

Regulatory races among stock exchanges: Theory and evidence

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Corporate Governance in the Stock Markets

- ▶ 2000: Special segments in Brazil's stock exchange: Novo Mercado.
 - ▶ Strengthening the rights of minority shareholders
- ▶ 2006: Calls in the U.S. for relaxing Sarbanes-Oxley rules.
 - ▶ Weakening the rights of minority shareholders

Regulatory Competition

	Race to the top	Race to the bottom	Segmentation
Definition	Exchanges raise standards	Exchanges lower standards	Different standards
Examples	?	Osaka vs Singapore	Bovespa Novo Mercado

Research questions

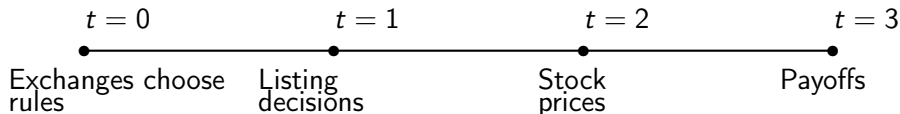
- ▶ Santos and Scheinkman (2000) and Chemmanur and Fulghieri (2006):
 - ▶ Competition does not necessarily lead to a race to the bottom
 - ▶ Segmented equilibrium
- ▶ But are races to the bottom likely?
- ▶ What is the likely outcome of a regulatory race?

In a nutshell

- ▶ The result:
 - ▶ Races to the top or bottom end with no winner and dead-weight costs
- ▶ The implication:
 - ▶ Races to the top or bottom only when expectations fail
 - ▶ Fragmentation is the likely outcome: One exchange raises standards, the other lowers
- ▶ Evidence: Battle for market share between Korea's stock exchanges

The Model:

► Timing:



► Two Exchanges: $i \in \{1, 2\}$

- Set of feasible rules: $\{\Psi_0, \Psi_1, \Psi_2\}$,
- Goal: Maximize capitalization value of listed firms

► Firms:

$$\text{Cash-flow} = \begin{cases} X & \text{with probability } \pi_G \\ 0 & \text{with probability } 1 - \pi_G \end{cases}$$

$$\text{Dilution} = \begin{cases} 0 & \text{for G-type (inefficient to dilute)} \\ q(\Psi)(\pi_G - \pi_B)X & \text{for B-type (efficient to dilute)} \end{cases}$$

$$q(\Psi) = \begin{cases} 1 & \text{if } \Psi = \Psi_0 \\ q \in (0, 1) & \text{if } \Psi = \Psi_1 \\ 0 & \text{if } \Psi = \Psi_2 \end{cases}$$

$$\text{Listed B-types} = f_B^i(\Psi) \in (0, 1) = \begin{cases} f_B^i(1 + v) & \text{if } \Psi = \Psi_0 \\ f_B^i & \text{if } \Psi = \Psi_1 \\ f_B^i(1 - v) & \text{if } \Psi = \Psi_2 \end{cases}$$

$$\text{Listed G-types} = f_G^i(\Psi) \in (0, 1) = \begin{cases} f_G^i(1 - kv) & \text{if } \Psi = \Psi_0 \\ f_G^i & \text{if } \Psi = \Psi_1 \\ f_G^i(1 + kv) & \text{if } \Psi = \Psi_2 \end{cases}$$

Assumption: $kf_G^i < f_B^i$

Optimal rules under segmented markets:

- ▶ Market cap

$$V^i(\Psi_i) = f_G^i(\Psi_i)\pi_G X + f_B^i(\Psi_i) \left[\pi_G X - q(\Psi_i) (\pi_G - \pi_B) X \right].$$

- ▶ **Assumption:** Ψ_1 optimal under segmented markets and G-types matter ($k > 0$)

$$v \in \left[q \frac{f_B^i}{f_B^i - k f_G^i} \left(\frac{\pi_G - \pi_B}{\pi_G} \right), (1 - q) \frac{f_B^i (\pi_G - \pi_B)}{f_B^i \pi_B - k f_G^i \pi_G} \right]$$

$$v > (1 - q) \left(\frac{\pi_G - \pi_B}{\pi_B} \right).$$

- ▶ **Intuition:** Ψ_0 optimal if $k = 0$; cater to B-types

Competition between the stock exchanges:

1. The Firms' Problem

Assumption: With symmetric rules, public firms do not migrate to rival exchange.

Proposition 1 *If Ψ^i is stricter than Ψ^j , then the only Nash Equilibrium of the firms' listing decision has G-firms at exchange i and B-firms at j .*

2. The Exchanges' Problem

- ▶ Race to the top-I: (Ψ_2, Ψ_2)

$$V_i(\Psi_2) = f_G^i(1 + kv)\pi_G X + f_B^i(1 - v)\pi_G X$$

- ▶ Race to the top-II: (Ψ_2, Ψ_1)

$$V_i(\Psi_1) = (f_B^1 + f_B^2)(\pi_G X - q(\pi_G - \pi_B))X$$

- ▶ Fragmentation: (Ψ_2, Ψ_0)

$$V_i(\Psi_0) = (f_B^1 + f_B^2)(1 + v)\pi_B X$$

Proposition 2 *If $\Psi^j = \Psi_2$, then*

$$V^i(\Psi^i = \Psi_0, \Psi^j = \Psi_2) > V^i(\Psi^i = \Psi_1, \Psi^j = \Psi_2).$$

Intuition:

- ▶ Pleasing G-firms was the only reason for Ψ_1 rather than Ψ_0 .
- ▶ G-firms migrate to rival exchange under Ψ_1 or Ψ_0 (unique Nash equilibrium)

Proposition 3 *If $\Psi^j = \Psi_0$, then*

$$V^i(\Psi^i = \Psi_2, \Psi^j = \Psi_0) > V^i(\Psi^i = \Psi_1, \Psi^j = \Psi_0).$$

Intuition:

- ▶ Pleasing B-firms was the only reason for Ψ_1 rather than Ψ_2 .

