ESSAYS ON INFORMATION ENVIRONMENT OF INTERNATIONAL FINANCIAL MARKETS

by

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ABSTRACT

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This dissertation investigates three empirical issues in international finance: the bonding hypothesis in cross-listing, the information role of extreme trading activity in global financial markets, and the effect of cross-listing on the information role of extreme trading activity.

The first chapter examines the bonding hypothesis without the self-selection bias via the impact of the delisting of Level II and Level III ADRs (American Depositary Receipts) on the home stock market. I find that both voluntary and involuntary delisting announcements result in a negative (market) impact over a 31-day event window (from the announcement date to 30 trading days after). However the negative impact is transitory for involuntary delisting but persistent for voluntary delisting. Further analysis on the bid/ask spread around the delisting shows that there is an increase in the adverse selection component of the spread, which greatly accounts for the variation in the abnormal returns on ADR delisting announcements. In summary, the study reveals that ADR delisting price effects are most consistent with a loss of legal and reputational bonding.

The second chapter studies the information role of extreme trading activity as proxy by the high-volume premium in a global setting. Using a large sample of 24,110 individual stocks from 37 countries beyond the US, I find that positive high-volume premium is pervasive globally, although it is more pronounced for a smaller size company or from an emerging market. A

detailed investigation shows that developing an external information environment, institutionally or physically, can weaken the information role of extreme trading activity.

The third chapter examines the effect of cross-listing on the information role of abnormal trading volume. Using a panel of foreign firms that cross-list in the US, I find a significant decline in the slope coefficient in a regression of log absolute returns on abnormal trading volume for firms that cross-list as Level II/III ADRs, and especially so for firms from emerging markets. Further analysis shows that the attenuation stems from the added analyst coverage that increases the information channels to the market. On the other hand, foreign firms that cross-list on the OTC/144A market do not experience a significant decline in the slope coefficient, which is consistent with the fact that they are not subject to the stringent disclosure requirements found in the U.S. The result suggests that the slope coefficient of the stock's log absolute return on abnormal trading volume can be a useful tool for measuring the economic consequences of disclosure regime shift.

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ADR Delisting: A Natural Test of the Bonding Hypothesis

1. Introduction

1.1 Motivation

As of July 2, 2006, 455 ADRs were delisted from major U.S. exchanges (source: DataStream). While a few studies have examined the characteristics of firms that deregister in the U.S. and the market reaction to the de-registration of domestic companies in the U.S. (Leuz, Triantis, and Wang, 2008; Marosi and Massoud, 2004), very little work has been done regarding the impact of the delisting of cross-listed firms.

In this study, I examine the impact of delisting on shareholder wealth and the market microstructure implications in the home equity market by constructing a sample data of ADRs that have been delisted from the three major U.S. stock exchanges: (a) the NYSE, (b) the NASDAQ, and (c) the AMEX. More importantly, this study provides a unique perspective on the bonding hypothesis. Historically, the empirical testing of the bonding hypothesis has been criticized as being contaminated by the self-selection bias. The cross-listing literature cannot disentangle the bonding effect from other valuation effects because the reason for cross-listing is not mutually exclusive. Since the sample in this paper covers only delisted Level II and Level III ADRs, which already have chosen to bond themselves to the stringent regulatory requirements of the U.S. capital market, examining the consequences of their delisting provides a venue to test the bonding hypothesis independent of the self-selection bias.

1.2 Literature Review

The motivation for foreign firms to list on the highly regulated U.S. capital market has been examined extensively. Cross-listing may lower a firm's cost of capital due to diversification

and segmentation gains (Merton, 1987; Easley and O'Hara, 2004). In addition, cross-listing may contribute to shareholder wealth by increasing stock liquidity due to enhanced inter-market competition provided the home market is linked informationally to the cross-listed market (Domowitz, Glen, and Madhavan, 1998). Cross-listing enables a firm to expand its potential investor base more than if it is traded in a single market (Foerster and Karolyi, 1999). However, the debate between the bonding hypothesis and the avoidance hypothesis remains unresolved.

The bonding hypothesis refers to a mechanism by which firms that are incorporated in a jurisdiction with the weak protection of minority rights can create value by voluntarily subjecting themselves to a higher disclosure standard and a stricter enforcement (Coffee, 2002). Bonding takes effect through two primary channels: (a) regulatory bonding through the legal system and (b) reputational bonding through the operation of the underlying financial market.

A number of empirical studies have tested the bonding hypothesis either directly or indirectly. Miller (1999) found that the positive abnormal returns as a result of cross-listing are only significant for ADRs that are subject to the highest levels of disclosure and regulatory supervision (i.e. Level III ADRs). Doidge, Karolyi, and Stulz (2004) found that, by cross-listing, minority investors are better protected and they benefit more from the cross-listing. Doidge (2004) provided empirical evidence supporting the bonding hypothesis for firms cross-listed via Level II and Level III ADRs by examining the difference in premium between voting and nonvoting shares of ADRs.[1] On the other hand, Siegel (2005) examined Mexican ADRs traded on U.S. exchanges and argued that bonding is mainly through the reputation channel.

A number of recent studies tested the bonding hypothesis from the perspective of corporate governance. Ugur and Darius (2008) found that firms from weak investor protection

[1] On average, firms with Level II or III ADR programs have voting premiums that are 43% lower than firms that are not cross-listed.

regimes that are subject to the U.S. capital market regulation (Level II and Level III ADRs) have a higher probability of management turnover following a weak firm performance. On the other hand, Doidge, Karolyi, Lins, Miller, and Stulz (2009) provided support to the bonding hypothesis by demonstrating that, when the private benefit is high, the controlling shareholder of the foreign firm is less likely to cross-list in the U.S. In other words, the increased level of investor protection provided by the U.S. capital market constrains the manager's ability to consume private benefits.

The avoidance hypothesis claims that the bonding hypothesis is subject to a self-selection bias. To the extent that corporate governance is an issue in the cross-listing decision, it plays a negative role. Surveys on the cross-listing motivations by Bancel and Mittoo (2001) and Fanto and Karmel (1997) showed that managers view the SEC reporting and the reconciliation to U.S. GAAP as the major obstacles to their decision to cross-list. Licht (2003) claimed that, since foreign firms can easily exempt themselves from the corporate governance listing requirements that U.S. firms are subject to, the validity of legal bonding on cross-listed firms is not well grounded. He argued that the major motivation for firms to cross-list is not to commit to better corporate governance practices but, rather, to obtain cheaper sources of funds and a greater visibility among investors. Several other researchers have indirectly provided evidence supporting the "avoiding hypothesis". Franck and Mittoo (2001) and Mittoo (1992) challenged the bonding hypothesis by showing that managers consider the SEC reporting costs and the reconciliation of the financial statement to the GAAP as the major deterrents in their decision to cross-list in the U.S. Yamori and Baba (2001) also argued that increased financial disclosure and reconciliation costs are the major obstacles to listing abroad. Saudagaran and Biddle (1995) showed that firms are more likely to list on non-U.S. exchanges that have a lower financial

disclosure requirement than exchanges in their home market. Sundaram and Logue (1996) documented that home market disclosure quality and government style does not explain the cross-sectional valuation premium from listing in the U.S. Recently, Burns, Francis, and Hasan (2007) examined a sample of the foreign acquisitions of U.S. target firms. Although cross-listing reduces barriers to investment, these researchers found limits to its ability to subsume both the legal environment and the importance of the monitoring of financial intermediaries completely. They argued that that the extent of actual legal and regulatory bonding by cross-listed firms may be more limited than is often assumed.

1.3 Main Result

This research provides support to the bonding hypothesis in a negative way (i.e. avoiding bonding leads to increased agency costs and destroys the firm's value), More specifically, this research pursues three objectives. First, I examine the impact of delisting by cross-listed firms on the shareholder wealth in the home market and find that the market initially (0 to +30 trading days after the delisting announcement) reacts more adversely against involuntary delisting announcements than against voluntary delisting. However, over a longer period (+30 to +99 trading days following the delisting announcement), the market reaction reverses. The cumulative abnormal returns turn significantly positive for involuntarily delisted firms and remain negative for voluntarily delisted firms. This leads me to conclude that the negative market impact is transitory for involuntarily delisted firms while remaining persistently negative for voluntarily delisted firms. The result for voluntary delisting provides initial evidence that the market reacts negatively to the firm's decision to avoid the stricter corporate governance practices in the U.S., even after considering the savings from the high listing costs (which is one of the main reasons often cited by the management of firms for voluntary delisting).

Second, to examine the market's increased concern on the agency cost, I decompose the change in the bid-ask spread into order processing costs and adverse selection costs after delisting (similar to George, Kaul, and Nimelendra, 1991). To control for the effect of the inter-market integration of the home stock market and the ADR market, I construct a proxy for the degree of integration based on generalized forecast error variance decomposition (Pesaran and Shin, 1998). The findings reveal that, on average, delisting increases the implicit spread from 2.3% to 2.66%. By decomposing the implicit spread into the order processing and the adverse selection cost, I find that the proportion of adverse selection cost in the implicit spread increases for the home market stock that voluntarily delists from the U.S. capital market while it decreases for the involuntarily delisted ADRs. This result still holds after I control for the degree of integration.

Third, to detect the impact of avoiding increased regulation on the firm's wealth further, I run a cross-sectional regression of the delisted ADR's home stock cumulative abnormal return on the proxy of increased agency cost (i.e. the implicit spread due to the information asymmetry). The adverse selection component of the bid-ask spread explains 12.87% of the variation in the cumulative abnormal return. After I control for market integration, market turnover, and firm size, I find that the proxy for the increased agency cost is far more statistically significant than are any of the above control variables.

In sum, this research reveals that avoiding increased regulation increases the market's concerns regarding the firm's increased agency cost. Consequently, this reduces the firm's value. This study adds to the existing literature by demonstrating that agency cost is also priced in the equity price.

In the remainder of this chapter, Section 2 contains an overview of the characteristics of ADRs listed on the NYSE, NASDAQ, or AMEX. It contains an overview of the delisting

procedure. Section 3 includes the data and the delisting sample used in the paper. Section 4 contains the announcement effect using the standard market model. Section 5 includes the market microstructure impact of ADR delisting while, Section 6 contains the pricing implication of the increased adverse selection cost. Finally, Section 7 concludes the findings of this paper.

2. ADR and Delisting Procedure

2.1 The Regulatory and Disclosure Requirement for Level II/III ADRs

The sample used in this paper covers the ADRs delisted from the major U.S. stock exchanges (Level II and Level III) since they are subject to the highest level of regulatory requirements on the U.S. capital market. Although certain provisions in the Securities Exchange Act mandate different treatment for U.S. issuers and non-U.S. issuers, the exemption is not available for Level II and Level III ADRs. The Sarbanes-Oxley Act (SOX) requires Level II and Level III ADRs to comply fully with all provisions of SOX initially but this requirement has since been relaxed for foreign firms.

Level II and Level III ADRs are traded and listed on the NYSE, AMEX or NASDAQ, thus meeting their listing requirements and complying with the registration provisions and the reporting requirements of the Securities Exchange Act. A brief summary of the characteristics of such ADRs is presented in Table 1.

Level II ADRs must file a Form F-6 registration statement to register the ADR to be issued. To register the listing of a Level II ADR, the firm should also submit a Form 20-F registration statement (an annual filing that contains a detailed financial disclosure from the issuer including financial statements) and a reconciliation of these statements to U.S. GAAP. The firm should also submit annual reports and any interim financial statements to the SEC on a regular, timely basis.

Level III ADR programs must comply with stricter SEC rules than Level II ADR programs. These rules includes the full registration and reporting requirements of the SEC's Exchange Act and entails the firm filing: (a) a Form F-6 registration statement to register the ADR; (b) a Form 20-F registration statement; and (c) a Form F-1 to register the equity securities underlying the ADR that are offered publicly in the U.S. for the first time. The firm is also required to submit annual reports and any interim financial statements to the SEC and all registered public shareholders on a regular, timely basis.

By subjecting themselves to more stringent regulations and a broader disclosure regime, firms with exchange-listed ADRs have significantly higher announcement-day price effects (2.63% according to Miller, 1999), lower post-listing share-price declines (especially for Level III ADRs; Foerster and Karolyi, 1999), a reduction in the cost of capital (Errunza and Miller, 2000), and a larger valuation premium than over the counter (OTC) listings and SEC Rule 144a private placements (Doidge, Karolyi, and Stulz, 2004). The market seems to reward the cross-listed firms for bonding themselves to more effective protection measures for minority shareholders against managerial self-dealing or against the excess consumption of private benefits of control. However, is the reverse also true? In other words, will the same firm be punished if it delists or deregisters as an ADR? This is the primary research question addressed in this paper. In the next section, I introduce the escaping mechanism (delisting) that can be used by foreign firms.

2.2 The ADR Delisting Procedure

Over the last few years, especially since the passage of the Sarbanes-Oxley Act, the number of foreign firms delisted from the major U.S. exchanges (the NYSE, NASDAQ, and AMEX) has increased dramatically. From 1980 to July 2, 2006, 455 ADRS were delisted from the major U.S. capital market. This represents nearly 55.15% of the total ADRs listed in the U.S.

major capital market. Table 2 provides the distribution of exchange-listed ADRs by countries (Level II and III).

Delisting can be either voluntary or involuntary. Foreign issuers can voluntarily apply for delisting with the SEC using Form 15. The major reasons cited by foreign firms for delisting include a low U.S. trading volume and an increased compliance cost spurred by the passage of SOX. As for involuntary delisting, each major U.S. exchange has its own rules relating to various company problems that could lead to a delisting and its own procedures for the notification of and the appeal of a possible delisting. For example, when ADRs fail to meet the exchanges' listing criteria,[2] such as the minimum bid price requirement of $1 or the minimum market value requirement of $5 million, the NASDAQ sends a warning that the company has 90 days to get the stock trading back to the minimum required levels. If the company is unable to do so, the NASDAQ then notifies the company of its imminent delisting. At this point, the company has one week to issue a press release. Failure to issue the press release results in a trading halt. On the other hand, the NYSE adopts more complex criteria for the continued listing of foreign firms.[2] If a company fails to satisfy the listing criteria after the warning period, the firm should disseminate a public notice no fewer than 10 days before the delisting becomes effective. In addition, this notice must remain posted on its website until the delisting is effective.

During the ADR program termination process, the depositary bank must give the ADR holders 30 days' notice prior to the actual termination. During this period, the depositary can still issue ADRs, transfer them, and pay dividends if applicable. After the termination date, the depositary can no longer issue or transfer ADRs and neither can it pay any dividends. The agreement also sets a period during which the ADR holders can cancel their shares (this is typically six months but it can range from 60 days up to 1 year). Once cancelled, the holders

[2] http://www.nyse.com/regulation/listed/1147474807398.html

receive the shares in an account along with any accrued dividends. After this period is over, the depositary will sell the ordinary shares and transfer the proceeds into U.S. dollars, paying out a cash distribution (without interest) to all holders that tender their ADRs.

3. The Data and the Delisting Sample

The sample of delisted ADRs (Level II and Level III) comes mainly from DataStream and is complemented with CRSP since DataStream only captures the most recently available exchange information. Firms that delist from the major exchanges and traded on OTC listings are excluded from the DataStream sample (Ince and Porter, 2006). The data sample period used in this research is from January 1980 to July 2007.

To be included in the final sample, the delisted ADRs needed to satisfy the following criteria:

1. The delisting is not caused by bankruptcy, liquidation, or merger and acquisition;
2. The ADR must be delisted from a major U.S. stock exchange (NASDAQ, the NYSE, or AMEX);
3. There is no other ADR of the same company listed on another major U.S. exchange;
4. The cross-listed firm must have ordinary shares traded in the home market and continue to be traded for at least 125 trading days after the ADR termination date.

The JP Morgan ADR data universe provides most of the home market stocks of the delisted ADRs. The remaining unidentified home market stocks are examined by matching the delisted ADR's name, home country, and industry.

To identify the reason for the delisting of the ADRs, I first match the DataStream sample to CRSP database. Any ADR with one of the following CRSP delisting codes are removed:

1. those below 500 (who delisted due to a merger, acquisition, share exchange or liquidation);
2. delisting codes of 501, 502, 503, 505, 510, 513, 514, 516, 517, and 519 (delisted due to the fact that the share moved to another U.S. or Canadian Exchange);
3. delisting codes of 572, 574, and 575 (delisted due to bankruptcy); and
4. involuntary delisting codes of 535, 550, 551, 552, 560, 561, 580, 582, 584, 585, 589, 590, and 591 (delisted due to failure to meet the continued listing criteria).

