Information Asymmetry and Asset Prices
Evidence from the China Foreign Share Discount

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Motivation

- Information asymmetry in the international equity market has become an important topic...
  - domestic investors have a linguistic and cultural advantage (e.g. Brennan and Cao (1997), Choe, Kho, and Stulz (2001), and Hau (2001))
  - foreign investors have more experience and expertise (e.g. Seasholes (2000), Grinblatt and Keloharju (2000), Froot and Ramadorai (2001))
- It is, however, more commonly accepted that an informational disadvantage explains foreigners' reluctance to invest in foreign securities (Kang and Stulz (1997), Brennan and Cao (1997), and Grinblatt and Keloharju (2001))
- Few studies focus on whether information asymmetry affects equity prices (Bailey and Jagtiani (1994), Domowitz, Glen and Madhavan (1997))

Contribution

Objective:	Is information asymmetry (across foreign and domestic investors) priced in international equity markets?
Laboratory:	Perfectly segmented Chinese A (domestic) and B (foreign) share markets in 2000
Tools:	Information asymmetry measures inspired by market microstructure literature
Controls:	B-share illiquidity, and other explanatory factors based on Mei, Scheinkman, and Xiong (2003) and Karolyi and Li (2003)
Model:	Grossman and Stiglitz (1980) type noisy rational expectations model to formalize the intuition
Robustness:	Redo analysis after A-share market opened up to domestic investors in February 2001

Model

The model we propose is simple and based on Grossman and Stiglitz (1980):

- CARA investors trade in two fully segmented markets (A is domestic and B is foreign), but observe prices across markets
- future payoff is random, but identical across markets $v \sim \mathrm{N}(\overline{v}, \sigma_v^2)$
- a proportion λ of A (domestic) share investors receives a noisy signal: $S = v + \varepsilon_S$
- uninformed A and B share investors extract information (imperfectly) from A-share prices
- asset supply is noisy in both markets

We conjecture that prices are linear in the signal and in market supply and then find equilibrium prices. The partial derivative w.r.t. supply is inverse market depth ($1/\Delta$).

Model (ctd)

We find the following equilibrium price for the A-share market...

$$P_A = \beta_0^A + \beta_S^A \Delta S + \beta_y^A \Delta y$$

$$\begin{aligned}
\beta_0^A &= \frac{1}{1+r}\overline{v} - \frac{1}{(1+r)(\omega^I+\omega^U)}\overline{y} \\
\beta_S^A &= \frac{1}{(1+r)(\omega^I+\omega^U)}\left(\omega^I \frac{\tau_\varepsilon}{\tau_v+\tau_\varepsilon} + \omega^U \frac{\phi\tau_\varepsilon}{\tau_v+\phi\tau_\varepsilon}\right) \\
\beta_y^A &= \frac{1}{\Delta_A} = \frac{1}{(1+r)(\omega^I+\omega^U)}\left(1 + \left(\omega^U \frac{\phi\tau_\varepsilon}{\tau_v+\phi\tau_\varepsilon}\right) / \left(\omega^I \frac{\tau_\varepsilon}{\tau_v+\tau_\varepsilon}\right)\right)
\end{aligned}$$

where $\phi = \frac{\lambda^2\eta^2\tau_y\tau_\varepsilon}{1+\lambda^2\eta^2\tau_y\tau_\varepsilon}$, $\quad \omega_I = \lambda\eta(\tau_v+\tau_\varepsilon)$, $\quad \omega_U = (1-\lambda)\eta(\tau_v+\phi\tau_\varepsilon)$

Model (ctd)

