



## Investment restrictions and the cross-border flow of information: Some empirical evidence

Warren Bailey <sup>a,\*</sup>, Connie X. Mao <sup>b</sup>, Kulpatra Sirodom <sup>c</sup>

<sup>a</sup> *Johnson Graduate School of Management, Cornell University, 387 Sage Hall, Ithaca, NY 14853-6201, USA*

<sup>b</sup> *Department of Finance, The Fox School of Business and Management, Temple University, Speakman Hall, Philadelphia, PA 19122-6083, USA*

<sup>c</sup> *Faculty of Commerce and Accountancy, Thammasat University, Bangkok 10200, Thailand*

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### Abstract

We examine market responses to earnings announcements in Singapore and Thailand, where shares restricted to local investors trade alongside otherwise identical shares available to foreigners. Our evidence is consistent with foreigners having superior information-processing ability, rather than locals having pre-announcement private information. A small sample of Thai data that identifies trader nationality shows reduced foreign trading in the pre-announcement period and increased buying afterwards, suggesting that foreigners rely on their information-processing skills rather than pre-announcement information.

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### 1. Introduction

How significant are barriers to international portfolio investment? Explicit barriers take a variety of forms: legal and regulatory controls on capital flows, restrictions on repatriation of dividends and capital, taxes, settlement and custody costs, and expectations about future changes in barriers. The extent to which these barriers effectively segment national capital markets is relevant to a variety of financial management problems.

\* Corresponding author. Tel.: +1 607 255 4627; fax: +1 607 254 4590.

E-mail address: [wbb1@cornell.edu](mailto:wbb1@cornell.edu) (W. Bailey).

Typical tests of international capital market integration examine cross-sections of monthly national stock index returns to see if they are consistent with a common single or multiple factor asset pricing model.<sup>1</sup> Others focus on special situations such as cross-listed shares or changes in market behavior after capital barriers are loosened.<sup>2</sup> Several authors examine markets where equities trade at different prices depending on the nationality of the owner and report that differences in risk premiums, foreign ownership limits, and liquidity partially explain the premiums foreigners typically pay for these equities.<sup>3</sup>

Differences in information and information-processing ability can also segment investors by nationality. Merton (1987) models the situation where some investors pay a premium for “familiar” assets while French and Poterba (1991) note that difficulties in generating and interpreting information about foreign securities markets may explain the “home bias” which typifies individual and institutional stock portfolios. Brennan and Cao (1997) present a model in which local and foreign investors have different endowments of information about the local stock market. It is often thought that information asymmetry works against foreign investors because of the difficulty of obtaining information about investment prospects in a distant location. However, the superior quantitative skills and experience of foreign institutional investors may give them an advantage in processing information.<sup>4</sup>

This paper uses market reactions to earnings<sup>5</sup> announcements to detect differential information and information-processing ability across local versus foreign investors. We exploit the existence of a mechanism to accommodate binding foreign ownership restrictions, “unrestricted” shares available to foreign investors and “restricted” shares that can only be held by local citizens. The two types of shares are otherwise identical in terms of dividends, voting rights, and trading environments. Differences between local and foreign investors are further heightened because locals holding restricted shares are typically individuals while foreigners holding unrestricted shares are typically institutional investors. If local investors have superior information or foreign institutional investors have superior information-processing ability, existing theories of information and stock prices inspire several testable propositions that we use to interpret market reactions to corporate news across pairs of restricted and unrestricted shares of the same issuer.

The two countries we study, Singapore and Thailand, differ in interesting and useful ways. Information may be easier for foreigners to acquire and interpret in Singapore’s highly developed and regulated environment.<sup>6</sup> The presence of mandatory savings schemes and large government-related institutional investors reduces the proportion of local individuals trading directly in the restricted Singapore market.<sup>7</sup> In contrast, individual local investors are particularly significant in

<sup>1</sup> See, for example, Harvey (1991) and Ferson and Harvey (1993).

<sup>2</sup> See Jorion and Schwartz (1986), Campbell and Hamao (1992), and Bonser-Neal et al. (1990).

<sup>3</sup> See Hietala (1989), Lam and Pak (1993), Bailey (1994), Bailey and Jagtiani (1994), Stulz and Wasserfallen (1995), Domowitz et al. (1997), and Bailey et al. (1999).

<sup>4</sup> Brown and Otsuki (1993), for example, note that individual investors are thought to dominate Asian markets.

<sup>5</sup> All results have been replicated over dividend announcements as well. Results (unreported but available upon request) are very similar to those we report for earnings announcements.

<sup>6</sup> Singapore’s accounting and regulatory standards are similar to those in the U.S. and U.K. while accounting and investor protection in Thailand are described as only “adequate” in the International Finance Corporation’s *Emerging Stock Markets Factbook*.

<sup>7</sup> Large and active institutional investors in the Singapore market include the government run Central Provident Fund (CPF) and government-related investment companies like GIC and Temasek. While Singaporeans are permitted to actively trade some of their CPF funds, they are limited to approved “trustee stocks” (Lim et al., 1999). There are no comparable domestic institutions in Thailand.

Thailand because there are relatively few domestic institutional investors.<sup>8</sup> Furthermore, the capital market in Thailand is subject to considerably larger barriers to inward and outward portfolio flows than that in Singapore.<sup>9</sup>

The balance of the paper is organized as follows. Section 2 summarizes previous theoretical work that helps motivate our work and interpret our results. Section 3 outlines our data and methodology while Section 4 presents results. Section 5 is a summary, discussion of implications, and agenda for further research.

## 2. Testable hypotheses

Foreign ownership rules and short-selling constraints restrict arbitrage from equating restricted and unrestricted prices. Therefore, differences in restricted and unrestricted market behavior can arise if local and foreign investors form expectations of cash flows differently, in addition to applying different discount rates. In this section, we discuss the source and nature of different restricted and unrestricted market behavior around corporate news events.

Suppose that local investors have better information about local companies and business conditions. Therefore, they gather private information prior to an announcement, and partially anticipate its content:<sup>10</sup>

**H1.** Local investors have better pre-announcement private information than foreign investors. Therefore, the restricted market displays larger pre-announcement reactions to corporate news than the unrestricted market.

Kim and Verrecchia (1997) define “pre-announcement information” as private information gathered in anticipation of a public disclosure. Given pre-announcement information is not subsumed by the announcement itself, it can also be useful after the announcement occurs.<sup>11</sup>

Under H1, we also predict that reactions to corporate news depend on characteristics of the disclosing firm:

**H1a.** The private information of local investors is particularly valuable for assessing small firms, illiquid firms, and firms with little research coverage. Therefore, the gap between the behavior of restricted and unrestricted markets at times of corporate news is larger for these firms.

Kim and Verrecchia (1991a,b, 1997) and other theoretical and empirical works inspire specific cross-sectional predictions within H1, and motivate the empirical specifications that we detail subsequently. For example, we should be able to explain the trading volume reaction to an information release with the contemporaneous price reaction and the degree of information asymmetry. Specifically, when there is pre-announcement private information, trading volume at the time of a public announcement is positively related to the absolute value of price change.

As Kim and Verrecchia (1997) note, anticipated announcements motivate pre-announcement private information gathering, and event-period private information production provides context

<sup>8</sup> For example, the Stock Exchange of Thailand *Monthly Review* reports monthly aggregated turnover classified by type of investor. During our sample period, trading for “Securities Companies’ Portfolios” comprised 4.62% of aggregate turnover while trading for “Mutual Funds” was 6.26% of turnover.

<sup>9</sup> See Bailey and Jagtiani (1994) and Bekaert and Harvey (1995).

<sup>10</sup> See, for example, Bhattacharya et al. (2000) on corporate news and Mexican stocks.

<sup>11</sup> When there is private information, increases in trading volume are not necessarily accompanied by price changes. In He and Wang (1995), for example, high trading volume can occur as traders with “existing private information” unwind their positions against each other but do not alter their expectations.

or interpretation for a disclosure. They define event-period information as that which can only be used in conjunction with the announcement itself, in effect, only in the event period. In Kim and Verrecchia (1994, 1997), some traders process corporate news releases into private, possibly diverse information at a cost. This private information can be thought of as informed judgments or opinions. Differential information-processing ability and differences of opinion, in turn, stimulate trading activity at times of public announcements. Thus, local and foreign investors can differ in terms of their information-processing ability. Suppose that foreign investors direct more expertise and resources at interpreting public news than local investors:

**H2.** Foreign investors have better information-processing ability than local investors. Therefore, the unrestricted market displays larger event-period reactions to corporate news than the restricted market.