To identify the reasons for other delisted ADRs, I use Lexis-Nexis to identify the reason underlying the delisting. The final sample includes 129 delisted ADRs from the three major U.S. stock exchanges. Among these, 38 are involuntary delistings, 59 are voluntary delistings, and the remaining 32 ADRs are delisted for an unspecified reason. The delisting sample comes from 29 countries. One-third of the delisted ADRs come from emerging markets while the remaining two-thirds come from developed markets (as per the emerging market definition of *Economist*). Most delistings (69%) are concentrated in the period after 2000. The summary statistics on delistings are presented in Table 3.

4. The Empirical Results on Delisting Announcements

To be included in the sample, an ADR needed to have an identifiable announcement date of delisting. Announcement dates are collected from the Lexis/Nexis. The search algorithm uses key words found in a preliminary sample of announcements including terms for the instrument such as “Depositary,” “ADR(s),” “GDR(s),” and “delist.” The earliest press release is taken as the announcement date. When the announcement date for involuntarily delisted ADRs was not available, I used the date one week before the termination date (the maximum number of days

that NASDAQ allows the delisted ADRs to issue a press release before trading halts) as the announcement date.

The cross-listed firm must have its stock traded in the home market for at least 125 trading days after the delisting announcement. I obtained the stock price and the corresponding local market index data from DataStream International. Abnormal returns were determined based on the prediction errors from the standard market model (e.g. Foerster and Karolyi, 1999). First, I estimated the (local) market model for each firm during the 150-day prelisting period from trading day -250 to trading day -101. Next, I calculated abnormal returns as prediction errors. Figure 1 summarizes the average cumulative abnormal returns for 30 days around the announcement of the ADR delisting.

For all firms, the announcement of the delisting intention results in a significantly negative home market return of -0.75% within a two-day event window (days 0, +1). Of this, the voluntary delisting announcement results in an insignificant cumulative abnormal return of -0.22% in the two-day event window (0, +1) while the involuntary delisting announcement results in a significantly negative cumulative abnormal return of -1.28%. The cumulative abnormal return remains negative within the 30-day event window for both voluntary and involuntary delistings. This is consistent with the other delisting literature that finds significantly negative announcement date returns to delisting announcements (Liu, 2004; Smith, 2005; and Witmer, 2006). One possible explanation for the immediate price drop of the home market stocks is that many institutional investors cannot own shares in companies that are not listed on major stock exchanges and thus the subsequent selling pressure.

To examine the relatively long-term impact of a delisting announcement on the stock price, I also calculate the abnormal returns over a relatively longer event window (the period

between 99 days before and after the announcement date). These results are summarized in Figure 2. Interestingly, the market reaction towards the voluntary and involuntary delisting decision diverges 30 trading days after the announcement date. The negative market impact of involuntary delisting is transitory while the impact of voluntary delisting is persistent.

One possible explanation for this divergence is that domestic investors raise their concerns about the heightened agency cost for cross-listed firms that voluntarily avoid the strict regulatory regime of the U.S. markets. This avoidance results in a decline in the wealth of the shareholders despite the cost savings from the delisting (which is one of the prime reasons cited by management to justify a firm's delisting intention). On the other hand, the shock of the agency cost concern for involuntary delisting is only temporary. The domestic investors apparently do not hold an involuntary exit against the management and the cost savings is soon reflected in the stock prices. Table 4 provides the summary statistics of the major financial variables of the voluntarily and involuntarily delisted firms one year before delisting. On average, firms that delist voluntarily are larger in asset size and net sales and have positive earnings per share. By contrast, involuntarily delisted firms are usually smaller and financially less secure (earnings per share of $-0.51).

According to a 2004 report by Foley & Lardner, LLP, companies with annual revenues ranging from $100 million to $499 million spend $780,000 and 5,100 hours on compliance while those with revenues ranging from $500 million to $999 million spend $1 million and 6,900 hours on compliance. The report estimates that the average "cost of being public" in the fiscal year 2004 was $2.86 million. Thus, delisting from major U.S. exchanges greatly alleviates the financial burden for involuntarily delisted firms. This may explain the positive cumulative abnormal return in the post-delisting event window for involuntarily delisted firms whose net

sales revenue is only $416.5 million before delisting. In other words, the direct benefit of the cost saving of being delisted from the NYSE or NASDAQ outweighs the concerns of an increased agency cost from involuntarily exiting the stringent compliance rules of U.S. corporate governance.

The market divergence for voluntary and involuntary delisting announcements provides initial evidence supporting the hypothesis that avoiding bonding could increase agency costs and destroy firm value. In the next section, I examine the impact of delisting on agency costs by looking at the change in the adverse selection component of the bid-ask spread of the market maker.

5. Market Microstructure Effect of Delisting: Decomposition of the Implicit Bid-Ask Spread

In this section, I examine the adverse selection component of the bid-ask spread surrounding delisting. To test changes in the implicit bid-ask spread before and after delisting, I follow the indirect inference approach used by George, Kaul, and Nimelendra (GKN, 1991). The GKN spread decomposition assumes that there is no serial correlation between the sequence of buy and sell orders (the order arrival is random) and the constant quoted spread across transactions. In the GKN framework, the logarithm of the transaction price for an individual stock *i* at time *t* can be written as:

$$p_{it} = m_{it} + \pi_i(s_{qit}/2)Q_{it} \quad (1)$$

where m_{it} is the unobservable true price of stock i that reflects all public information immediately following the transaction at time t; $\pi_i$is the unobservable quoted spread due to the order-processing cost; s_{qit} is the proportional quoted spread for stock i from the market maker at time t which equals to $2\frac{bid-ask}{bid+ask}$ (the bids (asks) are the highest and lowest quotes among all

market makers who are trading the security at the end of each trading day); and Q_{it} is the unobservable buy/sell indicator (+1 for buy and –1 for sell) identified according to the quote rule (i.e. I classified trades at prices above the prevailing quote midpoint as market-maker sells ($Q_{it} = +1$) and trades at prices below the prevailing quote midpoint as market-maker buys ($Q_{it} = -1$)).

The true price is subject to the following process:

$$m_{it} = m_{it-1} + E_{it} + (1 - \pi_i)\left(\frac{s_{qit}}{2}\right) Q_{it} + u_{it} \quad (2)$$

where E_{it} is the unobservable expected return of stock i between $t-1$ and t based on all public information up to the transaction at t; $(1-\pi_i)$ is the proportion of the quoted spread due to adverse selection; and u_{it} is the innovation in true price due to the news arrival between $t-1$ and t.

Solving the transaction return from Equations (1) and (2):

$$R_{it} = E_{it} + \pi_i\left(\frac{s_{qit}}{2}\right)(Q_{it} - Q_{it-1}) + (1 - \pi_i)\left(\frac{s_{qit}}{2}\right) Q_{it} + u_{it}. \quad (3)$$

When we have the data for the bid quote for each security in logarithm following a transaction at t,

$$b_{it} = m_{it} - \pi_i\left(\frac{s_{qit}}{2}\right) \quad (4)$$

the return from the bid quotes, R_{it}^b, can be calculated as:

$$R_{it}^b = E_{it} + (1 - \pi_i)\left(\frac{s_{qit}}{2}\right) Q_{it} + u_{it}. \quad (5)$$

Subtracting Equation (5) from Equation (3), we have,

$$RD_{it} = R_{it} - R_{it}^b = \pi_i\left(\frac{s_{qit}}{2}\right)(Q_{it} - Q_{it-1}). \quad (6)$$

Taking the autocovariance of RD_{it} yields the spread measure:

$$s_{it}^{GKN} = 2\sqrt{-cov(RD_{it}, RD_{it-1})} = \pi_i s_{qit}. \quad (7)$$

The GKN measure depends on the assumption that the transaction price and the bid quote are obtained sequentially. The simultaneous measurement of the bid/ask quote and the transaction price will lead to an upward bias in the spread measure (GKN, 1991). However, there is evidence that such market-at-close orders are infrequent even in highly liquid markets such as the NYSE, NASDAQ, or AMEX (Harris, 1989, and GKN, 1991). Considering the relatively less liquid home stock markets in the sample, it seems reasonable to assume that such an effect is negligible.

Let $s_0^{GKN} = \frac{\sum_{i=1}^{n} 2\sqrt{-I_T(t<T)cov(RD_t, RD_{t-1})}}{n}$ denote the average estimated spread before delisting and $s_1^{GKN} = \frac{\sum_{i=1}^{n} 2\sqrt{-I_T(t>T)cov(RD_t, RD_{t-1})}}{n}$ denote the average estimated spread after delisting, where T is the termination date of the individual ADR and $I_T(t < T)$ is an indicator function of delisting which is equal to 1 if the time period is before termination and 0 otherwise. The change in the bid-ask spread after delisting is denoted as $h(s_0, s_1) = s_1^{GKN} - s_0^{GKN}$.
The testable hypothesis of interest is:

$$H_0 = h(s_0, s_1) = 0 \quad (8)$$

The two-sample mean comparison *t*-test is presented in Panel A of Table 5. The sample period is from 125 trading days before the ADR termination day (the last trading day of ADR) to 125 trading days after the termination. I obtain the closing bid/ask spread of the home stock price from DataStream.

The average spread for the home market stock before delisting is 2.3% compared to 2.66% after delisting. For the whole sample, the change in the spread is not statistically significant. However, when I decompose the firms into voluntary and involuntary delisted firms, the change in the spread diverges. While the implicit spread for voluntarily delisted firms decreases from

2.18% to 1.87% (statistically significant at 10%), it increases from 2.21% to 4.57% for the involuntarily delisted firms (statistically significant at 1%).

To examine the impact of ADR delisting on the spread due the adverse selection cost, I regress the estimated implicit spread on the proportional market maker's quoted spread for stock i:

$$s_{it}^{GKN} = \alpha + \beta_1 s_{qit} + \beta_2 Delisting_t s_{qit} + \in_{it} \quad (9)$$

$$\in_{it} = \rho \in_{it-1} + e_{it} \quad (10)$$

where β_1 is the proportion of spread due to the order processing cost and $1 - \beta_1$ is the proportion of the adverse selection cost before delisting; β_2 is the impact of delisting on the proportion of the order processing cost and $1 - \beta_1 - \beta_2$ is the proportion of the adverse selection cost after delisting. The fixed effect panel regression corrected for first order correlation in the disturbance term is reported in Panel A of Table 6.

For all of the delisted firms in the sample, the exit from the U.S. major stock market increased the proportion of the order processing cost in the bid/ask spread from 12.14% to 36.15% and the proportion of the spread due to adverse selection cost decreased from 87.86% to 63.85%. For firms that delisted voluntarily, the proportion of the order processing cost in the implicit spread decreased significantly from 17.35% to 6.7%, implying that the proportion of the adverse selection cost increased significantly from 82.65% to 93.3%. For involuntarily delisted firms, the proportion of the order processing cost increased from 6.26% to 37.7%, which implies that the proportion of the adverse selection cost decreased from 93.74% to 62.3%.

The impact of delisting on the spread component might be affected also by the historical integration between the ADR and its home market stock. For a home market stock that is highly integrated with its ADR, the ADR's delisting from the U.S. might either (a) increase the adverse

selection cost due to the loss of an overseas price discovery channel; or (b) increase the order processing cost because of the rent accruing to the market maker due to the disappearance of a competitive market. To control for the effect of integration, I construct a proxy for a measure of integration between the ADR and the home market stock using the Johansen generalized forecast error variance decomposition method (Pesaran and Shin, 1998). This method allows for contemporaneous correlation between the ADR and the home market stock. More specifically, the Johansen error correction model (Johansen, 1991) is stated as:

$$\Delta P_t = \Pi P_{t-1} + \sum_{i=1}^{k} \Gamma_i \Delta P_{t-i} + \mu + e_t \quad (11)$$

where ΔP_t is a 2×1 vector containing the first difference of ADR price and the exchange-rate adjusted home stock price from the previous 250 trading days to 125 trading days before the ADR termination in the U.S. capital market; the parameter matrix Π contains information regarding the long-run cointegration relationship between the two markets; Γ is a parameter matrix about the impulse response function; and k is the optimal lag based on information criteria. Rewriting equation (11) as a moving average process, we have:

$$\Delta P_t = \sum_{i=0}^{\infty} C_i \varepsilon_{t-i}, t = 1,2, \dots T. \quad (12)$$

As demonstrated in Pesaran and Shin (1998), the generalized forecast error variance decomposition for the vector ΔP_t is given by:

$$\theta_{ij} = \frac{\sigma_{ii}^{-1} \sum_{l=0}^{n} (e_i' C_l \sum C_l' e_j)}{\sum_{l=0}^{n} (e_i' C_l \sum C_l' e_j)}, i, j = 1,2 \quad (13)$$

where σ_{ii} is the iith element of the residual variance covariance matrix $\sum$ of the vector ΔP_t , e_j is a 2×1 vector with unity in the jth row and zero elsewhere; and n is the number of steps ahead. The term θ_{ij} is used to measure the relative importance of the ADR market (home stock market) in influencing the home stock market (the U.S. ADR market). The generalized forecast error

variance decomposition is conducted up to a three-day horizon and the results are presented in Table 7.

Table 7 shows that, on average in a three-day horizon, less than 30% of the variation in the ADR price (home market stock) is explained by the home market stock price (ADR). The average integration for voluntarily and involuntarily delisted stocks is 22.6% and 27%, respectively (not reported in the table). I classify a firm as integrated if the average integration lies in the top 50% and classify it as fragmented if the average integration lies in the bottom 50%. The difference of the mean *t*-test for the pre and post-delisting implicit spread for integrated and fragmented firms is presented in Panel B of Table 5. The implicit spread for integrated firms increases from 1.69% to 2.71% due to delisting (significant at the 1% confidence level). In contrast, the fragmented firms see a slight decrease (but not statistically significant) in the implicit spread from 2.77% to 2.65%. This is consistent with the previous conjecture that the order processing cost of the home market stock that is highly integrated with its ADR will rise because of the rent accruing to the market maker due to the disappearance of a competitive market.

I also examine the spread decomposition based on the degree of integration according to Equation (9). The result is reported in Panel B of Table 6. For integrated firms, the proportion of the implicit spread due to the order processing cost increases from 18.7% to 58.51%. The regression on the fragmented firms generated an insignificant proportion of spread due to the order processing cost before delisting, but the delisting significantly increased the proportion of the order processing cost by 11.9%.

In sum, the proportion of the implicit spread due to the adverse selection cost increases for voluntarily delisted firms but decreases for involuntarily delisted firms. The degree of

integration plays an important role in explaining the change in the spread component. In order to control for the impact of historic integration between the ADR and the home stock market, I multiply the degree of integration with the delisting dummy in the regression:

$$s_{it}^{GKN} = \alpha + \beta_1 s_{qit} + \beta_2 \cdot Delisting_t . s_{qit} + \beta_3 \cdot Integration \cdot Delisting_t \cdot s_{qit} + \in_{it} (14)$$

The results are reported in Panel C of Table 6. Panel C shows that, even after controlling for the degree of historic integration between the ADR and the home market stock, the proportion of the adverse selection cost still decreased significantly for involuntarily delisted firms and increased significantly for voluntarily delisted firms.

The increased adverse selection cost proportion of the implicit spread in the post-delisting period and the persistent negative abnormal return of voluntarily delisted firms provides evidence consistent with the bonding hypothesis. In other words, avoiding a higher level of disclosure and corporate governance regulation increases the market's concern about the agency cost. This concern, in turn, destroys firm value, which provides negative support to the bonding hypothesis.

6. Pricing Implication of Agency Cost

In this section, I examine whether the estimated implicit spread due to the adverse selection cost can explain the cumulative abnormal return of foreign firms that delist from the major U.S. stock exchange. I also check the robustness of the results by controlling for alternative explanations. Specifically, I test a cross-sectional regression of the delisted ADR's home stock cumulative abnormal return on the difference in the mean of the spread due to the adverse selection cost (denoted as Diff. AS Spread) and the difference in the mean of the spread due to the order processing cost (denoted as Diff. OP Spread) before and after the delisting announcement along with several control variables. The spread due to the adverse selection cost

and the order processing cost is estimated from Equation (9). The order processing spread is estimated as $\hat{\beta}_1 \cdot s_{qit}$ before delisting and as $(\hat{\beta}_1 + \hat{\beta}_2) \cdot s_{qit}$ after delisting. The spread due to the adverse selection cost is estimated as $(1 - \hat{\beta}_1) \cdot s_{qit}$ before delisting and as $(1 - \hat{\beta}_1 - \hat{\beta}_2) \cdot s_{qit}$ after delisting. The cumulative abnormal return is calculated from 99 trading days before to 99 trading days after the delisting announcement from major U.S. exchanges. The results are presented in Table 8.