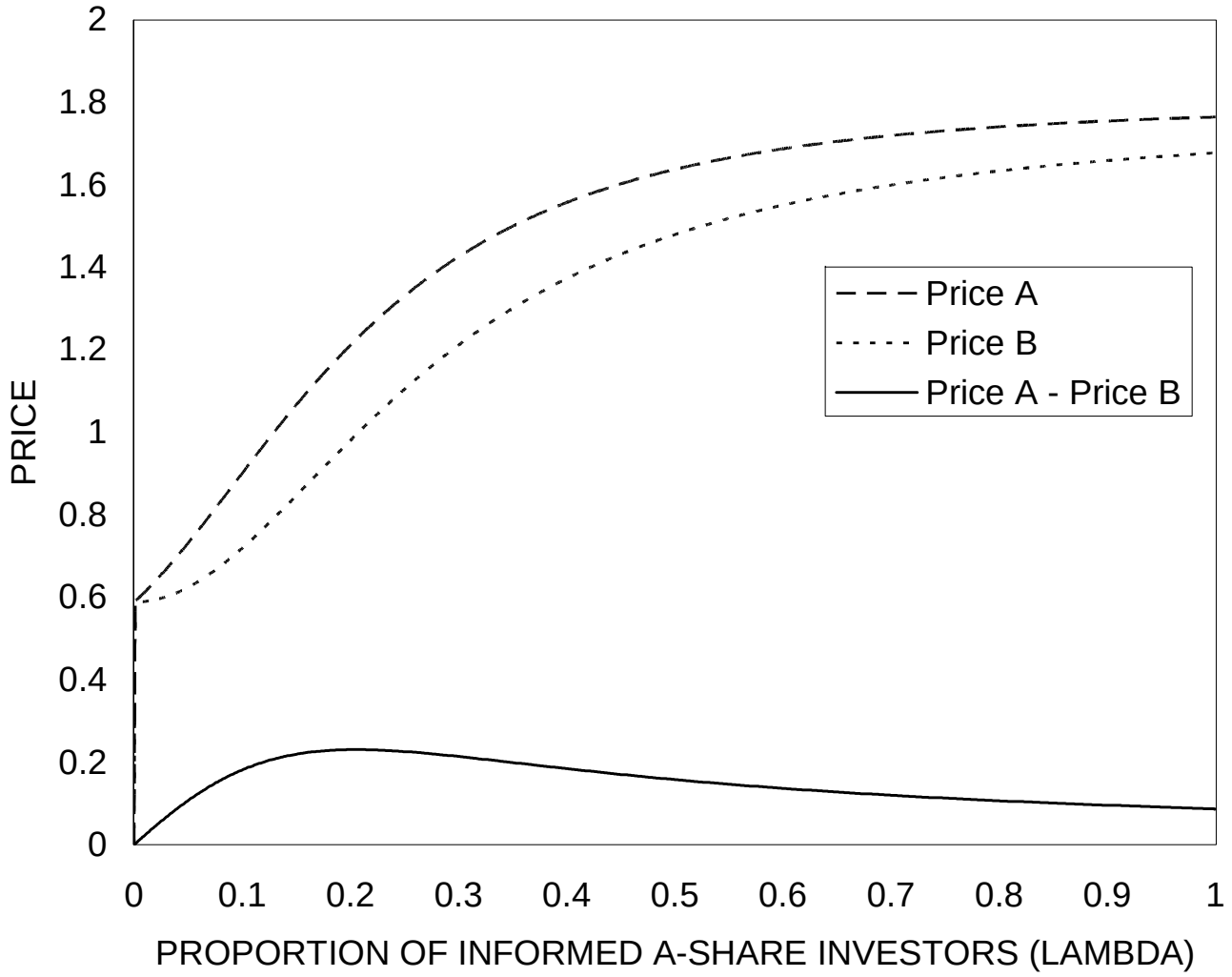
. . . and for the B-share market:

$$P_B = \beta_0^B + \beta_S^B \Delta S + \beta_y^B \Delta y + \beta_z^B \Delta z$$