In Wang (1994) and Kim and Verrecchia (1994), information stimulates trading activity if investors have different information-processing skills and different interpretations. In particular, Kim and Verrecchia (1994) show that the superior information-processing abilities of some traders give them an advantage akin to event-period private information and, therefore, lead to more event-period information asymmetry and trading. H2 assumes that the heavy investment by foreigners in security analysis and other information-processing activities leads to more disagreement. In contrast, it is possible that better information processing could lead to more consensus and, therefore, relatively lighter trading volume in the unrestricted market around earnings releases.

Since both pre-announcement information and event-period information can act in the event period, trading activity around an announcement can result from either or both types of information. A distinction between these two types of information emerges in Kim and Verrecchia (1997). When there exists pre-announcement private information, trading volume at the time of a public announcement is positively related to absolute value of price change. In contrast, when there is only event-period private information, trading volume is independent of the absolute value of price change. Thus, volume can arise without a price change at public news release, as has been documented in Kandel and Pearson (1995) for U.S. earnings announcements. Therefore, we can differentiate these two types of information empirically:

**H2a.** The relationship between the trading volume reaction to corporate news and the concurrent absolute return is weaker in the unrestricted market than in the restricted market.

Under H2, event-period information asymmetry results from event-period information processing, more of which goes on among unrestricted market traders since they are typically foreign institutional investors. Therefore, more event-period trading volume in the unrestricted market would result from information processing, and it has a weaker relationship with absolute return.

Under H2, we also predict that reactions to corporate news depend on characteristics of the disclosing firm:

**H2b.** The information-processing advantage of foreign investors is particularly valuable for assessing large firm, liquid firms, and firms that are extensively studied by foreign investors. Therefore, the gap between the behavior of restricted and unrestricted markets around times of corporate news will be larger for these firms.

Note that H2b implies a positive correlation between firm size and the gap between restricted and unrestricted behavior while H1a implies a negative correlation. These contrasting predictions help us to interpret our empirical evidence.

In He and Wang (1995), endogenous information (the current stock price) can affect trading behavior, in addition to exogenous private information and public news releases. This suggests that information may flow *between* the restricted and unrestricted markets we study: investors in one market may learn from the prices and volumes observed in the other market.

When traders have private information and can observe prices across multiple markets, a variety of complex equilibria are possible (Admati, 1985). Therefore, the single-market models we cite above do not match our empirical setting and cannot perfectly support our predictions. Additionally, the Singapore and Thai markets permit locals to trade unrestricted shares, if they are willing to pay the unrestricted price premium. Thus, local (foreign) activity in the restricted (unrestricted) market can offer information to foreign (local) traders in the unrestricted (restricted) market, and local investors may cross over into the unrestricted market to trade.

Other theories inspire modifications and additions to our predictions to recognize the multi-market setting we are studying. King and Wadhvani (1990) study contagion across markets in different countries. In their model, stock prices are observed imperfectly across markets, the equilibrium is not fully revealing, and stock return behavior is muted relative to a fully revealing equilibrium. In Chan (1993), a trader in one market conditions his actions on a signal that combines systematic and firm specific information and on lagged prices from other markets. The strength and direction of the correlation between markets varies with the precision of the signals traders receive. Kumar and Seppi (1994) study the relationship between spot and futures prices for the same asset, and their model admits the possibility of arbitrage across the two trading venues. The arbitrage activity that connects the two markets declines as the quality of cross-market information flow (modeled by the lag with which information travels) declines. Hong and Stein (1999) present a single-market model with “bounded rationality”: heterogeneously informed traders focus on private information, momentum traders focus on historical prices only, and there is only a gradual diffusion of information across traders.

For our purposes, these papers suggest that the gap between price and volume patterns across two related markets can increase as cross-market information flows and information processing decrease. If Singapore has high quality regulation and disclosure and sophisticated local individual and institutional investors relative to Thailand, the divergence between restricted and unrestricted trading should be larger for Thailand than for Singapore:

**H3.** The gap between restricted and unrestricted market behavior around times of corporate news releases is larger in Thailand than in Singapore.

In other words, the predictions of H1 through H2b are weakened in a setting where the forces that theory suggests bind related markets together are strongest. Put another way, a wedge between restricted and unrestricted markets is more likely in a setting with poorly informed local investors in the restricted market who process information poorly.

Finally, consider the possibility that corporate information releases are of no value in these countries. Bhattacharya et al. (2000) find few significant responses to corporate news in Mexico. Ball et al. (2000) find that the timeliness of accounting income varies across legal and governance environments. Ball et al. (2003) state that “public debt and equity finance tend to be replaced by family ownership and private banking relationships, thereby reducing the demand for timely public disclosure” in Asia. Their empirical results show little association between annual changes in accounting income and stock returns in Hong Kong, Malaysia, Singapore, and Thailand. The most obvious implication for our study is that there will be no event-study

reaction to earnings announcements in our two sample countries as traders recognize that this information is irrelevant. We can also take this notion a bit further and turn H2 on its head as follows. Suppose foreigners are “news watchers” in the sense of Hong and Stein (1999): they focus intently and exclusively on a forthcoming corporate information release. In contrast, locals recognize that such releases are irrelevant given the nature of corporate governance, disclosure, and regulation. This gives us predictions indistinguishable from H2 and H2b, that is, significant responses in the unrestricted market but none in the restricted market. However, suppose some locals enter the unrestricted market to trade against the (misguided) foreign investors. This yields a distinct prediction:

**H4.** Local investors enter the unrestricted market around times of corporate news releases to trade against noise-trading foreign investors.

In H2, we characterize foreigners as sophisticated investors that devote significant resources to processing information. However, it may be the case that their efforts are pointless, their activities amount to noise trading, and they are exploited by local traders who enter the unrestricted market to trade with them. As discussed below, the bulk of our data does not identify traders by nationality, but we have obtained a small sample of Thai data that allows us to examine H4.

### 3. Experimental design

#### 3.1. Data

The Appendix lists the Singapore and Thai companies from which we create our sample. During our sample period, Singapore lists 16 companies with both local and foreign listings. There is significant trading volume in both listings for all 16 so we include all of them in our sample. Sample selection for Thailand is more difficult. Foreign trading switches to the Alien Board whenever a particular company hits its foreign ownership limit, and returns to the Main Board if foreign ownership drops below the limit. Furthermore, a company may hit the limit and nominally appear on the Alien Board while experiencing little or no actual volume there. Therefore, we selected 67 companies based on their use in previous studies or by various measures of trading activity. The criteria are detailed in the Appendix.

The Pacific Basin Capital Markets Research Center (PACAP) at the University of Rhode Island is the source of most market and company data for this study. CD-ROMs for Singapore and Thailand contain data that are comparable to the sum of CRSP and COMPUSTAT. Sample period is 1988–1998 for Singapore and 1989–1998 for Thailand. We obtain daily stock returns and trading volumes, and balance sheet variables. I/B/E/S is the source of data on earnings forecasts and earnings announcements for both Singapore and Thailand.

The earnings surprise is defined as the actual announced earnings minus the mean of most recent analysts’ forecasts reported by I/B/E/S, then normalized by the absolute value of the forecast mean. For both Singapore and Thailand, all earnings announcements are annual since finer frequencies are not always supplied by corporations and are not followed by I/B/E/S brokers. A potential concern is that earnings and dividend announcements may be closely synchronized, as is the case for U.S. quarterly information (Aharony and

Swary, 1980). However, this is much less of a problem for companies from Thailand and Singapore.<sup>12</sup>

### 3.2. Methodology

#### 3.2.1. Event study

Classic event-study methodology is used to examine the information contents of earnings announcements. We define the announcement date as day 0, the event period as day  $-10$  to day  $+10$ , and the estimation period as day  $-200$  to day  $-11$ .<sup>13</sup> Any event without market information at day 0 is excluded from the sample. Our sample of events includes earnings surprises from both Singapore and Thailand. We conduct event studies on both absolute abnormal returns and abnormal trading volumes. As Beaver (1968) notes, price change reflects the average change in trader beliefs due to an announcement while trading volume reflects the sum of their idiosyncratic reactions. Therefore, volume reflects the sum of differences in trader reactions while the change in price measures only the average reaction.

