Disclosure Requirements and Stock Exchange Listing Choice in an International Context

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Introduction

- How does variation in disclosure across stock exchanges affect
  - listing
  - trading

- Does competition in the market for disclosure standards lead to a "race for the bottom"?
  - Cary 1974 "charter-shopping"

- Institutions
  - Regulators (e.g., SEC and FASB)
  - Exchanges (e.g., NYSE)
  - US vs. London or Hong Kong or Vienna
  - **not** NYSE vs. NASDAQ

Questions

- For given disclosure levels and numbers of liquidity traders around each of two exchanges,
  - where do firms list?
  - what do liquidity traders trade?
  - what are the consequences of increase mobility of liquidity traders?
  - where do firms cross-list?
- How do exchanges choose disclosure levels?
- What are the implications for regulators?

Cast of Players

- explicitly modeled agents who behave strategically
  - insiders
  - liquidity traders
  - market makers
  - exchanges
- others, of whom we are mindful
  - regulators

Objectives and Actions

- Exchanges set disclosure standards.
- Market makers set prices to break even on trades.
- Firms' listing decisions are made by VENAL, PROFITEERING insiders who maximize profits from inside information.
- Liquidity traders allocate liquidity shocks across stocks and exchanges to minimize expected trading costs.

Antecedents

- Kyle (1985)
- Admati and Pfleiderer (1988)
- Foster and Viswanathan (1990)
- Chowdhry and Nanda (1991)
- Baiman and Verrecchia (1996)

Innovation

- disclosure levels vary by exchange
- strategic choice by firms, traders, and exchanges
- but
  - exogenous equity
  - no learning
  - no moral hazard
  - secondary market only

Institutions

- A public signal of firm value precedes trading
- Listing is a commitment to reveal a signal of given precision.
- Precise signals reduce an insider's informational advantage.
- Features of the exchange and its regulator
  - mandate disclosure, and thereby
  - determine signal precision.

Findings

- If liquidity is mobile, exchanges "race for the top" regardless whether they seek volume or listings
  - i.e., liquidity effect dominates informational effect
- High disclosure can never lead to a loss of liquidity.
- High disclosure leads to a loss of listings if a lot of liquidity is trapped.

Basic Model

- noisy rational expectations model
- risk neutrality
- N liquidity traders
- M firms and M insiders
- 2 exchanges
  - one high disclosure
  - one low disclosure

↑	↑	↑	↑	↑	↑
Exchanges choose their disclosure standards.	Insiders decide where to list their firm's stock.	Public signals are revealed.	Insiders choose their demands; liquidity shocks are realized; and, liquidity traders allocate demands to markets and to firms.	Market makers set prices based on order flow.	Liquidation values are realized.

Proposition 0: *Assuming linear pricing, there exists a unique equilibrium characterized by the following price and insider trading strategies:*

$$\begin{aligned} p(y,\theta) =& v_\theta + \lambda y, \quad \text{and} \\ x(v,\theta) =& \beta(v - v_\theta), \end{aligned}$$

where $\lambda = \sigma_{v|\theta}/(2\sigma_u)$, $\beta = \sigma_u/\sigma_{v|\theta}$, *and* $\sigma^2_{v|\theta} = {\sigma_\epsilon}^2\sigma^2_v/\left({\sigma_\epsilon}^2 + \sigma^2_v\right)$. *The insider's expected profit is*

$$P = {}^1\!/_2\sigma_{v|\theta}\sigma_u. \tag{1}$$

The expected loss to the liquidity trader equals the insider's expected profit.

Insider's objective

- Analogous to (1), insider m's objective function is

$$P_m = {}^1\!/_2 \sigma_u \sigma_{v_m|\theta_{em}} \sqrt{\sum_{n=1}^{N} g_{mn}^2}. \tag{2}$$

- insiders must share pool of available liquidity
- Insiders prefer exchanges that have:
  - low disclosure
  - high volume of trade
  - few other firms listed

Liquidity traders's objective

The expected loss of liquidity trader n aggregated over the M securities in which he may have a position is

$$\begin{aligned} L_n = & - \sum_{m \in M} E_{u_1,\ldots,u_N} E_{v_m|\theta_{em}} \left[g_{mn} u_n \left(v_m - p_m(y_m, \theta_{em}) \right) \right] \\ = & \sigma_u^2 \sum_{m \in M} \lambda_m g_{mn}^2. \end{aligned} \tag{3}$$

Insider profits = liquidity traders' losses

$$\sum_{m=1}^{M} P_m = \sum_{j=1}^{N} L_j .$$

Proposition 1: *An equilibrium allocation of liquidity trading over securities is symmetric, i.e., for* $m \in M$ $g_{mi} = g_{mj}$ *for* $i, j \in \{1, \ldots, N\}$.

- Each liquidity trader strives to allocate his demand in the same proportions as other liquidity traders.
- It is an equilibrium for liquidity traders to allocate their demands equally over firms that provide the same level of disclosure.