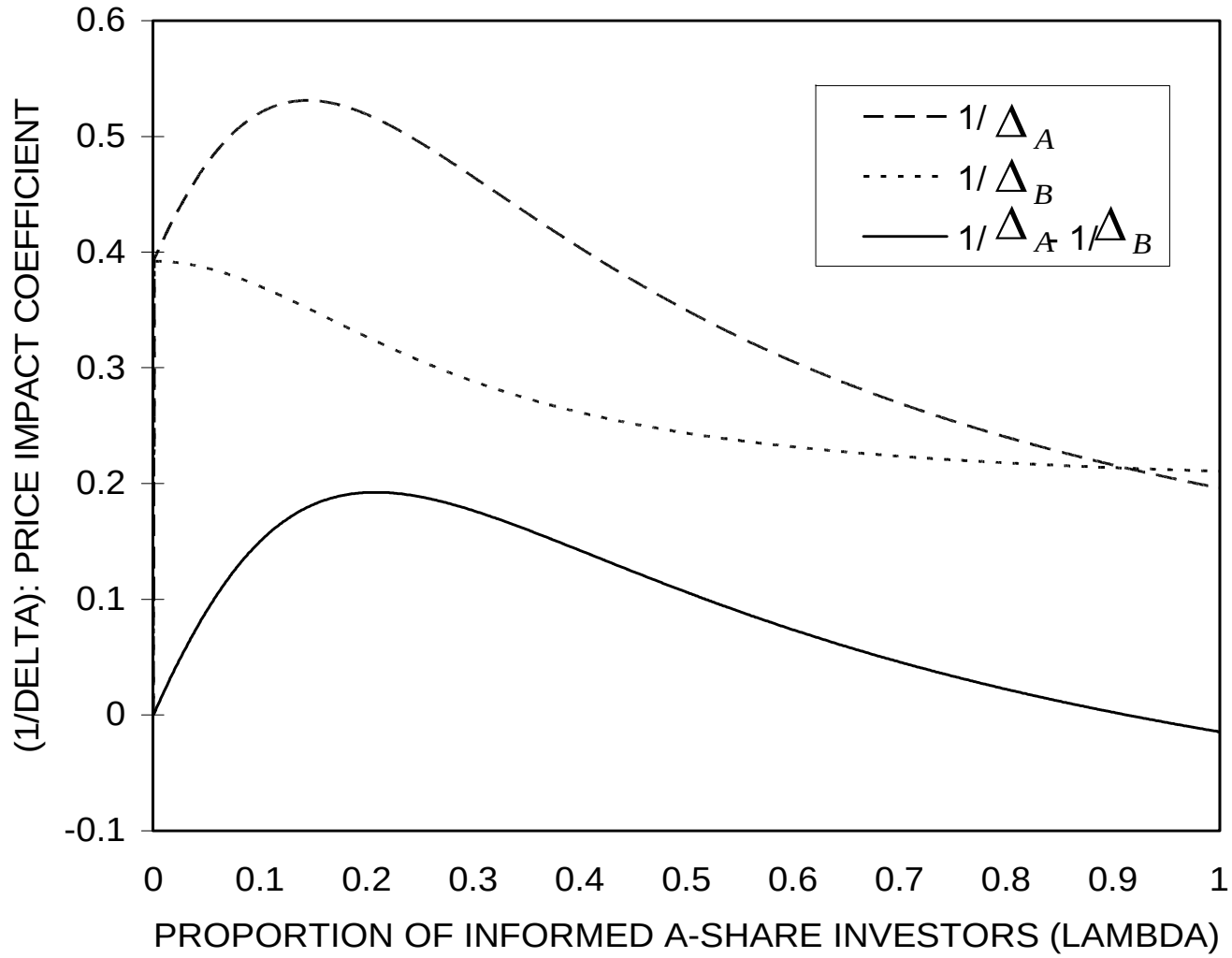
$$\begin{aligned}
\beta_0^B &= \frac{1}{1+r}\overline{v} - \frac{1}{(1+r)\omega^B}\overline{z} \\
\beta_S^B &= \frac{1}{(1+r)}\left(\frac{\phi\tau_\varepsilon}{\tau_v + \phi\tau_\varepsilon}\right) \\
\beta_y^B &= \frac{1}{(1+r)}\left(\frac{\phi\tau_\varepsilon}{\tau_v + \phi\tau_\varepsilon}\right) / \left(\omega^I \frac{\tau_\varepsilon}{\tau_v + \tau_\varepsilon}\right) \\
\beta_z^B &= \frac{1}{\Delta_B} = \frac{1}{(1+r)\omega^B}
\end{aligned}$$