Regression 1 of Table 8 shows that the Diff. AS Spread significantly explains the cross-sectional variation of the cumulative abnormal return while the Diff. OP Spread is not statistically significant. The increased spread due to an adverse selection cost is associated with a significantly negative stock return. Without any control, the Diff. AS Spread and Diff. OP Spread explain almost 13% of the cross-sectional variation of the cumulative abnormal return. Regression 2 controls for the average degree of integration as defined in Table 6. The result is qualitatively the same as Regression 1: only the Diff. AS Spread is the significant explanatory variable and the R^2 increases to 15%. To account for the effect of trading activity on the stock price and the informational role of trading volume (Wang, 1994), I add a turnover ratio as an additional control variable in Regression 3. Regression 4 further controls for the inherent information asymmetry of each firm by adding the market capitalization denominated in U.S. dollars (see Llorente, Michaely, Saar, and Wang, 2002). The results from Regressions 3 and 4 are qualitatively the same as Regression 2: only the Diff. AS Spread is significant.

In Regression specification 5, I reran the cross-sectional regression with all the control variables, namely the integration level, the average turnover ratio, and the average market capitalization over the 200-event day window. In Regression 6, I control for the difference of average turnover and market capitalization before and after delisting. In both specifications, Diff.

AS remains significant. Therefore, the explanatory power of the Diff.AS Spread appears to be pervasive.

7. Conclusion and Summary

The passage of the Sarbanes-Oxley Act in 2002 raised concerns of cross-listed firms about the excessive compliance cost. As a result, more and more firms chose to delist voluntarily from the U.S. exchanges. However, the evidence in this paper shows that the surged delisting trend might be just another evidence of managerial myopia. The investors in the domestic market react negatively to a voluntary exit from the major U.S. stock exchanges. The market maker also increases the proportion of the adverse selection cost in the post-delisting implicit spread, indicating the market's raised concern about the firm's agency cost. More importantly, the increased agency cost is priced in the stock market. This research supports the bonding role of the U.S. regulatory system by providing evidence that the deliberate downgrade of corporate governance can destroy firm value.

Table 1: Characteristics of ADRs Listed on AMEX, NYSE and NASDAQ

ADRs listed on major U.S. exchanges appear mainly in two forms: Level II and Level III. The registration and reporting requirements are subject to Securities Act of 1933 and Securities and Exchange Act of 1934 respectively.

Item	Level II	Level III
Capital Raising Ability	No	Yes
SEC Requirement	Registration Statement F6	Form F1 or F6 for IPO
U.S. reporting requirement	Form 20F filed annually	Form 20F filed annually; short form F2 and F3 for subsequent offerings
GAAP Requirement	Partial GAAP reconciliation for financials	Full GAAP reconciliation for financials

Source: Bank of New York (http://www.adrbny.com/)

Table 2: Country Distribution of the Listing/Delisting of Level II/III ADRs

This table shows the country distribution of the listing/delisting of Level II and III ADRs from 1980 to July, 2006 on major U.S. exchanges including AMEX, NYSE, and NASDAQ.

Countries	No. of Companies Issued ADRs on Major U.S. Exchanges	No. of Companies that delisted ADRs from Major U.S. Exchanges
Argentina	21	8
Australia	43	31
Austria	2	2
Belgium	3	2
Bermuda	1	1
Brazil	44	19
Chile	33	23
China	33	5
Colombia	2	2
Denmark	7	3
Finland	9	5
France	45	20
Germany	29	10
Ghana	1	1
Greece	4	3
Hong Kong	22	6
Hungary	1	0
India	15	3
Indonesia	4	4
Ireland	22	13
Israel	12	5
Italy	20	10
Japan	42	12
Korea	19	5
Luxembourg	8	6
México	39	24
Netherlands	36	17
New Zealand	11	5
Norway	11	6
Peru	3	2
Philippines	2	1
Portugal	4	3
Russia	5	1
Singapore	3	3
South Africa	27	17
Spain	16	9
Sweden	21	20
Switzerland	15	5
Taiwan	9	2
Turkey	1	0
United Kingdom	179	138
Venezuela	3	3
Total	827	455

Table 3: Summary Statistics of Delisting

The sample of delisted ADRs is obtained from DataStream and complemented with CRSP. The sample period covers January 1980 to July 2007. The final sample includes 128 delisted ADRs from NYSE and NASDAQ, of which 38 are involuntarily delisted, 59 are voluntarily delisted; and 32 are delisted with no specific reasons.

Country	NYSE	NASDAQ	Voluntary Delisting	Involuntary Delisting	Unknown
Argentina	2	0	0	1	1
Australia	4	4	2	2	4
Brazil	1	0	0	0	1
Chile	2	0	1	1	0
China	1	1	0	1	1
Denmark	1	0	0	1	0
Finland	0	1	0	1	0
France	1	3	3	0	1
Germany	0	8	4	2	2
Greece	0	1	1	0	0
Hong Kong	1	2	1	1	1
India	1	0	1	0	0
Indonesia	1	0	0	1	0
Ireland	1	1	0	2	0
Israel	1	1	2	0	0
Italy	1	0	1	0	0
Japan	0	3	1	1	1
Korea	1	0	1	0	0
Luxembourg	1	1	1	1	0
Mexico	21	2	8	10	5
New Zealand	3	1	3	0	1
Norway	1	0	1	0	0
Portugal	1	0	0	1	0
South Africa	3	2	1	4	0
Sweden	3	5	5	2	1
Switzerland	2	1	1	0	2
Turkey	2	0	2	0	0
United Kingdom	18	16	18	6	10
Venezuela	2	0	1	0	1
Total	**76**	**53**	**59**	**38**	**32**

Table 4: Descriptive Statistics of Financial Variables for Delisted Firms

This table provides the summary statistics of the major financial variables of the (voluntarily and involuntarily) delisted firms one year before delisting.

Financial Variables	Involuntary Delisting	Voluntary Delisting
Total Asset (Millions of Dollars)	723.1	3480.9
Net Sales (Millions of Dollars)	416.5	3061.1
Common Shares Outstanding (Millions)	64.4	108.5
Earnings Per Share (Dollars)	-0.51	0.15
Common Equity (Millions of Dollars)	202.2	635.01

Source: CRSP

Table 5: Test of Equality of Bid-Ask Spread across ADR Delisting

This table contains the estimated implicit bid-ask spread of home market stocks both before and after the termination of their respective ADRs on major U.S, Exchanges, using the methodology of George, Kaul and Nimalendran (1991). The sample period is from 125 trading days before to 125 days after the ADR termination date. (Prob(ΔS)is the significance level of t-test against the null hypothesis of zero differences in spread before and after delisting).

		Panel A			Panel B	
		All Delisted Firms	Voluntarily Delisted Firms	Involuntarily Delisted Firms	Integrated Firms	Fragmented Firms
s_0^{GKN}		0.0230	0.0218	0.0221	0.0169	0.0277
s_1^{GKN}		0.0266	0.0187	0.0457	0.0271	0.0265
No. Of Observations	s_0^{GKN}	5709	3454	1528	2479	2703
	s_1^{GKN}	5618	3421	1460	2459	2575
Prob($\Delta s \neq 0$)		0.0298	0.9207	0.0000	0.0028	0.3920
Prob($\Delta s < 0$)		0.0149	0.1587	0.0000	0.0014	0.8040
Prob($\Delta s > 0$)		0.9851	0.0793	1.0000	0.9986	0.1960

Table 6: Integration between the ADR and Home Stock Market

This table reports the historic degree of integration between the delisted ADR and the home market stock from 250 to 125 trading days prior to the ADR termination date based on generalized forecast error variance decomposition (Pesaran and Shin,1998). The integration explains the relative percentage of variation of ADR price (home market stock price) explained by home market stock prices (ADR price) over a three-day horizon. Average integration is calculated as the average of two-way integration between ADR and home market stock.

	Average Integration	ADR by ADR	ADR by Home Stock	Home Stock by Home Stock	Home Stock by ADR
Mean	24.06%	76.48%	23.5%	75.40%	24.6%
25% Quintile	10.81%	62.48%	8.0%	60.64%	11.1%
50% Quintile	25.95%	76.41%	23.6%	74.69%	25.3%
75% Quintile	37.37%	92.03%	37.5%	88.94%	39.4%
99% Quintile	47.47%	99.54%	47.7%	99.73%	47.3%

Table 7: Impact of Delisting on Spread Component

Panels A and B report the results from a fixed effect two-step panel regression of $S_{it}^{GKN}=\alpha+\beta_1 S_{qit}+\beta_2 \text{Delisting} \cdot S_{qit}+\varepsilon_{it}$ corrected for first order autocorrelation in disturbance term. S_{it}^{GKN} is the estimated implicit spread (George, Kaul, and Nimelendra, 1991) ; S_{qit} is the proportional quoted spread from the market maker; Delisting is a binary variable which equals to one if the observation is drawn before the ADR termination and zero otherwise. Panel C reports the result from a firm fixed effect two-step panel regression of $S_{it}^{GKN}=\alpha+\beta_1 S_{qit}+\beta_3 \text{Delisting} \cdot \text{Integration} \cdot S_{qit}+\varepsilon_{it}$ Integration is the average degree of integration. The standard error is included in parenthesis. ***, **, and * indicate statistical significance level at 1% , 5% and 10% respectively.

	Panel A			Panel B		Panel C	
	All Firms	Voluntarily Delisted Firms	Involuntarily Delisted Firms	Integrated Firms	Fragmented Firms	Voluntarily Delisted Firms	Involuntarily Delisted Firms
α	0.0197***	0.0186***	0.0320***	0.0139***	0.03445***	0.0191***	0.0300**
	(0.0010)	(0.0013)	(0.0014)	(0.0016)	(0.0006)	(0.0014)	(0.0014)
β_1	0.1214***	0.1735***	0.0626	0.1870***	-0.0094	0.1428**	0.2454***
	(0.0308)	(0.0414)	(0.0669)	(0.0534)	(0.0243)	(0.0408)	(0.0611)
β_2	0.2401***	-0.10656*	0.3144***	0.3981***	0.1190***		
	(0.0313)	(0.0550)	(0.0645)	(0.0568)	(0.0283)		
β_3						-0.2249	0.4106**
						(0.3206)	(0.1859)
R^2 : within	0.0170	0.0026	0.0503	0.0260	0.0055	0.0019	0.0464
R^2 : between	0.5266	0.4204	0.7665	0.6474	0.3186	0.4022	0.7889
R^2 : overall	0.0896	0.0364	0.3056	0.0939	0.0648	0.0361	0.3192
Number of Observations	11011	6791	2780	6000	5011	6494	2646
F-Stat	94.29	8.87	72.89	79.56	13.83	6.13	63.70

Table 8: Information Asymmetry and Cumulative Abnormal Return

This table presents a cross-sectional regression of the delisted ADR's home stock cumulative abnormal return on the measure of information asymmetry, i.e. difference in the mean spread due to the adverse selection cost (Diff. AS Spread) before and after cross-listing announcement . The control variables include the difference in the spread due to the order processing cost (Diff. OP Spread), the degree of integration, the turnover ratio, and market capitalization. The cumulative abnormal returns are calculated from 99 trading days before to 99 trading days after the announcement of delisting from major U.S. exchanges; the degree of integration is the average degree of integration defined in Table 5; turnover ratio is defined as daily trading volume/share outstanding while market value is the market capitalization denominated in U.S. dollars. Both turnover ratio and market capitalization are based on the mean of daily data from 99 trading days before to 99 trading days after the announcement of delisting. The difference in turnover (Diff. Turnover) and the difference in market value (Diff. Market Value) are the differences between the mean of 99 trading days before and 99 trading days after the delisting announcement. ***, **, and * indicate statistical significance level at 1% , 5% and 10% respectively. (t-values are in parentheses).

El	Diff. AS Spread	Diff. OP Spread	Integration	Turnover	Market Value	Diff. Turnover	Diff. Market Value	Intercept	R^2(%)
1	-715.96***	-437.72						-17.78**	12.87
	(-3.08)	(-1.54)						(-2.27)	
2	-767.69***	-471.59	74.65					-36.52**	15.11
	(-3.22)	(-1.63)	(1.37)					(-2.36)	
3	-723.10***	-429.27		0.007				-18.19**	13.29
	(-3.03)	(-1.48)		(0.03)				(-2.01)	
4	-703.01***	-420.35			0.0008			-20.25**	13.41
	(-2.98)	(-1.46)			(0.66)			(-2.29)	
5	-771.81***	-462.55	77.86	-0.034	0.0001			-38.16**	15.78
	(-3.07)	(-1.54)	(1.22)	(-0.15)	(0.13)			(-2.26)	
6	-718.58***	-417.12				0.098	0.0111	-19.71**	15.85
	(-3.04)	(-1.44)				(0.12)	(1.44)	(-2.39)	

Figure 1: Cumulative Abnormal Returns around Delisting Announcement (Days -30 to +30)

This figure illustrates the cumulative abnormal returns from 30 trading days before to 30 trading days after the announcement of delisting from major U.S. exchanges. The sample includes 58 voluntarily delisted firms and 39 involuntarily delisted firms. The two largest and the two lowest observations are dropped to avoid the impact of outliers.