We follow Brown and Warner (1985) and calculate three different measures of abnormal daily returns, mean adjusted (return minus estimation period average), market adjusted (return minus value weighted<sup>14</sup> local market return), and market model (prediction error from fitting a one-factor market model with estimation period beta). We find that all three methods yield similar results and, therefore, report only the market model evidence. Although we restrict our attention to relatively liquid stocks, we still face a problem with infrequent trading which is especially severe for unrestricted Thai shares. To combat this problem, we adopt the “trade-to-trade” return approach of Maynes and Rumsey (1993) to compute returns and to calculate means and betas in the estimation period. Since the absolute value of abnormal return (that is, return volatility) can never be negative, a standard *t*-test is not appropriate. Instead, we follow Corrado (1989) and use a non-parametric rank test to examine the significance of the absolute value of abnormal return for each day in the event window. The statistic test is adjusted to accommodate infrequent trading according to Corrado and Zivney (1992).

To examine changes in trading volume around times of earnings announcements, abnormal daily trading volume is calculated as the difference between trading volume and the mean daily volume for that stock over the entire window ( $-200, -11$ ) normalized by the mean volume. Following Brown and Warner (1985) and Corrado (1989), a *t*-test is applied to examine the significance of the mean standardized abnormal trading volume for each day in the event window.

#### 3.2.2. Cross-sectional regressions

We regress measures of return volatility and abnormal trading volume on firm characteristics to further explore our hypotheses. For return volatility, the dependent variable is the absolute value of the abnormal return (computed from the market model) cumulated over a three-day period (day  $-1, 0$  and  $1$ ). For trading volume, the dependent variable is cumulative mean-adjusted trading volume. Previous research (Morse, 1981; Bamber, 1987) suggests that, although the bulk of the trading volume reaction occurs on day  $-1$  and  $0$ , abnormally high trading persists up to five days after the announcement. On the other hand, any directional

<sup>12</sup> We find only six out of 81 (seven out of 97) instances where the time difference between a Thai (Singapore) firm's earnings and dividend announcements is less than 10 calendar days.

<sup>13</sup> Different estimation periods, such as  $-200$  to  $-20$  or  $-200$  to  $-50$ , hardly change the event-study results.

<sup>14</sup> Using an equally weighted market return gives very similar results.

aspect of the price response to the earnings announcement may end by the end of day +1. Therefore, it is possible that the use of cumulative abnormal trading volume up to day 5 adds noise to our results. Therefore, a four-day window (day -1, 0, 1, and 2) is chosen to cumulate abnormal trading volume for cross-sectional analysis. For regressions to explain trading volume reactions, we include the absolute value of the cumulative abnormal return over the same four-day window as an explanatory variable. Previous authors have documented a significant positive relationship between trading volume and the magnitude of returns at earnings announcements using U.S. data (Atiase and Bamber, 1994; Kim et al., 1997).

We construct additional explanatory variables for the cross-sectional regressions following Bamber (1987), Yoon and Starks (1995), Atiase and Bamber (1994), Bajaj and Vih (1990), and others. Firm size equals the natural logarithm of the month-end market value of common shares outstanding based on the restricted share price. It proxies for the amount of information available about the firm, market liquidity, average precision of investors' private pre-disclosure information, or other basic cross-sectional differences in information environment across firms.<sup>15</sup> Pre-disclosure information asymmetry is estimated with the dispersion in analyst earnings forecasts, which is the standard deviation of forecasts normalized by the absolute value of the mean forecast. Number of analysts following each company proxies for the amount of research devoted to the firm.<sup>16</sup> For regressions to explain reactions to earnings, we include the firm size or number of analysts, the dispersion in analyst earnings forecasts, and the earnings surprise as defined earlier.

#### 4. Empirical results

##### 4.1. Overview of the data

Table 1 gives a brief summary of the number of events and the nature of the firms in our final sample. Many of the firms indicated in the Appendix disappear due to lack of data, illiquid trading, or lack of analyst coverage. Typical firms in our final sample have a market capitalization of two or three billion dollars, which is large by the standards of these markets. There are 81 and 97 earnings announcement events for Singapore and Thailand, respectively.

There is an average of 43 analysts per Singapore earnings release and 29 per Thailand earnings release. These numbers, especially for Singapore, seem higher than those reported in U.S. earnings announcement studies. Das et al. (1998) report a mean number of analysts following a firm of 23 for the sample period of 1989–1993, and Barron and Stuerke (1988) report that the mean number of analysts for time period of 1990–1994 is 16. Our sample firms tend to be the largest in market capitalization and draw heavy analyst coverage. The mean forecast dispersion for Thailand is higher than for Singapore. The dispersion in forecasts is a measure of pre-disclosure information asymmetry. In the framework of Kim and Verrecchia (1991a), pre-disclosure information asymmetry arises when the quality (precision) of private pre-disclosure information differs across investors. Therefore, the dispersion summary statistics suggest that the quality (precision) of private information in Singapore is higher than that of Thailand, which is consistent with a higher quality accounting, legal, and regulatory environment in Singapore.

<sup>15</sup> See Bailey and Jagtiani (1994) and Domowitz et al. (1997). The idea is that large firms tend to draw more press and analyst coverage.

<sup>16</sup> The I/B/E/S database contains earnings estimates from a variety of local and global brokerage houses.



Table 1  
Summary statistics

Variable	Definition	Singapore	Thailand
Number of sample firms		15	31
Mean [median] market cap (million US\$)	Common shares outstanding times month-end restricted share price	2506 [1860]	1760 [1186]
Number of earnings events		81	97
Earnings surprise	Announced earnings minus mean of most recent forecasts reported by I/B/E/S normalized by absolute value of forecast mean	0.2031	0.1109
Forecast dispersion	Standard deviation of forecasts normalized by the absolute value of forecast mean	0.1128	0.1643
Mean [median] number of analysts per earnings event	Mean number of analysts who have earnings forecasts outstanding for the firm at end of year	43 [45]	29 [32]
Mean [median] trading volume (1000 shares), restricted, event month	Number of shares traded in a month when an event occurs	3326 [1789]	12,729 [4298]
Mean [median] trading volume (1000 shares), unrestricted, event month	Number of shares traded in a month when an event occurs	8421 [5944]	2467 [1133]
Mean [median] monthly trading volume (1000 shares), restricted, entire sample	Monthly trading volume over the entire sample period	3168 [1674]	4206 [1113]
Mean [median] monthly trading volume (1000 shares), unrestricted, entire sample	Monthly trading volume over the entire sample period	7523 [5693]	1422 [792]

Time period is 1988–1998 for Singapore and 1989–1998 for Thailand. Sample is confined to firms with trading activity in both restricted and unrestricted markets at the event date.

Raw trading volume appears to differ significantly between restricted and unrestricted markets. In Singapore, trading volume in the unrestricted market is, on average, much larger than in the restricted market while in Thailand it is the restricted market which is much more active. There is no obvious difference in event and non-event-month trading in Singapore while in Thailand event-month trading in the restricted market seems much larger than non-event-month trading.

#### 4.2. Responses to earnings announcements

##### 4.2.1. Singapore

Table 2 presents event-study results for the absolute value of returns<sup>17</sup> (left-hand panel) and trading volume (right-hand panel) at times of Singapore earnings announcements. Within each panel, there are separate results for restricted and unrestricted shares. We present daily abnormal return and trading volume back to day  $-10$  so as to capture the potential pre-announcement reaction due to private information.<sup>18</sup> There are no significant pre-announcement reactions in abnormal return volatility in either the restricted or the unrestricted market. There are statistically significant reactions in trading volume at day  $-8$  in the unrestricted market. Closer to the earnings announcements, a significant increase in trading volume starts at day 0 in the unrestricted market, and extends nine days beyond. There are considerable post-event reactions extending from day 2 to day 8 in the restricted market.<sup>19</sup>

The event-study evidence on Singapore earnings is not consistent with H1, which predicts larger pre-announcement reactions in the restricted market.<sup>20</sup> On the contrary, we observe some significant pre-announcement increases in trading volume in the unrestricted market. Such a result may reflect “existing private information” (He and Wang, 1995) in the unrestricted market. The significant trading volume reactions in the unrestricted market at and after the earnings release are consistent with H2, which predicts larger unrestricted market responses due to better information processing by foreigners. Furthermore, H3 predicts relatively small differences between restricted and unrestricted behavior in Singapore assuming that there are sophisticated investors in both the restricted and unrestricted markets. Therefore, significant trading volume reactions in both markets around the earnings release are consistent with H3.