where $\omega^B = \eta(\tau_v + \phi\tau_\varepsilon)$

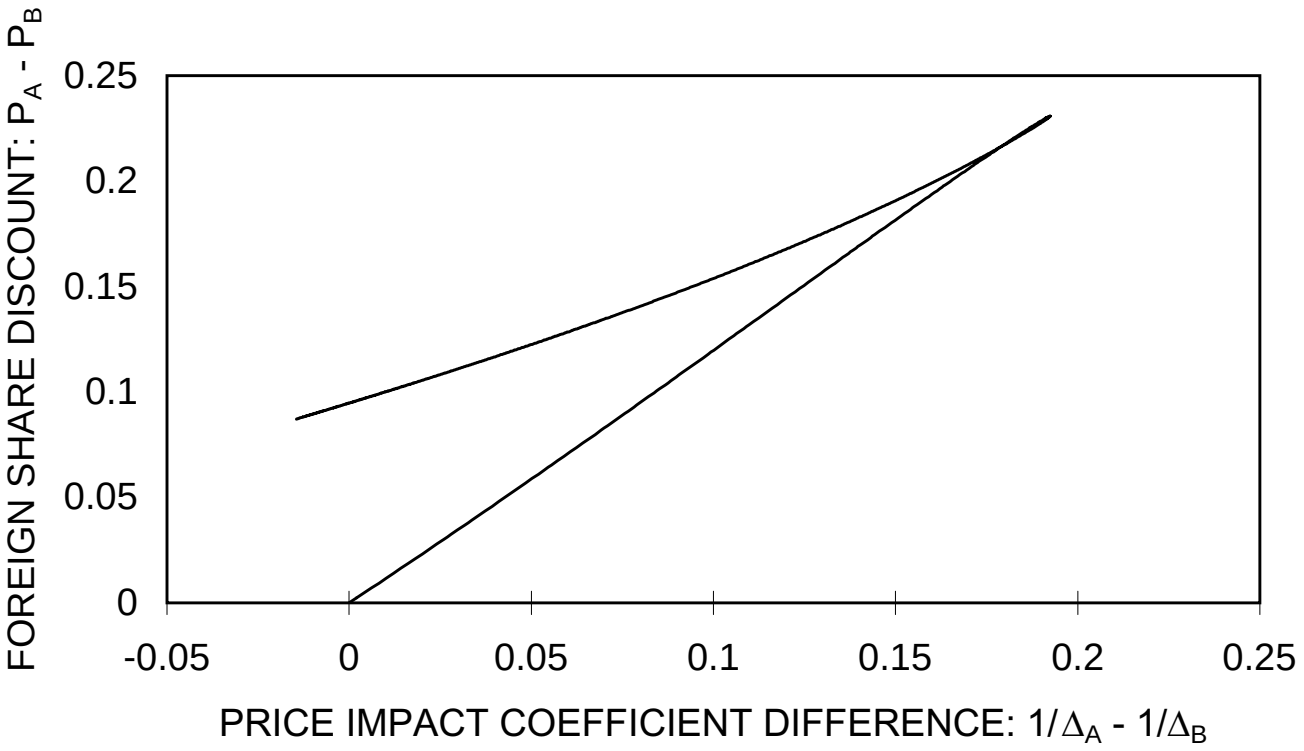
Equilibrium Price vs λ



Price Impact Coefficient vs λ



B-Share Discount vs Price Impact Coefficient



Experiment

We study TAQ data on Chinese firms listed as A (local) and B (foreign) shares for the year 2000.

- Markets are fully segmented
- Both shares are equal in terms of dividend and voting rights
- B-shares trade at a discount of 72% on average
- Exchanges run automated, order-driven markets
- Off-exchange trading is forbidden

We study dispersion in foreign share discount across the 76 "cross-listed" stocks.

Summary Statistics

Cross-sectional averages, N=76, year=2000:

	A-share	B-share
Time between Trades	62 sec	313 sec
Daily Volume	1.7 mln	0.9 mln
Trade Size	5,769	16,769
Quoted Spread	0.027 Y	0.035 Y
Effective Spread	0.035 Y	0.035 Y

Information Asymmetry Measures

We use three measures for information asymmetry:

1. LAMBDA - price impact of trade, based on transaction data

   (Glosten (1987), Kyle (1985), Glosten (1987), and Easley and O'Hara (1987), and Glosten and Harris (1988))

$$\Delta P_t = \lambda Q_t V_t + \phi(Q_t - Q_{t-1}) + e_t$$

2. AS - adverse selection component of spread

   (Glosten & Harris (1988))

$$\Delta P_t = z_0 Q_t + z_1 \hat{\varepsilon} + c_0(Q_t - Q_{t-1}) + c_1(Q_t V_t - Q_{t-1} V_{t-1}) + u_t, \quad u_t \sim \text{MA}(1)$$

3. PIN - probability of informed trading

   (Easley, Kiefer, and O'Hara (1996, 1997a, 1997b))

Information Asymmetry Measures (ctd)

Information asymmetry measures, N=76, year=2000:

	A-share	B-share
LAMBDA	9.66	2.61
AS	0.0056 Y	0.0047 Y
μ in PIN model[a]	0.38	0.11
PIN	0.13	0.20