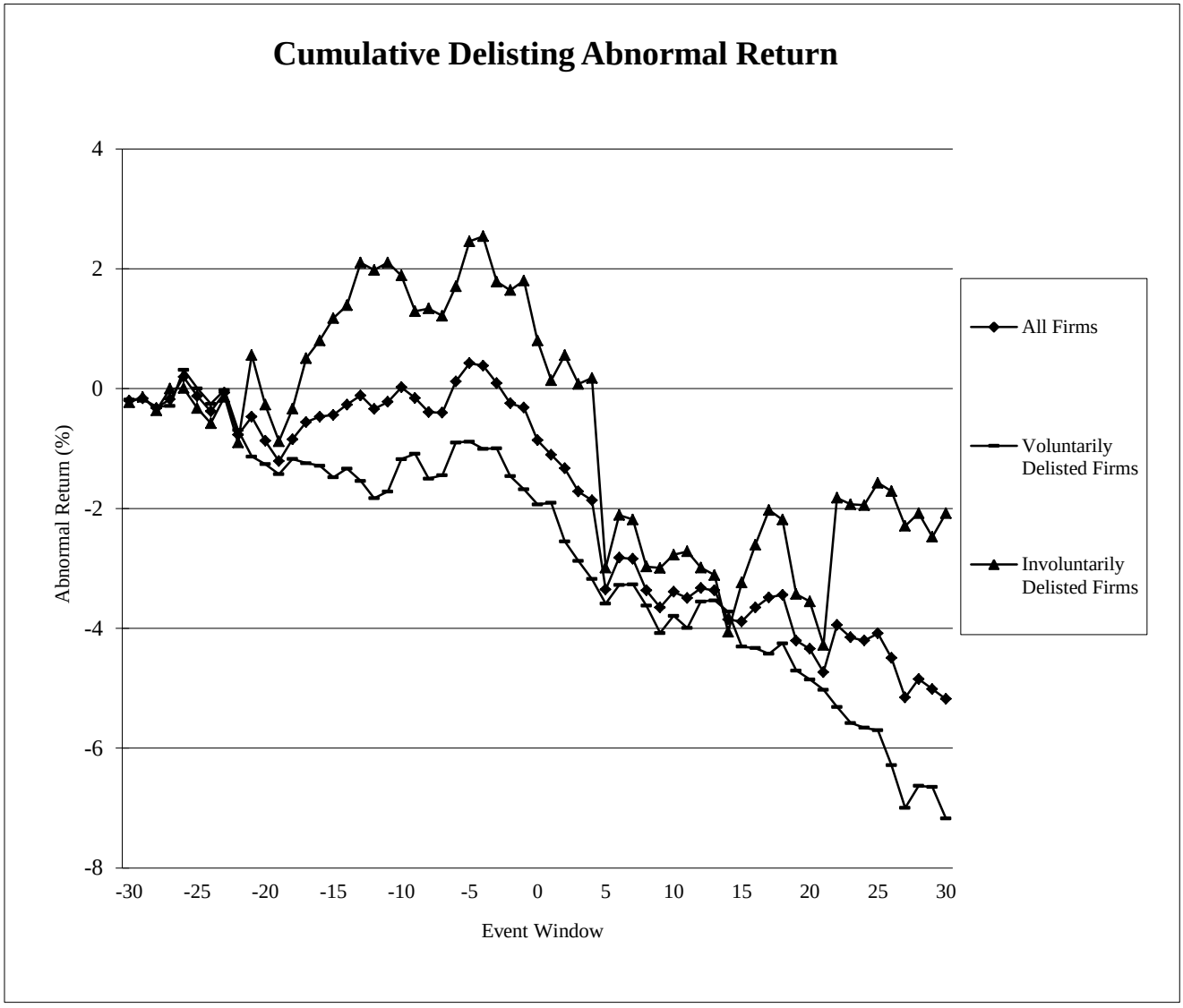
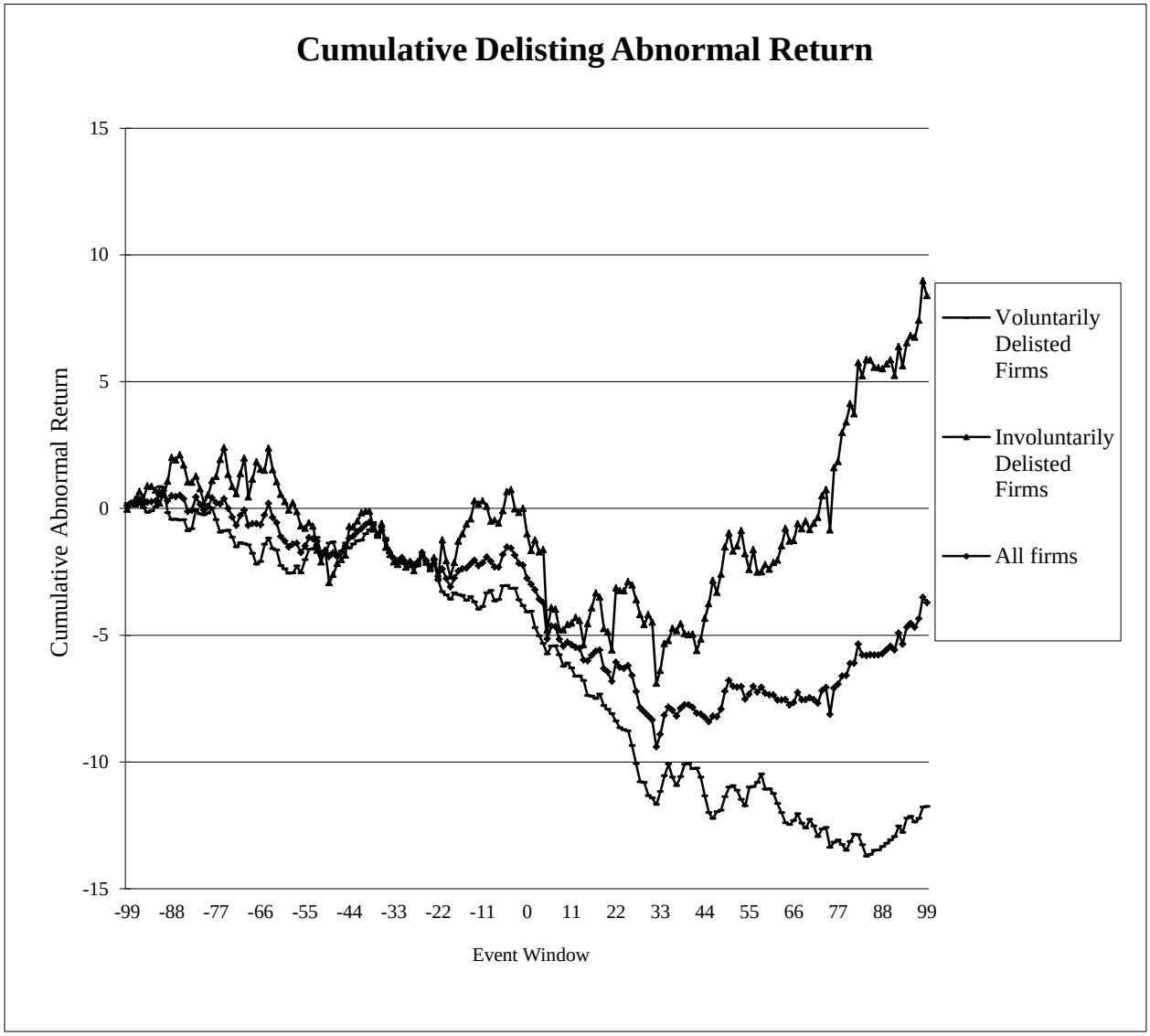


Figure 2: Cumulative Abnormal Returns Around Delisting Announcement (Days -99 to +99)

This figure illustrates the cumulative abnormal returns from 99 trading days before to 99 trading days after the announcement of delisting from major U.S. exchanges. The sample includes 58 voluntarily delisted firms and 39 involuntarily delisted firms. The two largest and the two lowest observations are dropped to avoid the impact of outliers.



Bibliography

Essay 1

Bailey, Warren, G. Andrew Karolyi, and Carolina Salva, 2006, The economic consequences of increased disclosure: Evidence from international cross-listings, Journal of Financial Economics 81, 175-213.

Baker, H. Kent, John R. Nofsinger, and Daniel G. Weaver, 2002, International cross-listing and visibility, Journal of Financial and Quantitative Analysis 37, 495-521.

Bancel, Franck, and Cusha Mittoo, 2001, European managerial perceptions of the net benefits of foreign stock listings, European Financial Management 7, 213-236.

Burns, Natasha, Bill B. Francis, and Iftekhar Hasan, 2007, Cross-listing and legal bonding: Evidence from mergers and acquisitions, Journal of Banking & Finance 31, 1003-1031.

Coffee, C. John, 1999, The Future as History: the prospects for global convergence in corporate governance and its implications, Northwestern University Law Review 93, 641-708.

Chowdhry, Bhagwan, and Vikram Nanda, 1991, Multimarket trading and market liquidity, Review of Financial Studies 4, 483-511.

Doidge, Craig, 2004, U.S. Cross-listings and the private benefits of control: Evidence from dual-class firms, Journal of Financial Economics 72, 519-553.

Doidge, Craig, G. Andrew Karolyi, and René M. Stulz, 2004, Why are foreign firms listed in the U.S. worth more? Journal of Financial Economics 71, 205-238.

Doidge, Craig, G. Andrew Karolyi, Karl V. Lins, Darius P. Miller, and René M. Stulz, 2009, Private benefits of control, ownership, and the cross-listing decision, The Journal of Finance 64, 425-466.

Domowitz, Ian, Jack Glen, and Ananth Madhavan, 1997, Market segmentation and stock prices: Evidence from an emerging market, The Journal of Finance 52, 1059-1085.

Domowitz, Ian, Jack Glen, and Ananth Madhavan, 1998, International cross-listing and order flow migration: Evidence from an emerging market, The Journal of Finance 53, 2001-2027.

Easley, David, and Maureen O'Hara, 2004, Information and the cost of capital, The Journal of Finance 59, 1553-1583.

Fanto, James A., and Karmel S. Karmel, 1997, A Report on the Attitudes of Foreign Companies Regarding a U.S. Listing, Stanford Journal of Law, Business & Finance 51, 63-66

Foerster, Stephen R., and G. Andrew Karolyi, 2000, The long-run performance of global equity offerings, Journal of Financial and Quantitative Analysis 35, 499-528.

Kadlec, Gregory B., and John J. McConnell, 1994, The effect of market segmentation and illiquidity on asset prices: Evidence from exchange listings, The Journal of Finance 49, 611-636.

George, T.J, G. Kaul, and M. Nimalendran, 1991, Estimation of the bid - ask spread and its components: A new approach, Review of Financial Studies 4, 623-656.

Grossman, Sanford J., and Merton H. Miller, 1988, Liquidity and market structure, The Journal of Finance 43, 617-633.

Harris, Lawrence, 1989, A day-end transaction price anomaly, Journal of Financial and Quantitative Analysis 24, 29-45.

Ince, Ozgur S., and R. Burt Porter, 2006, Individual equity return data from Thomson DataStream: Handle with care!, Journal of Financial Research 29, 463-479.

Foerster, Stephen R., and G. Andrew Karolyi, 2000, The long-run performance of global equity offerings, Journal of Financial and Quantitative Analysis 35, 499-528.

Lesmond, David A., 2005, Liquidity of emerging markets, Journal of Financial Economics 77, 411-452.

Leuz, Christian, Alexander Triantis, and Tracy Yue Wang, 2008, Why do firms go dark? Causes and economic consequences of voluntary SEC deregistrations, Journal of Accounting and Economics 45, 181-208.

Licht, Amir N., 2003, Cross-Listing and corporate governance: Bonding or Avoiding, Chicago Journal of International Law 4,141-163

Liu, Shinhua, 2005, The impact of involuntary foreign delistings: An empirical analysis, Journal of Emerging Market 10 (3), 22-39.

Madhavan, A, 1995, Consolidation, fragmentation, and the disclosure of trading information, Review of Financial Studies 8, 579-603.

Marosi, András, and Nadia Massoud, 2007, Why do firms go dark? Journal of Financial and Quantitative Analysis 42, 421-442.

Merton, Robert C., 1987, A simple model of capital market equilibrium with incomplete information, The Journal of Finance 42, 483-510.

Miller, Darius P., 1999, The market reaction to international cross-listings: Evidence from depositary receipts, Journal of Financial Economics 51, 103-123.

Mittoo, Usha R., 1992, Additional evidence on integration in the Canadian stock market, The Journal of Finance 47, 2035-2054.

Pagano, Marco, Ailsa A. Röell, and Josef Zechner, 2002, The geography of equity listing: Why do companies list abroad?, The Journal of Finance 57, 2651-2694.

Pesaran, H. Hashem, and Yongcheol Shin, 1998, Generalized impulse response analysis in linear multivariate models, Economics Letters 58, 17-29.

Reese Jr, William A., and Michael S. Weisbach, 2002, Protection of minority shareholder interests, cross-listings in the United States, and subsequent equity offerings, Journal of Financial Economics 66, 65-104.

Saudagaran, Shahrokh M.,1988, An empirical study of selected factors influencing the decision to list on foreign stock exchanges, Journal of International Business Studies 19(1), 101-127.

Shahrokh, M. Saudagaran, and C. Biddle Gary, 1995, Foreign listing location: A study of MNCs and stock exchanges in eight countries. Journal of International Business Studies, 26(2), 319–341.

Siegel, Jordan, 2005, Can foreign firms bond themselves effectively by renting U.S. Securities laws?, Journal of Financial Economics 75, 319-359.

Smith, Geoffrey, 2007, A look at the impact of Sarbanes-Oxley on cross-listed firms, Working Paper, University of Illinois.

Sundaram,K. Anant, and E. Dennis Logue, 1996, Valuation effects of foreign listings on U.S. exchanges, Journal of International Business Studies 27(1), 67–89.

Lel, Ugur, and Darius P. Miller, 2008, International cross-listing, firm performance, and top management turnover: A test of the bonding hypothesis, The Journal of Finance 63, 1897-1937.

Jonathan, Witmer, 2006, Why do firms cross-(de)list? An examination of the determinants and effects of cross-delisting", working paper, Bank of Canada.

Verrecchia, Robert E., 2001, Essays on disclosure, Journal of Accounting and Economics 32, 97-180.

Yamori, Nobuyoshi, and Taiji Baba, 2001, Japanese management views on overseas exchange listings: Survey results, Journal of International Financial Management & Accounting 12, 286-316.

ESSAY 2

The Informational Role of Extreme Trading Volume and External Information Environment: A Global Study

1. Introduction

The literature on return-volume relationship can be traced back to Osborne (1959). In Osborne's model, prices change according to a diffusion process that has a variance dependent on the quantity of transactions and a positive contemporaneous relationship exists between the trading volume and the absolute price change. Later researchers also find evidence that abnormal trading volume contains valuable information that can help predict the future stock return.

There are two main streams of research in this area. The first attributes the return predictability of abnormal trading volume to the existence of insider trading. Blume, Easley, and O'Hara (1994) developed a model in which individuals can use a previous period's trading volume to make inferences about the information quality of informed trading. Using data on illegal insider trading from the Securities and Exchange Commission, Meulbroek (1992) found that the amount traded by an insider leads to the market's recognition of informed trading and, therefore, predicts the future return. She found that abnormal trading volume can approximate the volume generated by the insiders' transactions in the presence of insider trading.

The second research stream explains the return predictability of abnormal trading volume from the perspective of increased investor awareness. Specifically, Merton (1987) proposed the investor recognition hypothesis that showed that an investor's information set affects the investor's trading behavior and the consequent return process. The stock's required rate of return contains a risk premium that results from the imperfect diversification of the stock

portfolio due to an incomplete knowledge of the feasible investment universe. In other words, the stock's required rate of return depends on the investor base or the "visibility" among investors. Given that extreme trading activity, especially an abnormal increase in the trading volume, attracts an investor's attention and increases the investor base, the abnormal positive shock to the trading volume will reduce the cost of the capital and increase asset value.

Several studies have found evidence supporting the information role of abnormal trading volume in the United States. Using a sample of the NYSE stocks traded from 1963 to 1996, Gervais, Kaniel, and Mingelgrin (2001) found that abnormal trading volume contains valuable information that can predict the future returns in the U.S. stock market. Specifically, they found that an equally weighted portfolio of stocks that experiences an unusually high (low) trading volume shock increases (decreases) in value over at least the next 20 trading days. By taking a long position in all of the high-volume stocks and a short position in all of the low-volume stocks, they attributed the high-volume return premium (the return from the zero-investment portfolio) to the stock's increased visibility caused by more trading. Similarly, Lo and Wang (2006) found that a hedging portfolio constructed from an individual stock's trading volume consistently outperforms other predictors of future returns such as market beta or size and value factor. Their result suggests that the trading volume contains valuable information that can be used to predict future market returns.

This paper extends the empirical research from the U.S. stock market to a more heterogeneous global setting. I re-examine the information role of abnormal trading volume under Merton's (1987) investor recognition framework across other countries. According to the investor recognition hypothesis, the investor's awareness of a feasible set of investments should be affected not only by market statistics such as price or trading volume but also by the quality of

external information environment such as accessibility, credibility, and coverage. If the external information environment in different countries differs to the degree that it affects the investor's awareness of the feasible investment set, the information role of abnormal trading volume should display a different predictive power for the future return. To test this hypothesis, I adopt a framework similar to Gervais, Kaniel, and Mingelgrin (2001) and use the high-volume premium as a proxy for the information content in abnormal trading volume. I first examine whether the high-volume premium found in the U.S. market also exists in other countries. Further, I test whether the high-volume premium is affected by the external information environment in that country.

Using a sample of 24,110 individual stocks from 37 countries with a relatively developed stock market (excluding the U.S.), I find a positive high-volume premium in 34 out of 37 countries. In the country-level analyses, I show that, across countries, the magnitude of the high-volume premium is negatively related to the size of the underlying firm. This is consistent with Blume, Easley, and O'Hara's (1994) argument that the information role of abnormal trading volume, if any, might be stronger for small stocks. The negative coefficient on firm size is also consistent with Merton's (1987) investor recognition hypothesis that the investor base plays a role in determining the effect of a visibility event such as a volume shock. More specifically, the larger the original investor base, the smaller the marginal effect on visibility given a certain level of trading volume shock.

I find that the high-volume premium is negatively affected by relative economic development (proxied by gross domestic product (GDP) per capita) and is positively affected by the aggregate stock market liquidity (proxied by the stock market turnover). However, absolute

economic development and the degree of investor protection do not affect the high-volume premium.

According to Merton's (1987) investor recognition hypothesis, the investor's knowledge of the feasible set of investment should not only be affected by market statistics such as price and trading volume but also affected by the quality of the external information environment such as accessibility, credibility, or coverage. To examine this hypothesis, I collect two sets of variables that measure the institutional information environment and the physical information environment. The institutional information environment is proxied by (a) the CIFAR (the Center for International Financial Analysis and Research) index, which is commonly used to measure the "quality" of accounting information within a country; and (b) the accounting transparency measures (developed by Bushman, Piotroski, and Smith, 2004). The physical information environment is proxied by (a) the mobile phone subscriptions per 100 people; (b) the number of internet users per 100 people; and (c) the number of fixed line telephones per 100 people. Consistent with Merton's (1987) investor recognition hypothesis, I find that the development of both the institutional and the physical information environment significantly reduces the reliance on market statistics as a source of information.