Table 3 presents the estimated coefficients, their adjusted  $P$ -values based on White’s (1980) heteroskedasticity-corrected covariance estimates and adjusted  $R^2$  for cross-sectional regressions. Absolute abnormal returns (Panel A, cumulated over a three-day  $-1$  to  $+1$  window) and abnormal trading volume (Panel B, cumulated over a four-day  $-1$  to  $+2$  window) are

<sup>17</sup> Throughout the paper, we do not attempt to analyze positive and negative surprises separately given the limited number of events. Instead, we analyze the aggregate effect of surprises on return volatility.

<sup>18</sup> Defining pre-announcement and event periods is ad hoc and varies in the literature. Given the poorer accounting standards and disclosure in emerging markets, we consider day  $-10$  to day  $-2$  as pre-announcement period so as to capture any earlier information leakage of earnings information. Since earnings may be announced one day before it appears in the newspaper or our database, the event period is defined as day  $-1$  to day  $+2$ .

<sup>19</sup> Broadly similar post-event volume has been documented for U.S. earnings announcements. In Morse (1981) and Bamber (1987), the bulk of the trading volume reaction occurs at day  $-1$  and 0, but persists up to five days after the earnings announcement. Significant, negative pre-announcement volume is documented by Beaver (1968) and Lobo and Tung (1997). It may represent uninformed traders postponing their trades until after earnings are announced.

<sup>20</sup> Restricted market return volatility and trading volume at earnings announcements is qualitatively similar when we use a sample of all firms shown in Appendix which offers 379 events in total, rather than confining ourselves only to those events where there is sufficient liquidity in both restricted and unrestricted markets. Therefore, the small sample size is not the cause of the insignificant return volatility reaction.

Table 2  
Event study of absolute value of abnormal returns and abnormal trading volume for Singapore earnings announcements

Window	Absolute value of stock return				Trading volume			
	Restricted stocks		Unrestricted stocks		Restricted stocks		Unrestricted stocks	
	Median	<i>R</i> -stat	Median	<i>R</i> -stat	Mean	<i>T</i> -stat	Mean	<i>T</i> -stat
-10	0.0059	-0.304	0.0074	-0.395	-0.0187	0.383	0.1422	0.959
-9	0.0061	-0.514	0.0120	1.664	-0.0839	0.065	0.0631	1.355
-8	0.0060	0.534	0.0097	0.264	-0.0712	-0.285	0.1583	2.400
-7	0.0067	1.941	0.0112	1.402	0.1220	0.967	-0.0352	0.083
-6	0.0063	0.889	0.0099	-0.105	0.0221	1.029	-0.1253	-0.725
-5	0.0067	1.277	0.0111	1.146	0.1457	1.685	0.1133	1.606
-4	0.0067	0.392	0.0092	-0.274	-0.0397	-0.021	0.0667	1.814
-3	0.0059	0.030	0.0101	0.475	0.0948	0.204	-0.0342	0.724
-2	0.0068	0.024	0.0107	0.851	0.0180	0.740	-0.1398	-0.523
-1	0.0064	0.720	0.0093	-1.344	-0.0594	0.077	-0.0065	0.971
0	0.0073	1.704	0.0095	0.124	0.1541	1.328	0.3417	3.032
1	0.0067	1.008	0.0119	1.730	0.0480	1.585	0.0808	2.159
2	0.0064	0.536	0.0078	-1.385	0.3586	4.387	0.4918	5.090
3	0.0068	1.222	0.0113	-0.146	0.0002	1.184	0.0260	0.942
4	0.0060	0.107	0.0085	-0.808	0.1846	3.135	0.2760	3.256
5	0.0067	1.697	0.0117	1.038	0.3001	5.720	0.3374	3.715
6	0.0062	0.075	0.0110	1.122	0.0164	2.408	0.2648	3.172
7	0.0055	-0.660	0.0110	1.848	-0.0789	0.386	0.2684	1.990
8	0.0061	-0.772	0.0089	0.989	0.1185	2.864	0.1551	2.125
9	0.0064	-0.140	0.0089	-1.001	-0.0679	0.242	0.1548	2.683
10	0.0058	-0.468	0.0105	1.125	0.0423	0.612	0.0843	1.739

This table reports event-study results on absolute value of abnormal returns and abnormal trading volume. Sample is restricted to those events with trading activity at day 0 in both restricted and unrestricted markets. Abnormal stock returns are generated using one-factor market model residuals. A non-parametric rank test described in Corrado (1989) is used for testing the significance of the rank of the abnormal return. Supplemental tables based on mean-adjusted and market-adjusted stock residuals are available on request. Abnormal trading volumes are generated as the differences between trading volume and the mean of daily volume for that stock over the window (-200, -11) normalized by the mean volume. Following Brown and Warner (1985) and Corrado (1989), a *t*-test is applied to examine the significance of the standardized mean abnormal trading volume.

regressed on several explanatory variables as previously discussed. There are specifications that use one explanatory variable at a time and others which include several explanatory variables in one estimate. The regressions stack observations for both restricted and unrestricted shares, but the coefficients are allowed to differ across the two groups by using intercept and slope dummies. The dummy variable equals one for unrestricted shares and zero otherwise.

In specifications for absolute abnormal returns that control for the magnitude of earnings surprises, the intercept dummy variable is significantly negative, implying a larger return volatility reaction to earnings shock in the restricted market. Moreover, the sizes of coefficients suggest that the intercept of the restricted market is significantly positive while the intercept for the unrestricted market is not significant. Thus, return volatility in the restricted market is higher after the information release, but return volatility in the unrestricted market is not significantly different after the information release. These results are only observed after controlling for the size of the earnings surprise. Given the large  $R^2$  in regression (2), the earnings surprise variables explain a significant part of the cross-sectional variation of the return volatility. Regressions without the earnings surprise variable are biased due to this omitted variable problem.

Table 3  
Cross-sectional regression results for Singapore earnings announcements

Independent variables	1	2	3	4	5	6	7
Panel A: Dependent variable is absolute value of cumulative stock return residual from day -1 to +1							
Constant	0.00511 (0.000)	0.00497 (0.000)	0.01239 (0.000)	0.00906 (0.000)	0.00510 (0.000)	0.01213 (0.000)	0.00839 (0.000)
Dummy	0.00102 (0.2040)	-0.00507 (0.000)	-0.00267 (0.535)	-0.00217 (0.455)	0.00106 (0.179)	-0.01213 (0.000)	-0.00881 (0.000)
Earnings surprise		0.00085 (0.497)				0.00585 (0.177)	0.00462 (0.242)
Earnings slope dummy		0.99312 (0.000)				0.95000 (0.000)	0.96223 (0.000)
Size			-0.00096 (0.006)			-0.00093 (0.006)	
Size slope dummy			0.00049 (0.363)			0.00095 (0.006)	
Number of analysts				-0.00009 (0.043)			-0.00007 (0.079)
Analysts slope dummy				0.00007 (0.160)			0.00008 (0.009)
Forecast dispersion					0.00078 (0.009)		0.00046 (0.007)
Dispersion slope dummy					-0.00021 (0.887)	-0.00044 (0.030)	-0.00038 (0.008)
Adjusted $R^2$	0.004	0.585	0.033	0.043	0.09	0.630	0.634
Panel B: Dependent variable is cumulative mean-adjusted trading volume from day -1 to +2							
Constant	0.12721 (0.281)	0.11185 (0.476)	-0.25051 (0.692)	-0.29979 (0.201)	0.13050 (0.287)	-0.35397 (0.530)	-0.46151 (0.121)
Dummy	0.11741 (0.483)	0.04029 (0.851)	0.32966 (0.738)	0.44774 (0.243)	0.15071 (0.385)	0.38654 (0.687)	0.54554 (0.220)
Abnormal return		3.00570 (0.907)				7.85907 (0.741)	17.96636 (0.514)
Return slope dummy		12.06691 (0.696)				7.66450 (0.793)	2.61572 (0.936)
Size			0.04962 (0.529)			0.05767 (0.421)	
Size slope dummy			-0.02788 (0.813)			-0.03781 (0.741)	
Number of analysts				0.00913 (0.685)			0.01065 (0.464)
Analysts slope dummy				-0.00702 (0.230)			-0.00846 (0.234)
Forecast dispersion					0.01922 (0.659)	0.01169 (0.834)	0.00538 (0.902)
Dispersion slope dummy					0.19448 (0.304)	0.21254 (0.246)	0.20322 (0.233)
Adjusted $R^2$	-0.003	-0.013	-0.014	-0.002	-0.013	-0.033	-0.019

This table reports cross-sectional regressions to explain abnormal return volatility and abnormal trading volume around Singapore earnings announcements. Sample is restricted to those events with trading activity at day 0 in both restricted and unrestricted markets. In Panel A, absolute value of the cumulative abnormal return (derived from the market model) over a three-day window (day -1, 0, and 1) is regressed cross-sectionally on explanatory variables including dummy variable for unrestricted market, earnings surprise, firm size, number of analysts following the firm, forecast dispersion, and their dummy-interacted counterparts. Dummy variable equals zero for restricted shares and one for unrestricted shares. In Panel B, cumulative firm-specific mean-adjusted trading volume over a four-day window (day -1, 0, 1 and 2) is regressed cross-sectionally on absolute value of the cumulative abnormal return over the contemporaneous window, firm size, number of analysts, forecast dispersion, and their dummy-interacted counterparts. White-adjusted  $P$ -values are reported in parentheses with each coefficient estimate.