Proposition 4 *Three equilibrium outcomes of a regulatory battle:*

Race to the top: $\Psi^i = \Psi_2$ for $i \in \{1, 2\}$

Race to the bottom: $\Psi^i = \Psi_0$ for $i \in \{1, 2\}$

Fragmentation: $\Psi^i = \Psi_2, \Psi^j = \Psi_0$.

Implications:

1. Races to the top or bottom end with similar rules and no winner.
2. Incentives to integrate the market iff

$$\begin{aligned}
 & p_{2,0}^{frag} \left(V^i(\Psi^i = \Psi_2, \Psi^j = \Psi_0) - V^i(\Psi_1) \right) + \\
 & p_{0,2}^{frag} \left(V^i(\Psi^i = \Psi_0, \Psi^j = \Psi_2) - V^i(\Psi_1) \right) > \\
 & C + \sum_{k \in \{0,2\}} p^k \left(V^i(\Psi_1) - V^i(\Psi_k) \right). \quad (1)
 \end{aligned}$$

- Exchange starts a battle only if the likelihood of races to the top or bottom are small.

A battle over delisting rules in Korea: 2000 through 2002

- ▶ January 2000: KOSDAQ raises standards
- ▶ June 2000: KSE matches
- ▶ January 2002: KOSDAQ raises the bar once again.
- ▶ November 2002: KSE matches

Descriptive Statistics: KSE and KOSDAQ

March 2003	KSE	KOSDAQ
No. of listed firms	685	867
No. of shares (million)	26,981	10,857
Daily avg. trading volume (million)	712	340
Daily avg. trading value (Bi won)	1,861	726
Market Cap (Bi Won)	220,891	33,088
P-E ratio	14.17	22.30

Delisting Criteria: Disclosure of Information

Period	KSE	KOSDAQ
2/1999 - 1/2000	Breaching often	Breaching often
1/2000 - 6/2000	Breaching often	3 times within 1.5 year
6/2000 - 12/2001	3 times within 1.5 year	3 times within 1.5 year
1/2002 - 12/2002	3 times within 1.5 year	3 times within 2 years

Number of Delisted Firms at KSE and KOSDAQ (%)

Years	KSE	KOSDAQ
1998	31 (4.1%)	36 (10.9%)
1999	54 (7.4 %)	38 (8.3 %)
2000	28 (4.0 %)	99 (16.3 %)
2001	31 (4.5 %)	64 (8.9 %)
2002	34 (5.0 %)	35 (4.2 %)
03/2003	2 (0.3 %)	6 (0.7 %)

Stock Market Response to Rule Change Announcements

Coefficients	KOSDAQ Index Returns	KSE Index Returns
Year 1999	.525	.260
Year 2000	-.559	-.272
Year 2001	.147	.131
Year 2002	-.181	-.030
First KOSDAQ announce	.686	1.714
First KSE match announce	-1.891	2.353
Second KOSDAQ announce	2.407	2.581
Second KSE match announce	.421	1.139
Observations	981	981
Adjusted R^2	.014	.005

KOSDAQ/KSE Market Cap and Trading Volume: Excludes High-Tech

Coefficients	Market Cap	Trading Volume
2/1999 - 1/2000	.522	- .067
1/2000 - 6/2000	.526	.113
6/2000 - 12/2001	.551	-.015
1/2002 - 12/2002	.560	-.205
Linear trend	-.009	.014
AR(1)	.898	.194
AR(2)	-	-.378
Adjusted R^2	.818	.683
Observations	47	46
Test Period 1 = Period 4 (p-value)	(.606)	(.336)

Frequency Distribution of IPOs: Excludes High-Tech

Periods	KSE	KOSDAQ	TOTAL
2/1999 - 1/2000	15 (20.8 %)	57 (79.2 %)	72 (100 %)
1/2000 - 6/2000	0 (0.0 %)	28 (100 %)	28 (100 %)
6/2000 - 12/2001	15 (11.2 %)	119 (88.8 %)	134 (100 %)
1/2002 - 12/2002	15 (24.6 %)	46 (75.4 %)	61 (100 %)
TOTAL	45 (15.3 %)	250 (84.7 %)	295 (100 %)

Propensity Score Matching on Tobin's Q: Excludes High-Tech

- ▶ Probit Model for listing on Kosdaq: **Age, Log of Assets, Business group, Leverage, Dummy for Stricter Governance, Industry Dummies, constant**

	1998	1999	2000	2001	2002
Matchings	113	151	203	265	280
Q (KOSDAQ)	.821	1.090	1.086	1.121	.939
Q (KSE)	.866	.861	.908	1.017	.940
Q (KOSDAQ - KSE)	-.045	.229	.178	.105	-.001

What is the likely outcome of a regulatory battle?

- ▶ Winning races lead to asymmetric changes in rules:
 - ▶ Winner caters to firms with high governance standards exchanges.
 - ▶ Loser caters to firms with low governance standards
- ▶ Races to the top or bottom cannot end with a winner:
 - ▶ Convergence of rules
 - ▶ Races to the top or bottom are rare events
- ▶ Evidence from a race to the top in Korea
- ▶ Question for future research: Should regulators induce a race to the top?