In sum, our findings support Merton's (1987) investor recognition hypothesis at both the portfolio level and the country level. The rest of the chapter is organized as follows: Section 2 contains the data and the methodology for measuring the high-volume premium. In Section 3, I present the high-volume premium across 37 countries, excluding the U.S. Section 4 contains the possible determinants of the high-volume return premium and the effect of external information environment. Section 5 concludes.

2. Data and Methodology

2.1 Data

To examine the information role of extreme trading activity in 37 countries beyond the U.S., I focus on the foreign securities that are included in the DataStream and ones that are traded between 1993 and 2008. To be included in the sample, a security needs to satisfy the following criteria: (a) it should come from a country with a relatively established stock market (i.e. with over 100 listed stocks on the domestic stock exchange); (b) it should have traded for at least 180 trading days after the IPO date; and (c) it must be a major security (excluding all ETFs, ADRs, GDRs, and preferred stocks).

Blume, Easley, and O'Hara (1994) suggested that the information role of market statistics like trading volume might be stronger for small, less widely-followed stocks. Merton (1987) also argued that firm size can be a proxy for a firm's investor base. Therefore, to control for the size effect, I classify every stock into a large, medium, or small sized group based on the firm's market capitalization in U.S. dollars at the end of every year. The size classification is based on the CRSP size decile. Specifically, the firms that fall in the CRSP size deciles 9 and 10 are assigned to the large group; the firms in CRSP size deciles 6, 7, and 8 are assigned to the medium group; and the firms in CRSP size deciles 2, 3, 4, and 5 are assigned to the small firm group. Firms in Decile 1 are not included in the sample to avoid the data insufficiency problem usually seen in this decile.

The final sample consists of 24,110 securities from 37 countries. Of these countries, 24 are from developed markets and 13 from emerging markets, based on the IMF classification. Table 1 shows the country distribution by size. 75.5% of the securities are from developed markets while 24.5% of the securities are from emerging markets. Japan and China have the

most stocks in the developed and emerging market sample, respectively. The size category distribution for the developed (emerging) market is 60% (66%) from the small group, 26% (25%) from the medium group, and 14% (9%) from the large group.

To examine the return predictability of extreme trading activity, I follow the framework of Gervais, Kaniel, and Mingelgrin (2001) and split the time interval between January 4, 1993 and December 26, 2008 into 80 non-overlapping trading intervals of 50 trading days. I skip a day between each of these trading intervals to avoid the possibility of a weekly pattern on stock return or trading volume. The first 49 trading days in a trading interval are used as the reference period while the last trading day (the formation day) is used to form portfolios based on the trading volume shock on that day.

The trading volume (number of shares traded) in the reference period is used as a benchmark to determine how unusually high or low the trading volume is for a given stock on the formation day. Specifically, I classify a stock into a high (low) volume portfolio if the trading volume on the formation day is among the top (low) 10% of trading volumes in the reference period. In each trading interval, I drop stocks with less than 25 valid data points in the reference period to ensure statistical sufficiency for the analysis.

Table 2 presents descriptive statistics on the number of stocks that are classified as either high or low volume stocks in the 80 non-overlapping trading intervals from January 4, 1993 to December 26, 2008 in 37 countries. For firms from the developed markets, large firms are more likely to be subject to a positive volume shock while small firms are more likely to be subject to a negative volume shock. Medium firms are equally likely to receive a positive or negative volume shock. On the other hand, I did not observe any difference in the probability of positive or negative shocks for emerging market stocks across all size groups. I also noted that small

firms, whether they are from developed or emerging markets, are less likely to have extreme trading activity. This is consistent with Blume, Easley, and O'Hara's (1994) argument that the information role of abnormal trading volume, if any, might be stronger for small stock.

2.2 **Portfolio Construction**

To gauge the return predictability of extreme trading activity, I construct a self-financing zero investment portfolio as follows: on each formation day, I long one dollar in all high volume stocks and short one dollar in all low volume stocks. After the portfolios are formed, they are held without any rebalancing over the subsequent 25 trading days (our test period). At the end of the trading interval *i*, I calculate the cumulative returns for the long and short positions R_i^H and R_i^L over the subsequent 1,2, 3, 4, 5, 10, 15, 20, and 25 trading days. To examine whether any difference exists in the return predictability of extreme trading activity across different size groups, I sort the high- and low-volume portfolios by size.

The equal-weighted cumulative return in the test period for the volume-size sorted portfolio by country is presented in Table 3. Generally, I find that stocks with a positive shock gain a higher cumulative return in the test period compared to the stocks with a negative shock. Taking the 37 countries as whole, the 25-day cumulative return is 3.4% for stocks with positive shocks and 1.7% for stocks with negative shocks.[3] The magnitude of the cumulative returns for both high and low volume portfolios is negatively related to firm size. Specifically, the 25-day cumulative return is 4.2% (2.0%) for a large high (low) volume portfolio, 3.3% (1.6%) for a medium high (low) volume portfolio, and 2.7% (1.5%) for a small high (low) volume portfolio. Furthermore, the magnitude of the cumulative return for stocks that experienced extreme activity is higher in emerging markets than in developed markets. For stocks from emerging markets, the

[3] The observed positive average cumulative return for both high volume and low volume stock could be due to the positive stock price drift.

25-day cumulative return is 5.5% for stocks with a positive shock and 3.3% for stocks with a negative shock. In contrast, the corresponding cumulative return for stocks from developed markets is 2.3% for stocks with a positive shock and 0.8% for stocks with a negative shock.

The same pattern held across all size categories. I also find that the magnitude of the return difference between portfolios with a positive and a negative shock is negatively correlated to size (i.e. the return difference is the largest for the small firm group followed by the medium firm group and then the large firm group). Specifically, the 25-day cumulative return difference between the positive-shock portfolio and the negative-shock portfolio is 2.2%, 1.7%, and 1.2% for the small, medium, and large firm size groups respectively. While this pattern held for both the developed and the emerging markets, it is clearly more pronounced in the emerging markets: the return differences in the small, medium, and large size groups are 2.6%, 2.5%, and 1.4%, respectively, in the sample of emerging markets and 2.1%, 1.3%, and 1.1%, respectively, in the sample of developed markets.

To test the null hypothesis that extreme trading activity does not contain information about future stock return, I examine, across several countries, whether the average net return over the J trading interval, $\overline{\mathrm{NR}} = \frac{1}{\mathrm{J}}\sum_{\mathrm{i}=1}^{\mathrm{J}} \mathrm{NR_i}$ is significantly different from zero. The net return from the zero-investment portfolio is the return difference between the high volume portfolio and the low volume portfolio: $\mathrm{NR_t} = \mathrm{R_t^H} - \mathrm{R_t^L}$. Table 4 presents the average net cumulative returns from the zero-investment strategy over the subsequent 1, 2, 3, 4, 5, 10, 15, 20, and 25 trading days along with the statistical level of significance (per Newey-West (1987) *t*-statistics). I find a one-day cumulative return statistically significant in 29 out of 37 countries, although the significance level of the net cumulative return tended to decrease as the test period expanded. The number of countries with a significant net return over the subsequent 5, 10, 20, and 25 days

is 24, 19, 14, and 12, respectively. The net cumulative return for the whole sample, the developed market sample, and the emerging market sample remained significantly positive throughout the subsequent 25 trading days.

To better illustrate the return predictability of extreme trading activity, I plot the median cumulative return for the high and low volume portfolio and the net cumulative return from the zero-investment portfolio for the small, medium, and large size groups (see Figure 1). Figure 2 illustrates the median cumulative return for the high and low volume portfolio and the net cumulative return for all countries, countries from developed markets, and countries from emerging markets.

In sum, I find that the high volume premium commonly exists in several countries around the world and displays a variation in the magnitude and significance of the premium across countries. In the next section, I explore the possible determinants of the high-volume premium using different sets of the country-level variables.

3. Cross-Country Determinants of High-Volume Premium

In this section, I explore the possible determinants of the high-volume premium using a comprehensive set of country level variables, including the absolute and relative level of economic development, the degree of investor protection, and, more importantly, the external institutional and physical information environment.

3.1 Economic Development and the Legal Regime

As discussed in the previous section, I find that stocks from emerging markets seem to be more affected by extreme trading activity as evidenced by the larger magnitude of cumulative return in the test period and the larger high-volume premium across all size categories. This

suggests that the magnitude of a high-volume return premium might be explained by the country's degree of economic development.

To test this hypothesis, I collect country level variables on economic development and legal protection for investors. The economic development variables included measures on both the absolute and relative economic development. The absolute economic development variables include the annual GDP, the number of domestic companies listed on the country's stock exchanges at the end of the year, the total value of shares traded during the year, and the total stock market capitalization at the end of the year (see Appendix A for a detailed description of the variables). The relative economic development variables include the GDP per capita, the number of listed domestic companies per one million people at the end of the year, the stock market capitalization as a percentage of the GDP at the end of the year, and the total value of shares traded during the year as a percentage of the GDP.

The high-volume premium in a country could also be affected by the degree of investor protection, which, in turn, might affect the rate of participation of investors. The increased visibility, due to the volume shock, may have a greater impact in a country with a poorer investor protection and participation rate. Such an effect is controlled by including a set of measures on the legal protection of an investor: the legal origin of a country, the anti-director rights (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998) , and the anti-selfdealing index (Djankov, Simeon, La Porta, Lopez-de-Silanes, and Shleifer, 2008). Table 5 presents the summary statistics of the variables that are used in this paper by country. As expected, the countries from a developed market have a higher level of absolute and relative economic development and better investor protection.

As observed in Section 2, the magnitude of the return difference between a portfolio with a positive volume shock and a portfolio with a negative volume shock is negatively correlated with stock size (i.e. the return difference is the largest for the small firm group followed by the medium group and then the large group.) To control for the effect of different investor base across different size categories, I include a categorical variable in the regression that equals to 1 if the stock belongs to the small size category, 2 if it belongs to the medium size category, and 3 for the large size category.

Another possible explanation for the difference in the high-volume premium across countries is the aggregate level of liquidity. Presumably, the gap between the positive volume shock and the negative shock should be larger in a market that has more active trading. As a result, the high-volume premium is expected to be positively related to aggregate liquidity. To control for this effect, I included the average stock market turnover ratio during a given year in the regression.

To examine the possible country level determinants of the high-volume premium, I conduct the Fama-MacBeth (1973) test. In the test, the dependent variable is the first day net return from a zero-investment portfolio in which long stocks receive a positive volume shock and short stocks receive a negative volume shock. The independent variables are the absolute and relative economic development, the proxy for investor protection, the portfolio size category, and the aggregate stock market liquidity. The results are presented in Table 6.

None of the absolute economic development measures are significant in explaining the high-volume premium across the 37 countries. For relative economic development, only the GDP per capita is found to be significantly related to the high-volume premium. The negative

coefficient on the GDP per capita is consistent with the finding in Table 3 that the magnitude of the high-volume premium is higher in emerging markets than it is in developed markets.

None of the proxies for investor protection (including the anti-director right, the anti-self-dealing index, and the common law dummy variable) are found to be significant in explaining the high-volume premium.

The coefficient on the portfolio size is significantly negative in explaining the high-volume premium, especially if I control for relative economic development instead of absolute development. The negative coefficient on portfolio size is consistent with Merton's (1987) argument that the investor base as a proxy for firm size plays a critical role in determining the effect of a visibility event such as a volume shock. Specifically, larger the original investor base, smaller the marginal effect on visibility given a certain level of a trading volume shock.

The aggregate level of liquidity in the stock market, as proxied by the average stock turnover ratio, is found to be significantly and positively related to the high-volume premium. This suggests that the effect of a trading volume shock tends to be more pronounced in markets with more active trading.

In sum, I find that, first, the high-volume premium is significantly negatively affected by the relative economic development in a country (proxied by the GDP per capita) and the investor base of the underlying portfolio (proxied by the company size). Second, it is significantly positively affected by the aggregate stock market liquidity (proxied by the stock market turnover). Third, it was not affected by absolute economic development and investor protection (as proxied by the legal origin, anti-director rights, and anti-self-dealing index).

3.2 Information Environment and High-Volume Premium

According to Merton's (1987) investor recognition hypothesis, the investor's knowledge of the feasible investment set should not only be affected by direct market statistics such as price or trading volume but also by the quality of external information environment such as accessibility, credibility, or coverage of information. To examine this hypothesis, I collect two sets of variables that measure the information environment from different perspectives: (a) the institutional information environment and (b) the physical information environment.

3.2.1 Institutional Information Environment

The first proxy for the institutional information environment is the Center for International Financial Analysis and Research (CIFAR) index, which is commonly used to measure the "quality" of accounting information within a country. The CIFAR index represents the average of ninety items included in the annual reports of a country and it is found to be related to the country's financial development, such as the development of financial intermediaries, the sensitivity of investment to internal cash flows, and concentration of stock ownership.

The second proxy for the institutional information environment is the accounting transparency measures developed by Bushman, Piotroski, and Smith (2004). This set of variables includes:

- TIME, which measures the timeliness of financial reporting;
- AUDIT, which measures the credibility of the financial accounting disclosure;
- DISCLOSURE, which measures the prevalence of disclosures relating to R&D expenses, capital expenditures, product and geographic segment data, subsidiary information, and accounting methods; and

- MEASURE, which captures the extent to which financial statements reflect subsidiaries on a consolidated basis and general reserves are used.

I also control for portfolio size, aggregate market liquidity, investor protection, and absolute (relative) economic development. The results are presented in Table 7.

Consistent with the findings in Table 6, the high-volume premium is negatively affected by portfolio size and positively affected by aggregate market liquidity. Absolute economic development does not seem to affect the high-volume premium. For relative economic development, the GDP per capita and the stock market capitalization as a percentage of GDP are found to be significantly related to the high-volume premium. Once again, the legal origin and anti-director rights play no role in determining the high-volume premium. The anti-self-dealing index, however, is marginally significant.

The CIFAR index is significantly negatively related to the high-volume premium. This supports the hypothesis that the external information environment alleviates the information role of direct statistics drawn from the market. Among the accounting transparency variables, DISCLOSURE is significantly negatively related to the high-volume premium irrespective of whether I control for absolute or relative economic development. The coefficient on AUDIT is also negative when I control for absolute economic development, although it is only marginally significant. The coefficient on MEASURE is found to be significantly negative when I control for relative economic development.

Overall, the results in Table 7 are consistent with the hypothesis that the external institutional environment substitutes for the internal information source. In other words, I reduce the reliance on the financial markets to infer information by enhancing the institutional

information environment, which includes accounting transparency, reporting timeliness, and reporting credibility.

3.2.2 The Physical Information Environment

To further examine the effect of external information environment on the information role of extreme trading volume, I collect three new proxies for the physical information environment: the popularity of the mobile phone, internet, and fixed line telephone in the country. The popularity of the mobile phone is measured by the mobile phone subscriptions per 100 people; the popularity of the internet is measured by the number of internet users per 100 people; and the popularity of the telephone is measured by the number of fixed line telephones per 100 people. I collect these three variables from the world development indicator database of the World Bank. Unlike the proxies for institutional information environment, which are static in nature, the proxies for the physical information environment vary across country and through time. The results on the physical information environment are reported in Table 8. Similar to earlier tests, I control for portfolio size, aggregate stock market liquidity, the degree of investor protection, and the economic development (absolute or relative).

The estimates on the control variables remain qualitatively the same as in previous regressions: the high-volume premium is significant, negatively affected by the portfolio size, and positively affected by the aggregate market liquidity; investor protection and economic development, except the GDP per capita, have little effect on the high-volume premium. When estimated separately, the physical information environment, as proxied by the popularity of the internet, the mobile phone, and the fixed line telephone, is found to be significantly negatively related to the high-volume premium. In other words, the high-volume premium tends to be lower in a country with a more developed, modern communication infrastructure. This reinforces

supports the hypothesis that the external information environment substitutes for the financial market's internal information source. The mobile phone popularity, however, is not significant in explaining the high volume premium when combined with the internet and fixed line phone popularity.