A positive earnings slope dummy suggests a significantly larger coefficient on the size of earnings shock for unrestricted shares than for restricted shares. At the same time, the coefficient on earnings shock itself is insignificant. This implies that local investors do not care about the size of earnings shocks, while foreign investors are responsive to them, perhaps because they are better able to use event-period information given their superior information-processing ability. This is consistent with H2. The slope dummy terms on firm size and number of analysts are also significantly positive in some specifications, indicating that the gap of return volatility between restricted and unrestricted shares is larger for large firms or firms with a lot of analyst coverage. This is consistent with H2b, which predicts that foreign investors focus on large or heavily researched firms and respond more to earnings announcements for these firms. We also find that the coefficient on forecast dispersion is significant and positive: return volatility goes up around those events where there is more disagreement. This is consistent with the propositions concerning differential information processing at earnings releases in Kim and Verrecchia (1994). The dispersion slope dummy is negative, implying that local investors are more sensitive to situations of imprecise information. Thus, the return evidence on Singapore is uniformly consistent with superior event-period information processing by foreign investors. H2.

In contrast to the cross-sectional results for the absolute value of returns, the cross-sectional results for trading volume (Table 3, Panel B) are insignificant: None of the explanatory variables can explain the cross-sectional variation of abnormal trading volume around earnings announcements. Recall that, in Kim and Verrecchia (1997), a world with only event-period private information (resulting from information-processing ability, H2) exhibits no relationship between trading volume and the absolute value of price change. On balance, Table 3 suggests that differential event-period information processing by institutions is the prevalent force at times of Singapore earnings releases.

#### 4.2.2. Thailand

Table 4 presents event-study results for the absolute value of returns and trading volume at times of Thailand earnings announcements. The results for absolute value of returns indicate that small but statistically significant pre-announcement return volatility increases at day  $-9$  in the restricted market, but nothing in the unrestricted market. Other than a significant negative residual at day  $+10$  in the unrestricted market, there appear to be no other significant return volatility reactions in either market. In contrast, trading volume shows considerable pre-announcement, event, and post-event reactions in both markets. Almost all the volume residuals are positive, suggesting a nearly uniform increase in trading activity around earnings announcements.

There is no evidence consistent with H1, which predicts larger pre-announcement volume effects in the restricted market due to the private information of local investors. Indeed, the stronger pre-announcement volume reaction in the unrestricted market suggests that foreigners have private information. Furthermore, there are significant event and post-event volume reactions, particularly in the unrestricted market. When combined with the lack of price volatility reaction, this is consistent with H2a, superior event-period information processing by foreign investors.

Table 5 presents cross-sectional regressions of event-period absolute returns and trading volume on several explanatory variables. As was the case for Singapore, absolute cumulative abnormal returns from day  $-1$  to  $+1$  and cumulative abnormal trading volume from day  $-1$  to day  $+2$  are used as dependent variables. The absolute return results for Thailand earnings announcements are similar to those for Singapore. Specifically, the intercept dummy is significantly negative, implying, on average, lower volatility in the unrestricted market than

Table 4  
Event study of absolute value of stock returns and trading volume for Thailand earnings announcements

Window	Absolute value of stock return				Trading volume			
	Restricted stocks		Unrestricted stocks		Restricted stocks		Unrestricted stocks	
	Median	<i>R</i> -stat	Median	<i>R</i> -stat	Mean	<i>T</i> -stat	Mean	<i>T</i> -stat
-10	0.0092	0.01	0.0176	1.40	0.0008	0.10	0.1329	1.29
-9	0.0140	2.09	0.0163	0.94	0.0061	0.28	0.1928	1.32
-8	0.0119	1.10	0.0165	0.95	0.1775	2.52	0.1689	2.17
-7	0.0118	-0.25	0.0152	1.19	0.2972	3.62	0.1520	2.02
-6	0.0108	-0.04	0.0158	0.20	0.1933	2.58	0.6771	6.38
-5	0.0113	0.48	0.0147	0.41	0.3147	3.36	0.5256	5.32
-4	0.0112	0.19	0.0100	-1.38	0.1182	1.56	0.1547	1.25
-3	0.0118	1.18	0.0150	0.47	0.1875	2.03	0.2792	3.12
-2	0.0115	1.74	0.0124	0.03	0.1436	2.37	0.2680	2.73
-1	0.0127	0.99	0.0127	-0.34	0.0819	1.55	0.2386	2.60
0	0.0109	0.29	0.0140	0.22	0.2370	3.18	0.2906	3.41
1	0.0137	1.60	0.0169	0.47	0.0527	1.35	0.4128	3.71
2	0.0139	1.86	0.0159	0.67	-0.0201	0.55	0.3976	4.03
3	0.0120	0.44	0.0150	-0.38	-0.1579	-1.28	0.5662	5.21
4	0.0105	0.40	0.0174	1.40	0.2010	2.61	0.2513	2.32
5	0.0115	0.31	0.0147	0.29	0.1105	1.84	0.2807	2.99
6	0.0111	0.26	0.0151	0.55	-0.0743	-0.44	0.1855	2.30
7	0.0116	1.47	0.0131	0.02	0.0716	1.07	0.3547	3.92
8	0.0117	-0.04	0.0115	-0.90	-0.0299	0.22	0.0437	0.66
9	0.0105	0.01	0.0111	-1.81	0.0261	0.71	0.3268	3.44
10	0.0107	0.52	0.0106	2.70	0.2263	2.98	0.3640	3.17

This table reports event-study results on absolute value of abnormal returns and abnormal trading volume. Sample is restricted to those events with trading activity at day 0 in both restricted and unrestricted markets. Abnormal stock returns are generated using one-factor market model residuals. A non-parametric rank test described in Corrado (1989) is used for testing the significance of the rank of the abnormal return. Supplemental tables based on mean-adjusted and market-adjusted stock residuals are available on request. Abnormal trading volumes are generated as the differences between trading volume and the mean of daily volume for that stock over the window (-200, -11) normalized by the mean volume. Following Brown and Warner (1985) and Corrado (1989), a *t*-test is applied to examine the significance of the standardized mean abnormal trading volume.

in the restricted market at times of Thai earnings releases. The slope dummy for the absolute value of the earnings shock is significantly positive, implying that foreign investors are more sensitive to earnings shocks. This is consistent with superior event-period information processing by foreigners, H2. In contrast to Singapore, the slope on earnings for the restricted market in Thailand is also positive and statistically significant in specification 2, although the small size of the coefficient may not be economically significant.<sup>21</sup>

Positive slope dummy terms on firm size and number of analysts indicate that, as in the Singapore case, the gap of return volatility between restricted and unrestricted shares is larger for large firms or firms with a lot of analyst coverage. This is consistent with H2b. As was the case for Singapore earnings, the coefficient on forecast dispersion is also positive, and the forecast dispersion slope dummy is negative.

<sup>21</sup> Although the slope on earnings is not statistically significant for the restricted market in Singapore, it is larger in magnitude than the corresponding slope for the restricted market in Thailand. However, the magnitude of the return response to earnings may be determined by country specific factors. Therefore, we cannot argue that information-process skills of local investors differ between the two countries.

