$D_1(p) = \begin{cases} 1 & \text{if } p_1 \leq \bar{p}, \quad \bar{p} > 1 \\ 0 & \text{otherwise.} \end{cases} \qquad D_2(p) = \begin{cases} 1 & \text{if } p_2 \leq \bar{p}, \quad \bar{p} > 1 \\ 0 & \text{otherwise.} \end{cases}$$

- Profit for firm i: $\Pi(\theta_i) = \bar{p} - \theta_i$.

Consolidation of trading platforms:

- Demand faced by a merger:

$$D(p) = \begin{cases} 2 + d & \text{if } p \leq \bar{p}, \quad d \geq 0 \\ 0 & \text{otherwise.} \end{cases}$$

- Charge price $\bar{p}$ for trading *and* settlement.
- Settle at $min\{\theta_1, \theta_2\}$: **ex-post efficient** merger...
- ... but costs are private information.

3 Ex-post Efficient Merger? Impossible.

- **impossible** $\equiv$ there is no mechanism that implements the ex-post efficient allocation.

- A direct mechanism specifies (Revelation principle):
a settlement allocation rule: $y(\hat{\theta}) = (y_1(\hat{\theta}_1, \hat{\theta}_2), y_2(\hat{\theta}_1, \hat{\theta}_2))$, and
a transfer rule: $t(\hat{\theta}) = (t_1(\hat{\theta}_1, \hat{\theta}_2), t_2(\hat{\theta}_1, \hat{\theta}_2))$,
for all possible costs announcement $\hat{\theta} = (\hat{\theta}_1, \hat{\theta}_2)$.

- Profit function: $\Pi_i((t, y)(\hat{\theta})|\theta) = t_i(\hat{\theta}) - (2 + d)y_i(\hat{\theta})\theta_i$.

- An allocation is ex-post efficient if: $y_i(\hat{\theta}_i, \hat{\theta}_j) = 1$ if $\theta_i < \theta_j$.

We concentrate the analysis on mechanisms that are:

1. Bayesian incentive-compatible for truth-telling: for all θ_i',

$$\int \Pi_i((t,y)(\theta)|\theta)f(\theta_j)d\theta_j \geq \int \Pi_i((t,y)(\theta_i',\theta_j)|\theta)f(\theta_j)d\theta_j$$

2. feasible
   - $\int \Pi_i(t,y|\theta_i,\theta_j)f(\theta_j)d\theta_j \geq \bar{p}-\theta_i$,
   - $t_1(\theta)+t_2(\theta)=(2+d)\bar{p}$,
   - $t_i(\theta)\geq 0$ for all θ,
   - $\sum_{i=1}^{2} y_i(\theta)=1$ for all θ, where $y_i(\theta)\geq 0$ for all i.

Theorem 1 *There is no incentive-compatible and feasible mechanism that implements an ex-post efficient allocation between the two firms.*

Intuition:

- In a merger, firms share $(2+d)\bar{p}$.
- But firms need to reveal information.
  (truth-telling costly to elicit)
- Merger's revenue is a constraint.
- When Δ is given to a firm to elicit truth,
  Only $(2+d)\bar{p} - \Delta$ is left to elicit truth from the other firm.
  This might not suffice.
- For some (θ_1, θ_2), it it too costly to do so for both firms, i.e. both incentives cannot be aligned at the same time.
- What is needed is that the merger's revenue varies.
- A subsidy does the job (Theorem 2 in paper)

$\int \Pi_i(t, y|s_i, s_j) f(s_j) ds_j = \bar{\Pi}_i(t, y|s_i)$

$$\begin{aligned}
\bar{\Pi}_i(t, y|\theta_i) &= \int_0^1 \bar{t}_i(x_i) f(x_i) dx_i \qquad \} \quad \text{expected transfer to any type} \\
&+ \underbrace{(2+d)\left[\int_0^1 \bar{y}_i(x_i) x_i f(x_i) dx_i - [E(x_i|x_i \leq \theta_i) + \theta_i(1 - F(\theta_i))]\right]}_{\Delta(\theta_i):\ \text{value for the designer of knowing } \theta_i}.
\end{aligned}$$