In sum, the development of the external information environment, whether institutional or physical, can reduce the reliance on market statistics as a source of information and, thus, can increase market efficiency. At least two possible explanations exist for such a substitution effect: (a) A more developed information environment expands the sources of information and thus reduces the weight of market-related statistics in investors' decision function; and (b) an enhanced information environment reduces the expected profit from trading on private information and, hence, reduces the likelihood of informed trading when abnormal trading volume occurs.

4. Conclusion

In this paper, I examine the information role of the extreme trading activity as proxied by the high-volume premium in a global setting. Using a sample of 24,110 individual stocks from 37 countries excluding the U.S., I find that a positive high-volume premium is a persuasive global phenomenon, although it is more pronounced for smaller size firms or firms from emerging markets. Further investigation shows that the high-volume premium is also affected by certain country characteristics. Specifically, I find that the high-volume premium is related positively to the stock market's liquidity but negatively by relative economic development in the country (proxied by the GDP per capita). The absolute level of economic development and the degree of investor protection do not seem to play a role in determining the high-volume premium.

More importantly, I examine the interaction between the internal information environment as proxied by the high-volume premium and the development of the institutional or physical external information environment. The institutional information environment is proxied by CIFAR (the Center for International Financial Analysis and Research) index, which is commonly used to measure the "quality" of accounting information within a country and the accounting transparency measures developed by Bushman, Piotroski, and Smith (2004). The physical information environment is proxied by the popularity of the mobile/fixed line phones and access to the internet. Both institutional and physical information environment proxies are found to be significant and negatively related to the high volume return premium. This suggests that the external information environment substitutes for the information role of extreme trading activity. The underlying mechanism of the substitution effect could be an interesting topic for future research.

Appendix A: Variable Definition

This table describes the definition and the source of the variables used in this study.

Variable	Description	Source
Size	The size classification is based on CRSP size decile. Specially, the firms that fall in CRSP size deciles 9 and 10 are assigned to the large group, firms in CRSP size deciles 6, 7 and 8 are assigned to the medium group, and those in deciles 2 to 5 are assigned to the small group.	DataStream
Stock Turnover	Turnover ratio is the total value of shares traded during the period divided by the average market capitalization for the period. Average market capitalization is calculated as the average of the end-of-period values for the current period and the previous period.	DataStream
Listed Domestic Companies	Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year.	World Development Indicators, (The World Bank)
Market Capitalization Of Listed Companies (as % Of GDP)	Market capitalization as a percentage of GDP during the same year. Market capitalization is the share price times the number of shares outstanding.	World Development Indicators, (The World Bank)
Stock Market Capitalization (2000 U.S. dollars)	Market capitalization (also known as market value) is the share price times the number of shares outstanding.	World Development Indicators, (The World Bank)
Listed Firms Per Million Population	Ratio of the number of domestic firms listed in a country to its population (in millions).	World Development Indicators, (The World Bank)
CIFAR	Index created by examining and rating companies' 1995 annual reports on their inclusion or omission of 90 items. These items fall into seven categories: general information, income statements, balance sheets, funds flow statement, accounting standards, stock data, and special items.	International Accounting and Auditing Trends, Center for Financial Analysis and Research (CIFAR)
Time	Average ranking of the answers to the following interim reporting questions: frequency of reports, count of disclosed items, and consolidation of interim reports	Internally constructed from data contained in CIFAR

Audit	Variable indicating the percentage of firms in the country audited by the Big 5 accounting firms. AUDIT equals 1, 2, 3, or 4 if the percentage ranges between (0, 25%), (25%, 50%), (50%, 75%), and (75%, 100%), respectively.	Internally constructed from data contained in CIFAR
Measure	Average ranking of the answers to the following questions: consolidation and discretionary reserves.	Internally constructed from data contained in CIFAR
Disclosure	Average ranking of the answers to the following questions: R&D, capital expenditure, subsidiaries, segment-product, segment-geographic, and accounting policy.	Internally constructed from data contained in CIFAR
Anti-Director Rights	The index is based on following criteria: (i) the percentage of outstanding shares required to call an extraordinary meeting is less than or equal to 10%; (ii) there is cumulative voting or proportional representation of minority interests on board; (iii) voting by mail is permitted; (iv) mechanisms are in place for oppressed minority investors; (v) preemptive rights exist that can only be waived by a shareholder vote; and (vi) there is protection of shareholders from the requirement that shares be deposited before a shareholder meeting.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
Anti-Self-dealing	An index based on the following parameters: disclosure in periodic filings, rights to sue abusive managers, ease in rescinding the transaction, ease of holding managers liable, ease of holding the approving body liable, ease in accessing evidence, and ease in proving wrongdoing.	Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008)
Common Law	Equals one if the origin of the commercial law of a country is English common law, and zero otherwise.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
Stocks Traded, Total Value (% Of GDP)	Total value of shares traded during the year as a percentage of GDP.	World Development Indicators (The World Bank)
Stocks Traded, Total Value (Billions Of 2000 US $)	Total value of shares traded during the year. Data is in 2000 U.S. dollars.	World Development Indicators (The World Bank)

GDP (Billions Of 2000 US $)	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in 2000 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates.	World Development Indicators (The World Bank)
Internet Users Per 100 People	Internet users are people with access to the worldwide network during a year.	World Development Indicators (The World Bank)
Mobile phone Subscriptions Per 100 People	Mobile phone subscriptions are subscriptions to a public mobile telephone service using cellular technology, which provide access to the public switched telephone network. Post-paid and prepaid subscriptions are included.	World Development Indicators (The World Bank)
Telephone Lines Per 100 People	Telephone lines are fixed telephone lines that connect a subscriber's terminal equipment to the public switched telephone network and that have a port on a telephone exchange. Integrated services digital network channels and fixed wireless subscribers are included.	World Development Indicators (The World Bank)

Table 1: Country Distribution of Sample Firms by Size

This table presents the country distribution of sample firms by size. The sample covers 37 countries, of which 24 are from developed markets and 13 from emerging markets. The firms with market capitalization that fall into CRSP size deciles 9 and 10 are assigned to the large firm group, ones in CRSP size deciles 6, 7 and 8 are assigned to the medium firm group, and those in deciles 2 to 5 are assigned to the small firm group.

COUNTRY	SMALL	MEDIUM	LARGE	TOTAL
PANEL A: Developed Markets				
Australia	827	180	95	1102
Austria	69	42	33	144
Belgium	93	42	41	176
Canada	1230	374	136	1740
Denmark	133	67	35	235
Finland	77	49	35	161
France	523	254	235	1012
Germany	509	227	192	928
Greece	224	82	36	342
Hong Kong	513	332	140	985
Ireland	50	35	27	112
Israel	74	65	34	173
Italy	161	144	122	427
Japan	2442	1449	652	4543
Netherland	141	63	44	248
New Zealand	96	36	17	149
Norway	178	95	40	313
Singapore	520	110	48	678
South Korean	724	318	122	1164
Spain	73	73	72	218
Sweden	276	79	46	401
Switzerland	135	98	83	316
Taiwan	699	261	83	1043
United Kingdom	1150	284	169	1603
Total	10917	4759	2537	18213
PANEL B: Emerging Markets				
Brazil	62	142	104	308
Chile	66	37	18	121
China	1081	468	85	1634
India	517	262	113	892
Indonesia	144	68	22	234
Malaysia	774	128	32	934
Mexico	43	44	38	125
Pakistan	67	27	12	106
Philippine	106	42	12	160
Poland	158	40	17	215
South Africa	278	106	34	418
Thailand	383	81	27	491
Turkey	193	38	28	259
Total	3872	1483	542	5897
World	14789	6242	3079	24110

Table 2: Descriptive Statistics for Daily Sample

This table shows statistics on the number of stocks that are classified as high or low volume stocks in 80 non-overlapping trading intervals of 50 trading days from January 04, 1993 to December 26, 2008. The firms with market capitalization that fall in CRSP size deciles 9 and 10 are assigned to the large firm group, the firms that fall in CRSP size deciles 6, 7 and 8 are assigned to the medium firm group, and those in deciles 2, 3, 4, 5 are assigned to the small firm group.

Country	LOW VOLUME SHOCK				HIGH VOLUME SHOCK			
	SMALL	MEDIUM	LARGE	TOTAL	SMALL	MEDIUM	LARGE	TOTAL
PANEL A: DEVELOPED MARKETS								
Australia	1,024	666	491	2,181	889	546	359	1,794
Austria	227	164	157	548	126	173	193	492
Belgium	289	211	229	729	157	164	183	504
Canada	2,044	1,160	856	4,060	1,355	792	526	2,673
Denmark	330	270	167	767	221	221	137	579
Finland	121	78	117	316	137	86	99	322
France	1,896	1,075	908	3,879	1,124	809	756	2,689
Germany	809	441	432	1,682	701	382	398	1,481
Greece	789	320	128	1,237	578	239	100	917
Hong Kong	995	829	564	2,388	786	704	380	1,870
Ireland	59	83	52	194	50	57	57	164
Israel	153	153	142	448	75	119	148	342
Italy	298	413	600	1,311	275	335	501	1,111
Japan	6,991	7,998	4,734	19,723	5,186	8,538	7,312	21,036
Netherlands	310	303	282	895	265	248	248	761
New Zealand	162	120	77	359	158	82	44	284
Norway	299	238	181	718	275	178	158	611
Singapore	995	598	331	1,924	615	379	197	1,191
South Korea	1,941	1,698	936	4,575	1,292	1,156	631	3,079
Spain	188	311	340	839	160	280	312	752
Sweden	506	309	255	1,070	518	293	230	1,041
Switzerland	324	485	502	1,311	205	366	427	998
Taiwan	1,633	1,719	764	4,116	875	813	289	1,977
UK	1,702	825	596	3,123	1,140	655	535	2,330
Total	24,085	20,467	13,841	58,393	17,163	17,615	14,220	48,998
EMERGING MARKETS								
Brazil	85	266	352	703	46	167	246	459
Chile	71	117	91	279	91	130	108	329
China	1,911	2,253	466	4,630	1,611	1,449	214	3,274
India	982	609	263	1,854	737	495	211	1,443
Indonesia	256	228	104	588	179	175	86	440
Malaysia	1,794	889	279	2,962	1,122	530	161	1,813
Mexico	31	128	226	385	29	92	166	287
Pakistan	135	120	36	291	99	98	34	231
Philippines	179	161	89	429	138	132	70	340
Poland	243	129	68	440	154	69	64	287
South Africa	401	386	202	989	322	301	197	820
Thailand	828	376	220	1,424	644	298	171	1,113
Turkey	602	268	182	1,052	411	196	96	703
Total	7518	5930	2578	16026	5583	4132	1824	11539
All Countries	31,603	26,397	16,419	74,419	22,746	21,747	16,044	60,537

Table 3: Equally-Weighted Cumulative Return in the Test Period for the Volume-Size Sorted Portfolio by Country

This table displays the percentage of the equally-weighted cumulative return for the volume-size sorted portfolio by country over nine different horizons following the formation date: 1, 5, 10, 15, 20, and 25. The Developed/Emerging market classification follows IMF's definition.

Country		SMALL						MEDIUM						LARGE					
		1	5	10	15	20	25	1	5	10	15	20	25	1	5	10	15	20	25
Australia	H	0.4	2.4	2.0	2.6	3.1	3.7	0.0	0.7	0.6	0.8	0.5	0.6	-0.1	1.4	0.1	1.1	0.4	2.0
	L	-0.2	0.7	0.0	0.6	0.2	0.7	-0.1	-0.4	-0.4	-0.4	-0.3	-0.1	-0.1	1.2	1.1	1.2	1.3	1.6
Austria	H	-0.3	2.9	1.5	1.7	2.1	3.5	0.1	-0.3	-0.6	-0.6	-1.3	-1.8	0.3	1.7	1.3	1.7	1.8	1.7
	L	-0.1	-0.7	-0.6	0.1	-0.7	-0.5	-0.1	0.1	-0.2	-0.7	-0.9	-0.7	-0.4	-0.1	-0.2	0.4	0.0	0.4
Belgium	H	0.8	2.2	2.2	2.7	2.8	3.1	0.2	1.7	2.0	2.3	2.7	3.0	0.0	0.5	1.2	2.0	2.4	3.4
	L	-0.1	0.8	1.2	1.7	2.3	3.0	0.0	1.2	1.9	3.0	2.7	3.5	-0.4	-0.3	-0.8	-0.6	0.0	0.5
Brazil	H	2.1	15.4	17.3	18.0	21.2	20.5	0.1	6.3	6.7	9.6	11.3	12.2	0.3	3.9	5.4	8.0	10.0	10.4
	L	1.0	6.3	8.7	8.1	11.1	11.5	-0.2	6.2	5.9	6.7	8.3	9.4	-0.3	4.6	6.4	7.9	9.8	10.5
Canada	H	0.7	3.0	4.3	5.6	5.7	6.1	0.3	2.2	2.5	2.8	2.3	3.8	0.2	0.6	0.0	0.1	-0.3	0.4
	L	0.0	0.0	0.8	0.9	1.2	1.4	-0.2	0.1	-0.1	-0.2	-0.4	0.1	0.0	0.4	0.3	0.8	0.8	0.8
Chile	H	-0.1	0.2	0.5	0.8	1.7	0.5	0.4	3.2	2.6	3.9	4.4	5.6	-0.3	2.6	2.1	2.8	3.2	3.2
	L	-0.2	-2.8	-3.1	-2.8	-2.3	-0.9	-0.4	-0.5	-1.0	-1.0	-0.7	-1.1	-0.3	7.0	7.0	8.5	8.8	8.7
China	H	1.5	3.2	2.5	3.2	4.0	5.2	1.1	4.3	4.3	5.3	5.3	6.3	-0.2	6.4	6.8	7.0	7.0	8.6
	L	-0.3	-0.2	0.4	1.3	3.6	2.9	-0.5	0.3	-0.6	-0.9	0.4	0.4	-0.7	3.2	1.6	2.2	4.3	5.5
Denmark	H	0.3	2.9	3.1	3.2	3.1	3.8	0.3	1.6	0.9	1.3	0.7	0.0	0.5	1.5	0.6	0.3	0.0	0.6
	L	-0.4	1.0	1.0	1.4	1.1	1.5	-0.1	-0.4	0.0	0.0	-0.5	-0.5	-0.2	0.6	-0.5	-0.9	-0.6	-0.7
Finland	H	-0.8	0.0	-0.5	-1.2	-2.2	-2.6	-1.7	-1.8	-1.2	0.5	0.0	0.1	-0.8	-0.4	-0.4	0.3	-0.2	-1.0
	L	-0.4	1.5	1.0	2.6	2.4	2.0	-0.2	0.7	1.3	1.9	0.9	0.5	0.0	0.0	-2.8	-1.6	-1.1	-0.4
France	H	0.3	0.9	0.9	1.6	1.5	1.5	0.0	1.2	1.6	2.2	2.4	2.3	0.3	1.3	1.0	1.6	1.8	1.7
	L	-0.1	0.0	-0.2	0.4	0.1	0.0	-0.2	0.2	0.1	0.4	0.6	0.7	-0.1	0.6	0.3	0.1	0.6	0.8
Germany	H	0.5	2.7	1.7	2.1	1.6	0.9	0.2	0.9	0.7	1.5	1.0	-0.6	0.5	2.5	2.7	4.4	3.7	4.6
	L	-0.4	-0.8	-1.1	-0.9	-1.0	-2.5	-0.3	1.3	0.7	0.8	-0.1	-0.6	-0.2	3.5	3.2	3.8	3.6	3.4
Greece	H	1.2	4.9	4.3	4.4	5.0	5.5	0.3	0.8	-0.1	-0.6	-1.0	-1.3	0.3	0.9	1.3	0.0	-1.7	0.6
	L	-0.1	3.2	2.7	1.8	2.5	3.0	-0.1	-0.6	-0.8	-1.4	-0.6	-1.3	-0.2	0.2	0.7	0.8	-0.4	0.3
HK	H	1.3	4.2	3.7	3.8	4.2	5.7	0.6	0.1	-0.4	0.0	-0.2	0.0	0.6	0.6	-0.6	0.1	-0.4	1.3