Table 5  
Cross-sectional regression results for Thailand earnings announcements

Independent variables	1	2	3	4	5	6	7
Panel A: Dependent variable is absolute value of cumulative stock return residual from day $-1$ to $+1$							
Constant	0.00918 (0.000)	0.00845 (0.000)	0.04200 (0.000)	0.01323 (0.000)	0.00761 (0.000)	0.03442 (0.000)	0.01197 (0.000)
Dummy	0.00320 (0.045)	0.00911 (0.000)	0.00062 (0.971)	0.00615 (0.303)	0.00464 (0.003)	0.03437 (0.000)	0.01197 (0.000)
Earnings surprise		0.00058 (0.002)				0.00011 (0.753)	0.00002 (0.963)
Earnings slope dummy		0.99383 (0.000)				1.00017 (0.000)	1.00008 (0.000)
Size			0.00321 (0.000)			0.00261 (0.000)	
Size slope dummy			0.00025 (0.871)			0.00261 (0.000)	
Number of analysts				-0.00013 (0.014)			-0.00014 (0.038)
Analysts slope dummy				0.00010 (0.556)			0.00014 (0.037)
Forecast dispersion					0.00191 (0.000)		0.00196 (0.011)
Dispersion slope dummy					-0.00176 (0.002)		-0.00193 (0.000)
Adjusted $R^2$	0.015	0.738	0.109	0.041	0.097	0.824	0.797
Panel B: Dependent variable is cumulative mean-adjusted trading volume from day $-1$ to $+2$							
Constant	0.04063 (0.578)	-0.12879 (0.220)	0.14050 (0.804)	0.11771 (0.614)	0.07842 (0.308)	-1.11164 (0.048)	-0.30896 (0.128)
Dummy	0.35303 (0.018)	0.60230 (0.001)	0.19203 (0.863)	0.10383 (0.800)	0.33390 (0.037)	1.84000 (0.039)	0.65362 (0.045)
Abnormal return		18.44570 (0.089)				42.66090 (0.000)	38.21490 (0.000)
Return slope dummy		-24.89500 (0.008)				-49.50115 (0.000)	-43.78170 (0.000)
Size			0.00978 (0.854)			0.08425 (0.101)	
Size slope dummy			0.01577 (0.879)			-0.10685 (0.291)	
Number of analysts				-0.00250 (0.698)			0.00314 (0.521)
Analysts slope dummy				0.00807 (0.494)			-0.00128 (0.904)
Forecast dispersion					0.04588 (0.357)		0.11937 (0.264)
Dispersion slope dummy					-0.02312 (0.326)		-0.09705 (0.248)
Adjusted $R^2$	0.023	0.027	0.013	0.015	0.021	0.040	0.037

This table reports cross-sectional regressions to explain abnormal return volatility and abnormal trading volume around Singapore earnings announcements. Sample is restricted to those events with trading activity at day 0 in both restricted and unrestricted markets. In Panel A, absolute value of the cumulative abnormal return (derived from the market model) over a three-day window (day  $-1$ , 0, and 1) is regressed cross-sectionally on explanatory variables including dummy variable for unrestricted market, earnings surprise, firm size, number of analysts following the firm, forecast dispersion, and their dummy-interacted counterparts. Dummy variable equals zero for restricted shares and one for unrestricted shares. In Panel B, cumulative firm-specific mean-adjusted trading volume over a four-day window (day  $-1$ , 0, 1 and 2) is regressed cross-sectionally on absolute value of the cumulative abnormal return over the contemporaneous window, firm size, number of analysts, forecast dispersion, and their dummy-interacted counterparts. White-adjusted  $P$ -values are reported in parentheses with each coefficient estimate.

In contrast to the evidence for Singapore earnings, the cross-sectional regressions for Thai trading volume (Table 5, Panel B) are often significant. The intercept dummy is positive, indicating a significantly stronger event-period trading volume reaction in the unrestricted market. This is consistent with H2: trading volume at earnings announcements largely reflects foreign investors with better information-processing ability. The contrast with Singapore is again evident: a difference in restricted versus unrestricted trading volume reaction at the earnings announcement is evident for Thailand but not for Singapore. There is a statistically significantly positive relation between trading volume and contemporaneous return reaction in the restricted market. Such an association has been well documented for U.S. data (Atiase and Bamber, 1994; Kim et al., 1997). However, this relationship is not significant in the unrestricted market: the strong negative slope dummies are almost the same size as the slopes on the return itself. The model of Kim and Verrecchia (1997) shows that, if there is pre-announcement private information, there is a positive relationship between trading volume and the absolute value of price change. If there is only event-period information processing (H2a), there is no relationship between event-period volume and return. Therefore, these results suggest that foreign investors in the unrestricted market engage in event-period information processing while local investors in the restricted market have pre-announcement private information. This is consistent with H2a: local investors with pre-announcement information dominate the restricted market while foreign investors who are skilled at information processing dominate the unrestricted market in Thailand.

On balance across both Singapore and Thailand, there is little evidence that local investors have an information advantage while there is much evidence that foreign investors enjoy an information-processing advantage. There is much evidence of H3, that is, a much larger divergence between restricted and unrestricted market behavior in Thailand relative to Singapore. Comparing Panel B across Tables 3 and 5, the intercept dummy is significantly positive for Thailand but not significant for Singapore. It suggests a difference in restricted versus unrestricted trading volume reactions to earnings for Thailand but not for Singapore. This is consistent with H3: the Thai restricted market is populated by poorly informed investors who do not process information effectively while the unrestricted market is populated by foreign investors with superior information-processing ability.

Furthermore, compare the coefficients on absolute return and its slope dummy across Panel B of Tables 3 and 5. There is a statistically significantly positive relation between trading volume and contemporaneous return reaction for Thailand earnings releases in the restricted market, but not in the unrestricted market. In contrast, there is no relationship between trading volume and absolute return in either the restricted or unrestricted market for Singapore earnings releases. Kim and Verrecchia (1997) model both pre-announcement (private information gathering) and event-period information (information processing). Their study suggests that if there is only event-period private information (resulting from information-processing ability), there is no relationship between trading volume and the absolute value of price change. Therefore, our results suggest that event-period information (differential information processing) is the prevalent force in both restricted and unrestricted markets for Singapore earnings, while event-period information may be prevalent only in the unrestricted market for Thailand. This is, again, consistent with H3.

#### *4.3. Who trades unrestricted shares at times of information releases?*

Thus far, our results suggest the presence of sophisticated investors that have greater resources to interpret information, and perhaps even gather greater pre-announcement



information. However, our predictions H1 through H2b do not recognize the potential information spillover between restricted and unrestricted traders while H3 only weakly suggests how information spillover modifies our predictions. H4 offers a specific prediction about the identity of traders in the unrestricted market, and it can help us understand the phenomena we have documented.

Testing H4 requires data on the nationality of traders in the unrestricted market. For Singapore, we were unable to identify any source of ownership data in either paper or electronic form. For example, the exchange does not make ownership records available to researchers. WorldScope does not break their “four largest owners” category down by restricted versus unrestricted shares, nor does Bloomberg break down their summary of large owners. We repeatedly contacted stock exchange officials, but they declined to supply ownership data. We were unable to get any leads from contacts in brokerages and universities in Singapore.<sup>22</sup>

For Thailand, we obtained a limited amount of data on the nationality of traders around corporate information releases. We extract these data from records of all individual orders and trades on the Stock Exchange of Thailand in 1999. Unfortunately, only one year of data are available and it does not overlap with the 1989–1998 sample on which we base our other tests. Nonetheless, these data yield some interesting insights about what goes on around corporate information releases in Thailand’s stock market.

We begin with our sample firms identified in the Appendix, and retain only firms for which I/B/E/S reports an earnings announcement in 1999 and for which there is sufficient trading activity on both the Main and Alien Boards. This leaves a sample of slightly less than 30 earnings events for 1999.<sup>23</sup> Each trade record classifies both buyer and seller as “member or broker”, “foreign client”, “mutual fund, finance company, or asset management company”, or “other”, the latter identifying Thai individuals. For each firm-event in this small sample, we compute three statistics.

First, for each company and day in the sample, we compute “Foreign trades on Alien Board divided by total trades” by summing foreign buy and sell volume on the Alien Board, then dividing by the sum of all buy and sell volume on the Alien Board. This yields the fraction of foreign trades among all trades on the Alien Board. The abnormal portion is the difference between that fraction for a particular day minus the average fraction for the stock over the –200 to –11 window. Following Brown and Warner (1985) and Corrado (1989), a *t*-test is applied to examine the significance of the standardized mean abnormal portion.