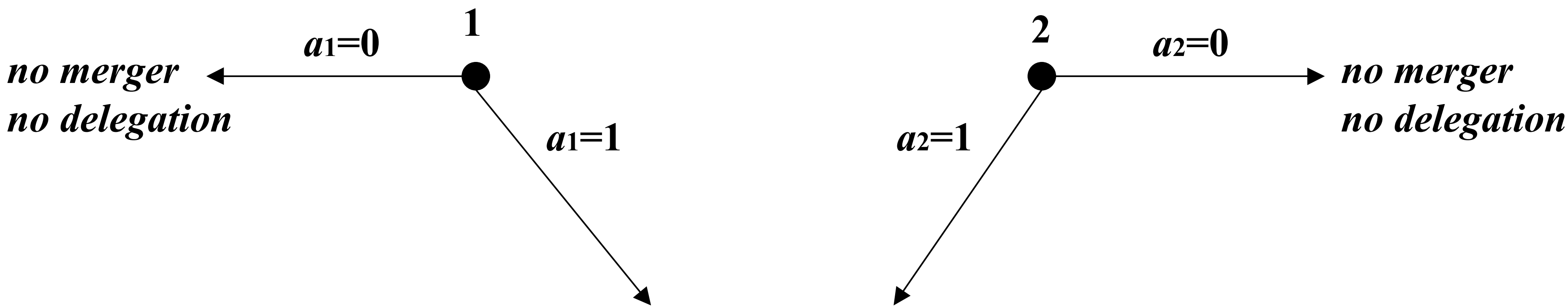
$t_i(\theta) + t_j(\theta) = (2+d)\bar{p} \quad \forall \theta$

Hence, $\bar{\Pi}_i(t, y|\theta_i) + \bar{\Pi}_j(t, y|\theta_j) = (2+d)\bar{p} + \Delta(\theta_i) + \Delta(\theta_j)$ But $\bar{\Pi}_i(t, y|\theta_i) + \bar{\Pi}_i(t, y|\theta_j) > (2+d)\bar{p}$ for some (θ_i, θ_j)

4 A Market Solution

- **Main idea: Prices reveal information**.
- Each firm delegates settlement activities to an agent (insider).
- Agents play a Bertrand game.

Market Game



delegation of settlement platforms, and consolidation of trading platforms

Settlement platforms play Bertrand

Price for settlement: $p=\min(p_1,p_2)$ $\theta=\min(\theta_1, \theta_2)$

Profit from trading: $(2+d)(\bar{p}-p)$

Revenue from merger: $R(p)$
$(2+d)(\bar{p} - p)+(2+d)(1-\alpha)\ (p-\theta)$

Transfer $t1(p)+t2(p)=R(p)$

p_i: price for settlement services charged by agent i.
Agent keep a share α_i from settlement profit.

Payoff of agent i:

$$u_i(p_i, p_j) = \alpha_i(2 + d) \begin{cases} (p_i - \theta_i) & \text{if } p_i < p_j \\ (p_i - \theta_i)/2 & \text{if } p_i = p_j \\ 0 & \text{if } p_i > p_j. \end{cases}$$

Proposition 1 *The equilibrium strategy $p_i(\theta_i)$ in the Bertrand game is strictly increasing and continuous on $[0, 1]$ for all i.*

Theorem 2 *Assume f is uniform. An ex-post efficient merger is implementable as a market outcome (perfect Bayesian Nash equilibrium).*

Intuition:

- Split the cost savings gain (net of paying agents) b/w 2 firms.

- The ex-ante net gain is always positive (for α low).

Set $\alpha_1 = \alpha_2 = \alpha > 0$.
Agent i quotes the Bertrand equilibrium price p_i.

Net gain from paying the agents and realizing the cost savings by
$\Delta(\theta) \equiv (2+d)\left[\sum_i (\frac{1}{2} - y_i(\mathbf{1},\theta))\theta_i - \sum_i \alpha_i y_i(\mathbf{1},\theta)(p_i - \theta_i)\right]$
$t_i(\mathbf{1},\theta) = \frac{(2+d)}{2}(\bar{p} - \theta_i) + \Delta(\theta)/2$
$\int \Delta(\theta) d\theta_j > 0$ for α low enough and IR holds with strict inequality

5 Bottom line

- Removing 15 barriers not enough to reach efficiency.
- For *efficient* consolidation, silos should be broken up.
- What is next? Optimal level of consolidation/competition.