	L	-0.6	1.1	0.8	1.2	1.2	1.4	-0.6	0.5	-0.7	-0.2	-0.6	0.3	-0.6	-0.5	-0.9	-1.7	-2.2	-1.5
India	H	1.0	6.3	6.2	5.5	5.4	5.2	0.8	7.4	7.1	6.9	7.2	6.7	2.0	6.4	5.2	4.4	3.5	2.9
	L	-0.4	7.4	7.1	6.1	5.9	5.8	-1.0	3.2	2.4	1.2	1.3	1.1	-0.5	3.5	1.0	1.7	1.0	1.8
Indonesia	H	1.1	3.9	2.5	3.3	4.8	4.0	1.3	4.9	2.7	5.6	5.4	6.2	0.0	1.2	-0.7	0.6	0.3	0.2
	L	-0.5	5.1	3.7	5.5	6.5	7.3	-0.6	0.8	-0.3	3.6	4.7	5.9	-0.2	-0.6	-1.3	0.3	2.4	4.0
Ireland	H	-1.2	-1.1	-2.0	-1.4	-0.8	0.2	0.5	4.6	3.3	3.8	4.8	4.1	0.0	0.7	0.3	2.0	1.5	1.0
	L	-0.8	-1.4	-2.4	-3.7	-2.0	-2.1	-0.3	-0.7	0.0	2.5	2.9	2.8	0.3	1.2	-0.4	2.5	1.8	1.5
Israel	H	1.6	7.3	5.7	5.3	6.7	4.9	0.6	4.0	4.4	3.8	4.1	3.0	-0.3	0.7	0.9	1.3	0.9	1.3
	L	0.2	6.1	6.1	6.6	3.5	4.9	0.0	4.3	3.7	2.8	2.1	2.6	-0.3	2.4	2.4	2.3	1.3	0.6
Italy	H	1.0	1.4	2.0	3.0	3.3	2.2	0.9	1.3	1.2	2.2	2.7	2.6	0.3	0.3	0.5	1.8	1.3	1.6
	L	-0.4	-0.4	-0.6	0.2	0.6	0.3	-0.5	-0.7	-1.1	0.4	1.0	1.1	-0.4	-0.5	-0.3	0.0	-0.7	-0.5
Japan	H	0.7	2.8	3.1	3.9	4.1	4.3	0.5	2.8	2.7	3.4	3.7	3.9	0.5	2.5	2.4	3.4	3.5	3.3
	L	-0.3	0.8	0.6	0.9	1.0	1.2	-0.2	1.1	0.7	1.1	0.9	0.9	-0.3	1.2	0.8	1.2	0.9	0.4
Malaysia	H	1.0	1.1	-0.1	0.7	-0.4	0.6	0.5	2.0	2.0	2.4	1.9	2.0	0.8	2.3	2.7	3.3	3.0	4.0
	L	-0.5	-0.3	-0.4	0.6	0.2	1.3	-0.6	0.3	-0.7	-0.3	-1.4	-0.8	-0.5	1.5	0.8	1.1	0.9	2.4
Mexico	H	0.3	-0.3	-2.1	2.5	-0.4	1.3	0.7	2.0	3.9	5.2	6.8	6.3	1.5	3.8	2.9	2.9	2.9	2.7
	L	0.1	-4.4	-8.2	-9.1	-5.5	-6.7	-0.2	3.9	4.0	3.7	5.4	7.1	-0.3	3.3	2.5	3.7	3.8	4.5
Netherlands	H	1.2	4.0	3.6	3.5	4.1	3.7	0.3	1.6	1.6	1.7	2.2	2.9	0.6	2.1	2.6	3.3	3.9	4.7
	L	-0.2	0.5	0.4	0.7	0.4	0.2	0.0	-0.1	-0.1	0.7	0.5	1.2	0.0	0.2	-0.5	-0.4	-0.5	-0.3
New Zealand	H	0.7	2.5	2.2	2.9	3.3	3.3	0.4	2.3	1.7	1.8	0.7	0.8	0.0	0.4	-1.0	-2.8	-3.3	-2.5
	L	0.2	0.4	1.3	1.8	1.5	2.3	0.3	-0.1	-1.0	-0.7	-0.7	-1.7	-0.1	-0.7	-2.1	-3.1	-2.4	-3.8
Norway	H	1.5	3.2	3.4	3.0	2.1	2.9	0.9	1.9	1.2	1.1	-0.4	1.2	0.0	0.0	-0.8	1.0	-0.2	-1.4
	L	-0.9	-1.5	-1.6	-0.6	-1.2	-1.4	-0.4	0.6	0.6	0.7	1.0	2.0	0.2	1.9	1.2	1.4	1.2	0.4
Pakistan	H	2.1	7.0	9.1	7.1	7.6	9.2	1.3	3.5	5.1	5.9	5.2	6.2	1.9	3.6	3.8	0.5	0.0	-1.3
	L	-0.4	4.1	4.8	4.1	5.0	5.6	-0.8	-1.6	1.7	4.3	2.6	5.7	-0.7	-2.0	-2.9	-4.6	-7.1	-6.5
Philippines	H	0.8	1.5	1.7	2.4	3.4	4.5	0.6	4.4	5.1	5.6	5.7	5.0	0.6	4.1	5.2	3.3	1.5	0.9
	L	-0.7	3.5	4.9	4.6	4.8	4.2	0.0	4.6	5.4	7.4	6.6	5.9	-0.3	3.3	2.8	1.9	-1.1	-2.1
Poland	H	-0.2	0.5	-0.4	-0.8	-0.6	0.4	-0.2	1.3	1.6	2.3	3.6	2.8	-0.1	-0.1	-0.5	-0.9	-1.8	-0.2
	L	-0.4	0.1	-0.6	-0.6	-2.0	-0.7	-0.7	-1.7	-1.8	-0.4	-1.1	-1.6	-0.3	0.4	-1.4	-2.1	-3.9	-4.8

Singapore	H	1.1	2.8	2.5	3.1	3.9	5.2	0.9	1.9	1.7	2.6	2.1	3.0	0.0	-0.4	-0.8	0.9	0.3	1.7
	L	-0.3	1.8	1.8	3.0	2.8	3.9	-0.5	0.7	0.1	0.7	0.3	1.0	-0.2	-0.9	-1.3	0.1	-0.2	0.6
South Africa	H	1.2	5.1	3.8	4.8	5.7	6.6	0.6	2.4	1.3	1.5	2.2	2.8	0.4	1.0	0.7	0.5	1.3	1.8
	L	-0.3	0.2	1.3	1.5	1.5	1.7	-0.4	1.2	1.6	1.3	2.0	2.3	-0.7	0.6	0.9	2.4	3.1	2.7
South Korea	H	1.8	2.3	2.2	1.0	1.2	2.0	2.0	3.6	3.8	3.3	4.0	4.4	1.4	3.6	3.6	3.8	3.8	4.1
	L	-0.7	1.9	1.8	1.9	1.7	2.6	-0.8	2.6	2.2	2.1	2.5	3.0	-0.5	2.9	2.9	3.1	2.6	3.4
Spain	H	0.7	3.8	4.1	5.4	6.3	5.6	1.0	3.1	3.6	4.3	4.8	5.1	0.3	1.0	0.7	1.9	1.6	1.7
	L	0.1	1.5	1.9	2.6	2.4	2.4	0.0	0.0	0.1	0.5	0.4	0.3	0.0	0.2	0.3	0.5	0.8	1.1
Sweden	H	1.3	2.8	2.5	2.5	2.2	3.2	0.6	2.3	1.5	1.8	1.6	2.9	0.8	1.5	0.9	1.7	2.1	2.1
	L	-0.4	-1.3	-0.9	-0.9	-1.0	0.2	-0.5	-1.0	-2.3	-1.8	-1.8	-1.6	-0.5	-0.7	-0.7	-0.6	-0.8	-0.6
Switzerland	H	0.4	2.5	2.9	3.3	3.6	3.4	0.7	2.0	2.3	2.8	2.7	2.5	0.1	1.5	1.8	2.1	2.5	2.6
	L	0.0	2.1	2.1	3.1	3.4	3.4	-0.2	-0.2	-0.2	0.2	0.6	0.7	0.0	0.7	0.7	0.9	0.7	0.8
Taiwan	H	1.4	2.3	3.1	3.4	2.7	2.7	1.4	2.2	1.5	2.2	1.2	0.7	1.0	1.3	1.6	1.7	1.0	1.1
	L	-1.0	0.1	0.7	1.7	0.6	0.9	-1.0	0.6	0.6	1.1	0.2	0.5	-1.0	0.6	1.4	1.8	1.7	2.2
Thailand	H	1.7	3.4	4.1	5.3	5.0	5.6	1.7	4.7	4.6	5.4	6.1	5.3	0.7	0.4	1.0	3.0	3.8	3.2
	L	-0.1	0.2	0.4	0.2	0.4	0.9	-0.4	0.9	0.3	1.3	1.4	1.7	0.5	-1.6	-1.8	-0.3	-0.8	-0.9
Turkey	H	2.8	10.0	10.5	12.3	14.8	14.9	1.9	4.6	7.0	10.7	7.3	8.7	1.0	14.2	13.5	17.5	21.4	24.0
	L	-1.0	4.1	6.8	7.2	10.1	11.3	-1.6	4.3	7.9	9.1	10.1	8.2	-1.4	12.8	13.2	17.3	17.9	15.9
UK	H	0.5	2.7	3.1	3.5	3.2	3.8	0.5	2.0	1.6	2.0	1.9	2.1	0.3	1.5	1.1	2.4	2.4	2.5
	L	-0.1	0.0	-0.2	-0.1	-0.4	-0.1	-0.1	-0.1	-0.5	-0.3	-0.6	-0.8	-0.1	0.6	0.3	1.2	0.7	1.2
Total	H	0.9	3.3	3.2	3.6	3.9	4.2	0.6	2.5	2.5	3.2	3.1	3.3	0.4	2.1	1.9	2.4	2.3	2.7
	L	-0.3	1.1	1.1	1.4	1.7	2.0	-0.4	0.9	0.8	1.3	1.4	1.6	-0.3	1.4	0.9	1.4	1.3	1.5
Developed	H	0.7	2.7	2.6	2.9	3.0	3.3	0.5	1.8	1.6	2.0	1.8	1.9	0.3	1.1	0.9	1.5	1.2	1.6
	L	-0.3	0.7	0.7	1.1	1.0	1.2	-0.3	0.4	0.2	0.6	0.4	0.6	-0.2	0.6	0.2	0.6	0.4	0.5
Emerging	H	1.2	4.4	4.3	5.0	5.5	6.0	0.8	3.9	4.2	5.4	5.6	5.9	0.7	3.8	3.7	4.1	4.3	4.6
	L	-0.3	1.8	2.0	2.0	3.0	3.4	-0.6	1.7	1.9	2.8	3.1	3.4	-0.4	2.8	2.2	3.1	3.0	3.2

Table 4: Average Returns of Zero Investment Portfolios by Country

This table displays the percentage of average test period return of zero investment portfolios by country over nine different horizons following the formation date: 1,2,3,4,5,10,15,20,25. The Developed/Emerging market classification follows IMF's definition. (***, **, and * indicate statistical significance level at 1%, 5% and 10% respectively.)

Country	1	2	3	4	5	10	15	20	25
Australia	0.2	0.5	0.9**	1.0***	1.1***	0.8	1.1*	1.1*	1.4**
Austria	0.1	0.4	0.5	1.3*	1.4*	0.9	1.0	1.2	1.3
Belgium	0.5***	0.6*	0.7*	0.9*	0.8*	0.9*	0.9	0.9	0.7
Brazil	0.6	2.3***	3.0	2.8	1.7	1.7	3.3	3.4	3.0
Canada	0.5***	1.3***	2.0***	1.9***	1.8***	1.9***	2.4***	2.1***	2.7***
Chile	0.3	0.8	1.2	1.3	1.1	1.0	1.3	1.6	1.5
China	1.5***	1.7***	3.2***	3.0***	3.6***	3.8***	4.1***	2.6*	3.8
Denmark	0.6***	1.0***	1.5**	1.4**	1.6**	1.4*	1.5*	1.3	1.4
Finland	-0.9**	-1.2	-1.8*	-1.4	-1.5	-0.7	-1.4	-1.8	-2.0
France	0.3***	0.7***	0.7***	0.9***	0.9***	1.1***	1.4***	1.4***	1.3***
Germany	0.7**	1.4***	0.8	0.9	0.7	0.8	1.4	1.3	1.5
Greece	0.8***	1.3***	1.1**	1.2**	1.3***	1.1	1.3	0.7	1.2
Hong Kong	1.5***	1.4**	1.2	1.2	1.3	1.3	1.5	1.7	2.2*
India	1.8***	2.6***	2.2**	1.9*	1.8	2.4*	2.4*	2.5*	2.0
Indonesia	1.5***	1.5*	1.1	1.7	1.5	0.7	-0.1	-1.0	-2.1
Ireland	0.0	0.6	2.4*	2.3*	2.3*	1.8	1.2	1.4	1.4
Israel	0.7	-0.1	-0.5	-0.5	-0.2	-0.3	-0.4	1.7	0.4
Italy	1.1***	1.5***	1.5***	1.3***	1.5***	1.9***	2.1***	2.1***	1.8**
Japan	0.8***	1.3***	1.6***	1.6***	1.7***	2.0***	2.5***	2.8***	2.9***
Malaysia	1.3***	1.7***	1.5***	1.4***	1.3***	1.6***	1.6**	1.5*	1.1
Mexico	1.2***	3.0***	0.2	-0.2	-0.1	0.9	1.6	0.7	-0.3
Netherlands	0.8***	1.1***	1.8***	2.2***	2.4***	2.7***	2.5***	3.2***	3.4
New Zealand	0.3	0.9**	1.6***	2.0***	2.0***	1.5**	1.4	1.1	1.5
Norway	1.3***	1.2**	1.2*	1.5**	1.7**	1.8**	1.7*	0.6	1.2
Pakistan	2.4***	3.5***	3.5***	3.1**	4.0***	4.2***	3.0*	3.3	3.0
Philippines	1.1***	0.2	0.3	-0.5	-0.8	-1.0	-1.4	-0.4	0.5
Poland	0.3	0.8	1.2	1.3	1.0	1.4	1.0	2.6	3.0
Singapore	1.1***	1.0***	0.7	0.7	0.9	0.9	0.9	1.2	1.5*
South Africa	1.2***	1.5***	2.0***	2.0***	2.3***	0.7	0.8	1.1	1.7
South Korea	2.3***	1.9***	1.4***	1.1***	0.5	0.8	0.2	0.7	0.5
Spain	0.7***	0.9***	1.3***	1.4***	2.0***	1.9***	2.4***	2.9***	2.7***
Sweden	1.4***	2.0***	2.6***	3.1***	3.2***	2.9***	3.1***	3.1***	3.4***
Switzerland	0.5***	0.9***	1.2***	1.3***	1.2***	1.4***	1.3***	1.3**	1.2*
Taiwan	2.3***	2.1***	2.1***	1.7***	1.5***	1.3*	1.0	0.9	0.5
Thailand	1.5***	1.9***	2.5***	3.1***	3.1***	3.7***	4.3***	4.6***	4.2***
Turkey	3.5***	3.7***	3.6*	2.9	3.4*	1.7	3.2	2.1	3.2
UK	0.6***	1.2***	1.5***	1.8***	1.9***	2.1***	2.4***	2.6***	2.7***
Total	1.0***	1.3***	1.5***	1.5***	1.5***	1.5***	1.6***	1.7***	1.7***
Developed	0.8***	1.1***	1.2***	1.3***	1.4***	1.4***	1.5***	1.6***	1.7***
Emerging	1.4***	1.9***	2.0***	1.9***	1.8***	1.7***	1.9***	1.9***	1.9***

Table 5: Summary Statistics of Variables

This table describes the annual average of variables that are used in this paper. The sample period starts from 1993 and ends at 2008. See appendix for detailed description and sources of the variables.