Second, for each company and day in the sample, we compute “Foreign buy trades on Alien Board” by classifying each foreign trade as either initiating a buy or initiating a sell. For example, a particular trade is considered a “buy” if it is executed at the prevailing “ask” price, implying that a buyer was sufficiently eager to trade that he or she submitted a market order at the prevailing “ask” price rather than posting an order to buy at a lower price. In contrast, if a foreigner submits an order to buy shares at below the current market “ask” and the order is filled by a sell order submitted subsequently, it is not considered as initiating a “buy”. “Foreign

<sup>22</sup> Grinblatt and Keloharju (2000) are able to separate institutional and individual trading behavior with their Finland data. Choe et al. (1999) are able to separate local and foreign trading, but exclude large firms which are at their foreign ownership limit because, in contrast to Singapore and Thailand, Korea does not have an organized market for foreigners to trade shares whose foreign ownership limit is binding. Seasholes (2000) uses ownership records to study the profitability of foreign investor trading around earnings announcements in Taiwan.

<sup>23</sup> We had also hoped to study the foreign trading proportion around dividend announcements but, perhaps due to the Asian Crisis, found few companies paid dividends in 1999.

buy trades on Alien Board” is scaled by the number of all Alien Board trades. A *t*-test examines whether the abnormal component of this measure is statistically significantly different from zero.

Third, we compute “Foreign ‘netbuy’ on Alien Board”, that is, the number of shares foreigners offer to buy minus the number of shares foreigners offer to sell. Similar to the “Foreign buy trades on Alien Board” measure, this measure represents the degree to which foreigners are unusually keen to buy or sell. It also measures the degree to which foreigners are trading with locals: an imbalance in the number of foreign “buys” versus the number of foreign “sells” must be met by local traders.<sup>24</sup> Again, the variable is scaled by the number of all trades on the Alien Board, and a *t*-test identifies any abnormal patterns.

Table 6 summarizes the results. Column 1 presents “Foreign trades on Alien Board divided by total trades”. Foreigners are typically responsible for half or three-quarters of Alien Board trading volume on days surrounding an earnings release. Prior to the announcement (day 0), there are three days (day –5, –2, –1) when the portion of foreign trades drops and one (day –3) when it increases. The proportion of foreign trades increases significantly for several days (day 0, 1, 2, 3) at or after the announcement, then dips again towards the end of the event window (day 8, 9, 10). While the pattern is not uniform, it is consistent with H2: the information-processing advantage of foreign investors encourages interpreting and processing public news to generate event-induced private information. This causes foreigners to significantly increase their trading at and after earnings announcements. Thus, there is no evidence that local investors enter the unrestricted market to “pick off” noise-trading foreigners at times of earnings releases (H4), although the pre-announcement decline in foreign trading may represent fear of trading against locals with pre-announcement information (H1).<sup>25</sup>

Column 2 presents “Foreign buy trades on Alien Board”, a measure of the extent of foreign buying. It is evident that, starting with day –5, the scale of foreign buying typically drops off prior to the announcement, then picks up at and just after the announcement. This is consistent with the finding on total foreign participation, column 1, that shows that the size of the foreign component of market trading recedes prior to the announcement (perhaps given fears of trading against locals with pre-announcement information) and increases at the announcement (perhaps to exploit the foreign advantage in event-period information processing). Column 3 presents “Foreign ‘netbuy’ on Alien Board”, a measure of the imbalance between foreign buying and selling similar in spirit to the “Foreign buy trades on Alien Board” presented in column 2. As suggested earlier, netbuy shows that foreign buying, as a fraction of all Alien Board activity, attenuates in the pre-announcement period and picks up shortly afterwards. The imbalance in foreign buys and sells is often substantial. On day 1, for example, the table indicates that the gap between foreign buys and sells is equal to 13.9% of total trading volume.

<sup>24</sup> Note that the Thai stock exchange is totally automated, consisting of a computer system that matches buy and sell orders that are submitted electronically. Therefore, a trader does not observe the nationality of the other traders in the market at the time an order is entered and does not observe the nationality of the trader against whom an order is ultimately filled.

<sup>25</sup> We also computed results for Thai “member or broker”, “mutual fund, finance company, or asset management company”, and “other” categories individually but found virtually no differences across different categories of Thai traders. This suggests that Thai institutional investors do not have behavior in common with the foreign investors who are almost entirely overseas institutional investors.

Table 6  
The proportion and direction of foreign trading on Thailand's Alien Board around earnings announcements in 1999

Event day	Obs	1. Foreign trades on Alien Board divided by total trades		2. Foreign "buy" trades on Alien Board divided by total trades		3. Foreign "netbuy" on Alien Board divided by total trades	
		Mean	<i>t</i> -Test for standardized mean residual	Mean	<i>t</i> -Test for standardized mean residual	Mean	<i>t</i> -Test for standardized mean residual
-10	26	0.642	0.038	0.304	-2.030	-0.034	-1.380
-9	27	0.628	-0.214	0.309	-1.460	-0.010	1.097
-8	28	0.627	-0.614	0.313	-4.839	-0.002	0.489
-7	25	0.616	-0.004	0.321	-0.813	0.026	1.743
-6	24	0.672	-0.606	0.365	1.014	0.058	0.725
-5	25	0.528	-3.468	0.300	-2.948	0.021	1.313
-4	23	0.579	-0.902	0.283	-2.267	-0.033	1.170
-3	27	0.637	3.170	0.302	2.369	-0.012	-0.303
-2	26	0.656	8.170	0.293	2.586	0.070	-5.285
-1	27	0.618	-2.030	0.318	-1.095	0.058	2.061
0	14	0.678	2.787	0.316	2.084	0.066	2.370
1	16	0.600	5.758	0.370	2.624	0.139	5.216
2	18	0.729	4.187	0.371	2.121	0.063	2.137
3	15	0.759	4.342	0.379	1.980	-0.001	-1.438
4	15	0.712	1.455	0.343	0.450	-0.025	1.055
5	17	0.697	1.417	0.373	0.616	0.050	1.427
6	16	0.673	-0.366	0.365	1.384	0.057	0.369
7	16	0.649	2.901	0.331	0.197	0.014	-1.694
8	18	0.701	-5.938	0.360	1.410	0.099	-4.798
9	16	0.688	-4.851	0.343	-0.082	-0.052	-2.054
10	13	0.769	-6.242	0.358	-1.093	-0.032	-0.095

Trades are classified as "buys" or "sells" by matching each completed order's price to the prevailing bid and ask prices. Foreign "netbuy" is the difference between foreign buy orders and foreign sell orders. Following Brown and Warner (1985) and Corrado (1989), a *t*-test is applied to examine the significance of the standardized mean abnormal proportion for each measure, where the mean is computed for each stock over the (-200, -11) window.

On balance, these results confirm that there are substantial differences in behavior across Thai and foreign traders. These differences seem to conform to the different roles (H1 ascribes better pre-announcement information to Thais while H2 ascribes better information processing to foreigners) that our testable hypotheses propose for local and foreign investors in such markets. Put another way, there is evidence that foreigners like to trade at or after the earnings release to make best use of their information-processing skills. They are somewhat reluctant to trade prior to the earnings release perhaps because they fear local traders with inside information.

## 5. Summary and conclusion

We have documented the differential impact of corporate news events in parallel markets for local and foreign equity investors. Singapore and Thailand provide an opportunity to study market activity stratified, to a degree, by nationality and by differences in the regulatory and disclosure environment. Our evidence suggests that sophisticated investors generate event-period private information with their superior information-processing ability. The contrast between

results for Singapore versus Thailand is particularly remarkable. Results for Thailand are consistent with a large presence of foreign institutions trading on event-period private information in the unrestricted market. There is much less evidence consistent with locals enjoying pre-announcement private information.

Our results are relevant to two strands of literature, the impact of information on asset markets and the nature of barriers to international capital flows. We confirm that differential information-processing ability is reflected in stock market trading activity. Our results also confirm our notion that the ability to process or indeed create information constitutes a barrier that serves to segment local and foreign investors quite significantly. While previous studies have often found it difficult to document a “differential cost of capital” theory of international market segmentation, our study suggests that there are other forces that can segment national capital markets. We also hope that we have highlighted the usefulness of corporate news events for empirical studies of questions in international asset pricing and the impact of information on asset markets.<sup>26</sup>

We recognize limitations to our study. First, the use of existing theoretical models to interpret our evidence is tentative: these models were not derived in a multi-market setting that corresponds exactly to the unusual market structure that we study. Even in a single-market setting, results and implications vary depending on the structure and implications of models.<sup>27</sup> Second, there are limited number of firms with the dual class structure, short time-series of data available, and missing data due to spotty liquidity for many Thai stocks, leaving us with a relatively small sample of events to look at. Third, we lack extensive data on trader nationality with which to completely characterize participation in these markets.