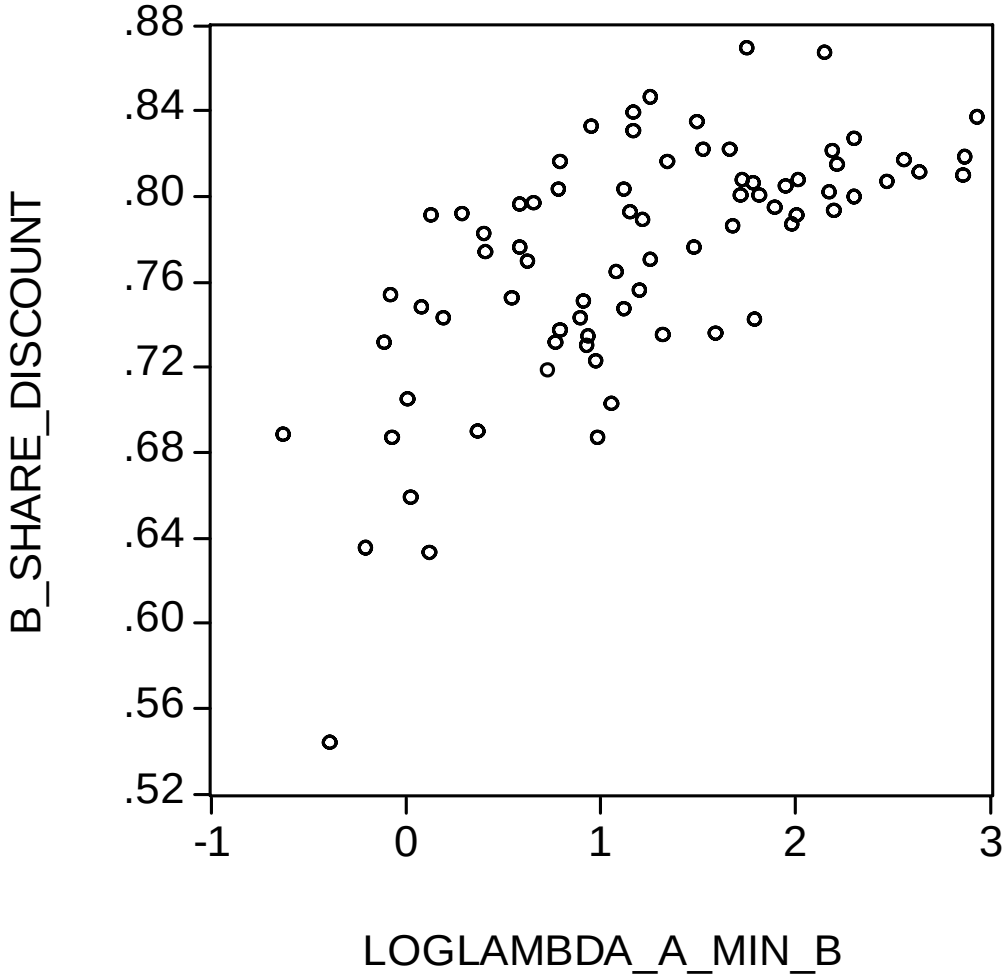
[a]: Arrival rate informed investors

Information Asymmetry Measures (ctd)

Correlation information asymmetry measure differences, N=76, year=2000:

	ΔLAMBDA	ΔAS	ΔPIN
ΔLAMBDA	1.00	0.86	0.16
ΔAS		1.00	0.18
ΔPIN			1.00

B-Share Discount vs Price Impact Coefficient



Cross-Sectional Regressions B-share Discount

		I	II	III	IV	V	VI
ΔLAMBDA	+	0.04**			0.07**		
ΔAS	+		0.07**			0.08**	
ΔPIN	+			0.05**			-0.06
T/O A-share	+[a]				0.03	-0.03	0.04
T/O B-share	-				-0.07**	-0.04**	-0.08**
#Trades A-share					-0.03	0.03	-0.13**
#Trades B-share	-				0.13**	0.08**	0.20**
Market Cap A-share	+[a]				0.03**	-0.03*	0.01
Market Cap B-share					-0.09**	-0.06**	-0.10**
Momentum	+[b]				0.01	0.00	0.01
R^2		0.44	0.46	0.08	0.77	0.74	0.59

[a]: Mei, Scheinkman, and Xiong (2003) [b]: Karolyi and Li (2003)

Robustness, Post Event IA Measures

Information asymmetry measures, N=76, before and after entry of A-share investors into B-share market:

	A-share			B-share		
	Before	After	Δ	Before	After	Δ
LAMBDA	9.66	11.70	+21%	2.61	4.70	+80%
AS	0.0056	0.0067	+20%	0.0047	0.0067	+43%
μ in PIN model[a]	0.38	0.27	-29%	0.11	0.29	+164%
PIN	0.13	0.15	+15%	0.20	0.19	-5%

[a]: Arrival rate informed investors

Conclusions

- Many studies on information asymmetry in international asset markets, but few study whether it is priced.
- We demonstrate the effect of information asymmetry on asset prices through analysis of the cross-sectional variation in the Chinese foreign share discount.
- Three measures of information asymmetry across markets (LAMBDA, AS, and PIN) do particularly well in explaining this variation, controlling for rival explanations.
- Robustness is demonstrated by a significant increase in informed trading in the B-share market after it opened up to domestic investors in 2001.
- As a result, the discount decreases (from 72% to 42%), but does not disappear. Redoing the cross-sectional regressions post-entry, we find similar results.