Proposition 2: *Given firm listings are fixed by exchange with at least one firm listing on each exchange, in equilibrium ALL liquidity beyond the lower bound for each firm is allocated to the high disclosure exchange.*

Paraphrase Proposition 3: *Given insiders can choose the exchange on which to list their firms, and liquidity traders can choose exchanges and firms over which to allocate their demands,*

- *All mobile liquidity goes to the high disclosure exchange.*
- *If liquidity trapped by firm is large, some firms will list on the low disclosure exchange*
- *If liquidity trapped by firm is small, then all firms will list on the high disclosure exchange.*

Proposition 4: *In the limiting case as $d \to 0$, an equilibrium exists in which all firms list on the high disclosure exchange, and all liquidity is allocated to that exchange.*

Further analysis

- Risk-averse liquidity traders
- Liquidity trapped by exchange
- Listing costs
  - endowed ownership stake by the insider
- Cross-listing
- Insider trading restrictions
- Harmonization

Risk-averse liquidity traders

- A race for the top emerges provided only that firm-specific liquidity is not too high.

Proposition 5: *If*

$$2dM - 1 < \frac{\underline{\sigma}_v}{\sigma_v}, \tag{4}$$

where $\underline{\sigma}_v^2$ *is the variance of firm value conditioned on the public signal from the highest feasible disclosure standard and* σ_v^2 *is the ex ante variance of firm value, then both exchanges choose the highest feasible disclosure standard in the unique equilibrium.*

Proposition 6: *Given* $\sigma_{v|1} < \sigma_{v|2}$*, each insider prefers to list her firm on the high disclosure exchange for any choice of* M_1 *and* M_2*.*

Liquidity trapped by exchange

- Causes of trapped liquidity
  - Canadian IRA tax law
  - extraterritorial application of US Securities law

Liquidity trapped by exchange

Paraphrase Propositions 7 and 8:

(i) *all mobile liquidity from the low disclosure exchange is allocated to the high disclosure exchange;*

(ii) *when trapped liquidity on both exchanges is substantial and there are many traders on the low disclosure exchange, then all mobile liquidity from the high disclosure exchange is allocated to the low disclosure exchange; and,*

(iii) *otherwise some mobile liquidity from the high disclosure exchange is allocated to the low disclosure exchange and some is allocated to the high disclosure exchange.*

Proposition 9: *Both exchanges choose the highest feasible disclosure standard in equilibrium.*

Liquidity is Trapped by Exchange

- For fixed disclosure standards, given $\sigma_{v|1} < \sigma_{v|2}$ and at least one firm listing on each exchange, in equilibrium:
  - all mobile liquidity from the low disclosure exchange is allocated to the high disclosure exchange;
  - the desire to flock draws some liquidity high disclosure exchange traders to low disclosure exchange traders.
- Firms list on exchanges so that the profits to insiders are equalized
- When exchanges choose disclosure levels to maximize volume, both exchanges choose the highest feasible disclosure standard.

Listing Costs

- insider has endowed ownership stake
- there is some minimum amount of liquidity for each firm

Paraphrase Proposition 10: *Result parallels Proposition 3. Firms sort according to either (i) the magnitude of the proprietary costs of disclosure, or (ii) the endowed stake of the insider, or both. When firm-specific liquidity is low, all firms list on the high disclosure exchange.*

Paraphrase Proposition 11: *Result parallels Proposition 5. Provided firm specific liquidity is low, a race for the top ensues.*

Cross-listing

Proposition 12: *Given insiders can choose to list their firms on either one exchange or cross-list on both exchanges, and each liquidity trader is constrained to buy or sell only the stocks listed on the exchange to which he is exogenously assigned, the allocation of firms between markets is decided according to*

$$c = \frac{\sigma_{v|1}}{\sigma_{v|2} - \sigma_{v|1}\sqrt{N_2}} \left[\frac{\sqrt{N_2} + (1 - dM)\sqrt{N_1}}{dM} \right]. \tag{5}$$

When this quantity lies between zero and unity, it is the fraction of firms that cross-list. When this quantity exceeds unity, all firms cross-list. When this quantity is less than zero, all firms list on the low disclosure exchange only.

Cross-listing

- Liquidity traders allocate non-trapped liquidity to firms on the high disclosure exchange.
- Some firms list on each exchange:

Cross-listing—Comparative statics:

- permitting cross-listing implies
  - more firms list on the high disclosure exchange; fewer firms list in the low disclosure market alone; all firms listed on the high disclosure exchange cross-list on the low disclosure exchange.
- more liquidity in the low disclosure market implies
  - fewer cross-listed stocks, more stocks listed in the low disclosure market alone
- lower the level of disclosure in the low disclosure market implies
  - fewer cross-listed stocks.
- increase the level of disclosure in the high disclosure market implies
  - fewer cross-listed stocks

Conclusions

- a framework for thinking disclosure choice by exchanges, listing choices by firms, and the allocation of trading activity across markets.
- Even VENAL insiders find high disclosure exchanges are attractive places to list securities.
- long-run, we expect a "race for the top"
- in the short run, frictions that trap liquidity or impede the evolution of exchanges toward high disclosure standards lead to endogenous interior allocations of firms across exchanges with interesting **testable** implications (see, e.g., Botosan and Frost)

Conclusions—Some answers to the questions

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Regulatory prescription

- "Race for the top"
  - requires mobile liquidity
  - insiders compete for scarce liquidity by making a listing choice which commits the firm to high disclosure
  - "Trapped" liquidity is a critical impediment to a race for the top
- clearly signal each firm's disclosure level
  - markets in low disclosure firms are predicted to be thin
- facilitate trend to greater mobility