Obvious extensions to our work include studying earnings in other countries such as China, Korea, and the Philippines that have a similar structure of segregated local and foreign trading.<sup>28</sup> Long-run performance is also an issue: perhaps locals are more likely to ignore corporate new releases because they are of little value while foreigners tend to herd or overreact to such news.<sup>29</sup> One could also examine a broader variety of corporate news events as in Bhattacharya et al. (2000). Extending the study to local and global financial and macroeconomic news releases would be useful as these types of news releases require a different set of information gathering and processing skills.

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<sup>26</sup> See, for example, Seasholes (2000), Bailey et al. (2006), and Bae et al. (2006).

<sup>27</sup> Contrast, for example, our testable hypotheses to Lundholm (1988).

<sup>28</sup> See Bailey et al. (1999).

<sup>29</sup> See Ball et al. (2003) for evidence on accounting performance and annual stock returns in the countries we study, plus Hong Kong and Malaysia. See Froot et al. (2001) for evidence of positive feedback trading by foreign investors.

### Appendix. Sample companies

“I/B/E/S Ticker” is the identifier from the I/B/E/S record of earnings forecasts and releases, “Exchange Ticker” is the identifier commonly used by the local stock exchange, and “PACAP Ticker” is the identifier used on the PACAP Center database. The Singapore database has distinct codes for “regular” and “foreign” shares while the Thailand database differentiates “Main” and “Alien Board” listings with the variable STKTYPE. For Singapore, we include in the sample all available firms with both restricted and unrestricted listings since the market is very liquid. For Thailand, we include only selected firms that are traded relatively regularly. “Sample Identifier” of “1” indicates company is from the Bailey and Jagtiani (1994) sample, “2” indicates 1994 Alien Board trading volume greater than one billion baht, “3” indicates 1994 Alien Board trading volume greater than half billion baht, “4” indicates 1994 Alien Board trading volume greater than one hundred million baht, and “5” indicates several large firms that became heavily traded in more recent years, in part due to their recent listing.

A. Singapore				
I/B/E/S Ticker	Exchange Ticker	Name	PACAP Ticker, regular	PACAP Ticker, foreign
@DBS	DBS	DEVELOPMENT BANK	59	2602
@HFN	HLF	HONG LEONG FIN	105	5166
@KAY	KHJC	KAY HIAN J C	2750	2749
@OOC	OCBC	OCBC OVERSEA CHI	239	1977
@OUB	OUB	OVERSEAS UN BANK	240	3456
@OUT	OUT	O.U.T.	241	5352
@SBU	SBS	SINGAPORE BUS	282	2590
@SIO	SIA	SINGAPORE AIR	310	1503
@SPH	SPH	SINGAPORE PRESS	309	1507
@SQE	SEEL	ST ELECT & ENG	3112	3124
@SX3	SAE	ST AUTOMOTIVE	3156	4117
@SZP	SPC	SINGAPORE PETE	2733	2737
@UOB	UOB	UTD OVERSEAS BAN	342	1972
@VSA	SA	ST AEROSPACE	2645	2820
@WSE	SSE	ST SPBLDG & ENG	2657	2824
@YSK	SCS	ST COMP SYS	3170	3756

  

B. Thailand				
I/B/E/S Ticker	Exchange Ticker	Name	Sample identifier	PACAP Ticker
@AF	AFC	ASIA FIBRE	1	AFC
@XAL	AYUCO	AYUD LIFE	1	AYUCO
@BKC	BBL	BANGKOK BANK	1	BBL
@BK9	BKI	BANGKOK INS	1	BKI
@BB9	BRC	BANGKOK RUBBER	1	BRC
@BOX	BAY	BANK AYUDHYA	1	BAY
@CWC	CTW	CHARNG W&C	1	CTW
@CPF	CPF	CHAROEN POKP FML	1	CPF
@CM9	CMIC	CMIC F&S	1	CMIC
@DHS	DS	DHANA SIAM	1	DS

(continued on next page)

## Appendix (continued)

B. Thailand				
I/B/E/S Ticker	Exchange Ticker	Name	Sample identifier	PACAP Ticker
@DUT	DTC	DUSIT THANI	1	DTC
@IC9	ICC	INTL CSMETICS	1	ICC
@NFS	NFS	NATL F&S	1	NFS
@OHT	OHTL	ORIENTAL HOTEL	1	OHTL
@PDD	PDI	PADAENG INDS	1	PDI
@PAZ	PAF	PAN ASIAN FOOTWR	1	PAF
@RC1	RCL	REGL CONTAINER	1	RCL
@SL9	SPI	SAHA PATH INT	1	SPI
@SU9	SUC	SAHA UNION	1	SUC
@SY9	SUE	SANYO UNIV	1	SUE
@SC9	SCC	SIAM CEMENT	1	SCC
@SYC	SCCC	SIAM CITY CEMENT	1	SCCC
@SCX	SCB	SIAM COML BK	1	SCB
@SM1	SMC	SWEDISH MOTORS	1	SMC
@TFB	TFB	THAI FRM BNK	1	TFB
@TPH	TPC	THAI P&C	1	TPC
@TW	TWC	THAI WAH	1	TWC
@AZ3	ADVANC	A I S COMPANY	2	ADVANC
@BKO	BLAND	BANGKOK LAND	2	B-LAND
@XFO	FINI	FINANCE ONE	2	FINI
@XLH	LH	LAND & HOUSE	2	LH
@MDX	MDX	MDX CO	2	MDX
@PHT	PT	PHATRA THNAKT	2	PHATRA
@XXX	SCIB	SIAM CITY BK	2	SCIB
@TMB	TMB	THAI MTRY BK	2	TMB
@XBP	BANPU	BANPU PUBLIC CO.	3	BP
@HC	HTX	HANTEX CORP	3	HTX
@XMC	MATI	MATICHON	3	MATI
@NTS	NTS	NTS	3	NTS
@SQ9	SPC	SAHA PATHANAPIBL	3	SPC
@6TD	TDT	THAI DURABLE	3	TDT
@UAF	UAF	UNION ASIA FN	3	UAF
@ND9	ASTL	AMERN STD SAN	4	ASTL
@H4C	HANA	HANA MICRO	4	HANA
@IEQ	IEC	INTL ENGINEERING	4	IEC
@XKT	KB	KRUNG THAI BK	4	KTB
@LOQ	LOXLEY	LOXLEY PUBLIC	4	LOXLEY
@NPB	NATION	NATION PUBG	4	NATION
@POP	POST	POST PUBLISHING	4	POST
@PSH	PSL	PRECIOUS SHIP	4	PSL
@PPZ	PERFEC	PROPERTY PERFECT	4	PERFEC
@RXD	ROBINS	ROBINSONS DEPT.	4	ROBINS
@SFI	CFRESH	SEAFRESH IND	4	CFRESH
@SNJ	SHIN	SHINAWATRA COMP.	4	SHIN
@WX6	MAKRO	SIAM MAKRO	4	MAKRO
@SP5	SPP	SIAM P&P	4	SPP
@SZO	SYNTEC	SIAM SYNTECH	4	SYNTEC
@SLZ	SOMPR	SMPRASNG LAND	4	SOMPR
@SF7	SITHAI	SRITHAI SUPER	4	SITHAI
@TZZ	TA	TELECOM ASIA	4	TA

## Appendix (continued)

B. Thailand				
I/B/E/S Ticker	Exchange Ticker	Name	Sample identifier	PACAP Ticker
@TGI	TGI	THAI GLASS IND	4	TGI
@TPF	TF	THAI PRES FOOD	4	TF
@UNJ	UCOM	UNITED COMM	4	UCOM
@EG5	EGCOMP	ELECTRICITY GENERATING	5	EGCOMP
@PTX	PTTEP	PTT EXPLORATION & PRODUCTION	5	PTTEP
@PXZ	PIZZA	THE PIZZA COMPANY	5	PIZZA
@TIG	TIG	THAI INDUSTRIAL GASES	5	TIG

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