Panel A: Absolute Economic Development

Country	GDP (Billions of 2000 US $)	Listed Domestic Companies	Stock Market Cap (Billions of 2000 US $)	Value of Stocks Traded (Billions of 2000 US $)
Australia	399.9	1321.3	411.4	295.1
Austria	183.8	101.2	48.1	26.5
Belgium	223.0	156.4	166.2	58.4
Brazil	643.1	486.6	261.1	165.9
Canada	685.3	1915.8	685.3	524.4
Chile	73.7	268.0	76.3	10.4
China	1294.0	931.5	705.1	913.6
Denmark	152.8	225.5	95.7	75.5
Finland	117.4	116.7	140.1	145.5
France	1276.0	683.2	1017.0	998.5
Germany	1838.0	674.8	898.0	1157.0
Greece	124.6	261.4	67.9	36.6
Hong Kong	170.6	733.1	543.7	369.6
India	498.2	5577.7	259.6	340.9
Indonesia	174.1	283.8	55.9	28.2
Ireland	87.9	73.1	67.5	29.6
Israel	118.6	638.9	67.3	35.1
Italy	1062.0	260.9	479.5	457.6
Japan	4642.0	2581.8	3187.0	2235.0
Malaysia	91.1	726.0	172.4	85.1
Mexico	544.3	176.9	155.5	53.9
Netherlands	362.9	212.6	469.5	534.9
New Zealand	50.8	139.2	27.9	11.8
Norway	161.4	177.1	79.3	91.8
Pakistan	74.0	730.7	13.2	25.7
Philippines	75.1	219.3	47.7	12.9
Poland	180.0	231.1	48.4	22.4
Singapore	88.2	332.2	149.4	95.4
South Africa	133.4	580.4	276.8	99.0
South Korea	517.0	1166.0	265.6	615.0
Spain	559.3	1283.2	461.8	793.4
Sweden	236.8	265.2	263.2	267.3
Switzerland	244.7	238.9	616.1	594.8
Thailand	127.9	417.1	81.4	56.7
Turkey	262.3	257.7	62.4	94.8
UK	1421.0	2142.8	2088.0	1808.0

Panel B: Relative Economic Development

Country	GDP per capita (2000 US $)	Listed Firms per Million Population	Market Cap of Listed Companies (% of GDP)	Stocks Traded, Total Value (% of GDP)
Australia	20911.4	68.3	85.8	53.5
Austria	22804.9	12.1	19.0	9.4
Belgium	21924.6	15.5	59.0	17.8
Brazil	3761.0	2.5	32.0	18.1
Canada	22379.4	73.8	87.1	59.0
Chile	4859.6	16.7	90.3	10.5
China	1153.0	0.9	33.9	41.2
Denmark	28846.0	39.4	48.7	35.6
Finland	24264.5	28.6	96.9	87.7
France	21003.0	13.7	61.5	54.2
Germany	23198.3	10.5	38.9	46.7
Greece	11777.3	29.7	40.4	22.1
Hong Kong	26171.4	129.2	317.9	203.2
India	494.8	5.6	38.3	51.2
Indonesia	862.7	1.5	25.5	11.3
Ireland	25500.1	17.9	59.1	25.3
Israel	19534.2	97.7	53.2	26.5
Italy	18662.3	4.9	36.7	33.4
Japan	36753.3	21.5	71.3	49.9
Malaysia	3985.2	34.6	181.4	92.3
Mexico	5622.6	1.7	29.4	10.5
Netherlands	22959.2	12.3	107.0	111.3
New Zealand	13370.9	36.9	43.8	17.1
Norway	36223.2	40.2	38.1	35.2
Pakistan	559.3	5.2	16.3	26.7
Philippines	996.4	2.9	60.0	16.0
Poland	4825.2	5.7	18.0	7.7
Singapore	22150.0	100.6	160.2	93.6
South Africa	3118.0	12.0	168.5	52.7
South Korea	11115.5	29.4	44.7	102.5
Spain	13601.8	45.9	59.3	96.0
Sweden	26747.8	31.4	95.2	89.3
Switzerland	33997.4	35.9	204.8	185.7
Taiwan	N/A	N/A	N/A	N/A
Thailand	2074.6	6.6	52.2	36.0
Turkey	4133.5	4.3	22.3	31.9
UK	23994.7	33.1	138.6	99.8

Panel C: Shareholder Protection			
Country	Anti-Director Right	Anti-Self-Dealing Index	Common Law
Australia	4.0	0.8	1.0
Austria	2.5	0.2	0.0
Belgium	2.0	0.5	0.0
Brazil	5.0	0.3	0.0
Canada	4.0	0.7	1.0
Chile	4.0	0.6	0.0
China	1.0	0.8	0.0
Denmark	4.0	0.5	0.0
Finland	3.5	0.5	0.0
France	3.0	0.4	0.0
Germany	2.5	0.3	0.0
Greece	2.0	0.2	0.0
Hong Kong	5.0	1.0	1.0
India	5.0	0.5	1.0
Indonesia	4.0	0.7	0.0
Ireland	4.0	0.8	1.0
Israel	4.0	0.7	1.0
Italy	2.5	0.4	0.0
Japan	3.5	0.5	0.0
Malaysia	5.0	1.0	1.0
Mexico	3.0	0.2	0.0
Netherlands	3.0	0.2	0.0
New Zealand	4.0	1.0	1.0
Norway	3.5	0.4	0.0
Pakistan	4.0	0.4	1.0
Philippines	3.0	0.2	0.0
Poland	2.0	0.3	0.0
Singapore	5.0	1.0	1.0
South Africa	5.0	0.8	1.0
South Korea	3.5	0.5	0.0
Spain	5.0	0.4	0.0
Sweden	3.5	0.3	0.0
Switzerland	3.0	0.3	0.0
Taiwan	3.0	0.6	0.0
Thailand	4.0	0.9	1.0
Turkey	2.0	0.4	0.0
UK	5.0	0.9	1.0

Country	CIFAR	Time	Audit	Disclosure	Measure	Internet Users	Mobile Phone	Telephone Line
			Panel D: Information Environment					
Australia	80.0	89.1	4.0	100.0	100.0	32.6	41.2	49.9
Austria	62.0	68.1	3.0	70.3	68.5	25.0	49.8	46.9
Belgium	68.0	63.0	3.0	92.8	39.1	22.3	39.9	46.8
Brazil	56.0	87.0	3.0	57.3	100.0	7.3	16.6	16.1
Canada	75.0	99.3	4.0	100.0	76.1	32.1	25.8	61.6
Chile	78.0	94.2	4.0	92.8	100.0	10.8	23.9	18.6
China	NA	NA	NA	NA	NA	3.9	11.4	14.2
Denmark	75.0	73.9	4.0	87.0	68.5	32.5	52.1	63.0
Finland	83.0	79.0	4.0	100.0	68.5	38.1	63.2	48.9
France	78.0	78.3	3.0	100.0	70.7	18.4	35.6	56.4
Germany	67.0	68.1	4.0	100.0	39.1	25.3	43.1	59.2
Greece	61.0	17.4	1.0	44.6	100.0	10.4	42.7	51.4
Hong Kong	73.0	69.6	4.0	79.7	100.0	25.4	63.3	56.1
India	61.0	45.7	1.0	79.4	54.4	1.2	5.3	2.7
Indonesia	NA	NA	NA	NA	NA	1.7	8.6	4.1
Ireland	81.0	69.6	4.0	100.0	100.0	17.3	45.9	45.2
Israel	74.0	66.7	2.0	100.0	76.1	14.5	57.6	45.8
Italy	66.0	87.0	4.0	100.0	68.5	15.0	56.7	44.2
Japan	71.0	86.2	4.0	100.0	36.1	25.8	40.7	47.5
Malaysia	79.0	65.2	3.0	100.0	100.0	17.5	26.4	17.4
Mexico	71.0	84.8	3.0	68.1	100.0	5.8	16.9	13.4
Netherlands	74.0	78.3	4.0	100.0	46.7	34.9	44.9	51.7
New Zealand	80.0	17.4	3.0	100.0	100.0	33.6	38.8	45.0
Norway	75.0	94.2	4.0	76.5	68.5	31.8	55.6	51.2
Pakistan	73.0	51.5	2.0	68.5	46.7	2.6	6.4	2.3
Philippines	64.0	75.4	1.0	80.1	23.9	2.1	14.8	3.4
Poland	NA	NA	NA	NA	NA	17.4	38.6	24.6
Singapore	79.0	63.8	4.0	100.0	100.0	26.7	48.7	44.1
South Africa	79.0	87.0	4.0	88.4	100.0	3.8	23.1	10.2
South Korea	68.0	17.4	3.0	65.2	39.1	28.0	39.4	48.6
Spain	72.0	89.1	4.0	92.8	100.0	14.3	41.9	41.7
Sweden	83.0	86.2	4.0	100.0	39.1	38.3	56.8	65.9
Switzerland	80.0	73.9	3.0	100.0	68.5	33.2	44.8	68.1
Taiwan	58.0	17.4	2.0	59.8	46.7	NA	NA	NA
Thailand	66.0	89.1	3.0	51.1	23.9	5.2	17.0	8.5
Turkey	58.0	17.4	1.0	59.1	68.5	6.4	22.7	26.1
UK	85.0	87.0	4.0	100.0	100.0	25.7	49.7	55.3

Table 6: High-Volume Premium and Economic / Legal Development

This table reports the results of pooled OLS regression of high-volume premium on the stock market turnover rate, the size of the zero-investment portfolio, the degree of shareholder protection, the absolute economic development level, and the relative economic development level. Year effect is controlled but not reported. The sample covers the period from 1993 to 2008. See appendix for detailed variable definition.

Independent Variables		(1)	(2)
Stock Market Turnover		9.073**	7.816***
		(2.17)	(8.03)
Portfolio Size		-0.530*	-0.210***
		(-1.82)	(-3.66)
Shareholder Protection	Anti Director Right	-0.115	-0.050
		(-0.39)	(-0.84)
	Anti Self-Dealing	-1.331	0.155
		(-0.83)	(0.5)
	Common Law	1.556	-0.076
		(1.59)	(-0.43)
Absolute Development	GDP	0.551	
		(0.96)	
	Listed Firms	-0.089	
		(-0.3)	
	Market Capitalization	-0.073	
		(-0.09)	
	Value of Stock Traded	0.030	
		(0.05)	
Relative Development	GDP per capita		-31.263***
			(-5.99)
	Listed Firms per million people		3.027
			(1.31)
	Market Capitalization (% of GDP)		1.522
			(1.19)
	Value of Stock Traded (% of GDP)		-1.001
			(-0.7)
Constant		1.393	0.437
		(0.83)	(1.28)
Number of Observations		4046	4029
R^2		0.0647	0.0094

t statistics in parentheses; * p<.1,** p<.05,*** p<.01

Table 7: High-Volume Premium and Institutional Information Environment

This table reports the results of pooled OLS regression of high-volume premium on the stock market turnover rate, the size of the zero-investment portfolio, the degree of shareholder protection, the absolute economic development level, the relative economic development level, and the institutional information environment variables. Year effect is controlled but not reported. The sample covers the period from 1993 to 2008. See appendix for detailed variable definition.

Independent Variables	(1)	(2)	(3)	(4)
Stock Market Turnover	7.784***	7.515***	7.998***	7.724***
	(9.27)	(7.71)	(8.07)	(7.06)
Portfolio Size	-0.205***	-0.187**	-0.205***	-0.188**
	(-3.58)	(-3.27)	(-3.58)	(-3.29)
Anti-Director Right	-0.039	0.025	-0.113	-0.027
	(-0.55)	(0.28)	(-1.62)	(-0.31)
Anti-Self-Dealing	1.064**	1.339**	0.804*	0.882*
	(2.70)	(2.98)	(2.05)	(1.97)
Common Law	-0.039	-0.266	-0.055	-0.258
	(-0.18)	(-1.17)	(-0.28)	(-1.19)
GDP	-0.0118	0.145		
	(-0.10)	(1.23)		
Listed Firms	0.059	0.029		
	(0.96)	(0.45)		
Market Capitalization	-0.045	-0.155		
	(-0.27)	(-0.91)		
Value of Stock Traded	-0.137	-0.094		
	(-1.23)	(-0.85)		
GDP per capita			-22.470***	-14.950*
			(-3.55)	(-1.72)
Listed Firms per Million People			1.456	3.109
			(0.64)	(1.19)
Market Capitalization (% of GDP)			2.371*	2.618*
			(1.87)	(2.05)
Value of Stock Traded (% of GDP)			-0.880	-1.573
			(-0.63)	(-1.12)
CIFAR	-0.043***		-0.036***	
	(-5.51)		(-4.29)	
Time		2.206		0.849
		(0.69)		(0.26)
Audit		-0.245*		-0.155
		(-2.44)		(-1.58)
Disclosure		-0.012***		-0.012**
		(-3.46)		(-3.27)
Measure		-3.567		-5.956**
		(-1.57)		(-2.65)
Constant	2.642***	1.189*	2.733***	1.744***
	(4.52)	(2.47)	(4.78)	(3.41)
Number of Observations	3756	3756	3744	3744
R^2	0.070	0.075	0.073	0.076

t statistics in parentheses; * p<.1,** p<.05,*** p<.01

Table 8: High-Volume Premium and Physical Information Environment

This table reports the results of pooled OLS regression of high-volume premium on the stock market turnover rate, the size of the zero-investment portfolio, the degree of shareholder protection, the absolute economic development level, the relative economic development level, and the physical information environment variables. Year effect is controlled but not reported. The sample covers the period from 1993 to 2008. See appendix for detailed variable definition.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Market Turnover	8.691***	9.057***	7.732***	7.852***	7.837***	8.086***	8.839***	9.420***
	(9.90)	(8.67)	(9.37)	(8.07)	(9.50)	(8.29)	(10.03)	(8.97)
Portfolio Size	-0.215***	-0.218***	-0.211***	-0.212***	-0.203***	-0.205***	-0.210***	-0.213***
	(-3.76)	(-3.79)	(-3.68)	(-3.69)	(-3.54)	(-3.58)	(-3.66)	(-3.71)
Anti Director Right	-0.022	-0.042	-0.027	-0.053	-0.071	-0.110*	-0.039	-0.099
	(-0.38)	(-0.71)	(-0.46)	(-0.90)	(-1.21)	(-1.79)	(-0.65)	(-1.61)
Anti Self-Dealing	0.590	0.154	0.670*	0.170	0.488	-0.002	0.481	-0.016
	(1.87)	(0.49)	(2.14)	(0.54)	(1.55)	(-0.01)	(1.50)	(-0.05)
Common Law	-0.075	-0.034	-0.143	-0.113	-0.071	-0.054	-0.033	-0.017
	(-0.38)	(-0.19)	(-0.75)	(-0.63)	(-0.37)	(-0.31)	(-0.17)	(-0.09)
GDP	0.072		0.095		0.027		0.036	
	(0.64)		(0.84)		(0.23)		(0.31)	
Listed Firms	0.072		0.068		0.079		0.051	
	(1.22)		(1.10)		(1.32)		(0.82)	
Market Capitalization	-0.217		-0.212		-0.087		-0.107	
	(-1.32)		(-1.27)		(-0.51)		(-0.62)	
Value of Stock Traded	-0.072		-0.131		-0.109		-0.094	
	(-0.67)		(-1.23)		(-1.02)		(-0.86)	
GDP per capita		-16.41*		-24.97***		-10.37		1.515
		(-2.46)		(-3.98)		(-1.29)		(0.17)
Listed Firms per billion people		3.394		3.855		6.295**		6.552***
		(1.47)		(1.64)		(2.53)		(2.62)
Market Capitalization (% of GDP)		1.581		1.671		1.373		1.680
		(1.22)		(1.31)		(1.08)		(1.29)
Value of Stock Traded (% of GDP)		-1.160		-0.963		-0.637		-1.083
		(-0.79)		(-0.68)		(-0.45)		(-0.74)
Internet	-0.017***	-0.014***					-0.012***	-0.011***
	(-6.08)	(-3.57)					(-2.97)	(-2.64)
Mobile			-0.009***	-0.005*			-0.0002	-0.002
			(-4.17)	(-1.81)			(-0.07)	(-0.58)
Telephone					-0.013***	-0.016***	-0.007*	-0.015***
					(-5.14)	(-3.43)	(-1.74)	(-3.02)
Constant	0.554	0.773*	0.721	0.855*	0.370	0.766**	0.614	1.126***
	(1.59)	(2.16)	(1.86)	(2.08)	(1.08)	(2.17)	(1.57)	(2.71)
Number of Observations	4036	4024	4058	4046	4058	4046	4036	4024
R^2	0.070	0.070	0.064	0.065	0.066	0.067	0.071	0.072

t statistics in parentheses; * p<.1,** p<.05,*** p<.01

Figure 1: Evolution of the Median Cumulative Return of Stocks with Positive and Negative Volume Shock by Size Groups

For each size group, I form an equally-weighted portfolio at the end of every 50 trading days according to the trading volume for each stock during that day. A stock is classified into the high (low) volume portfolio if the trading volume on the 50th day is among the top (low) 10% of trading volumes in the previous 49 days. The median cumulative return of the high (low) volume portfolio and the median return difference between these two portfolios are plotted over the subsequent 25 trading days.

Figure 1A: Median Cumulative Return over Test Periods- Large Firms

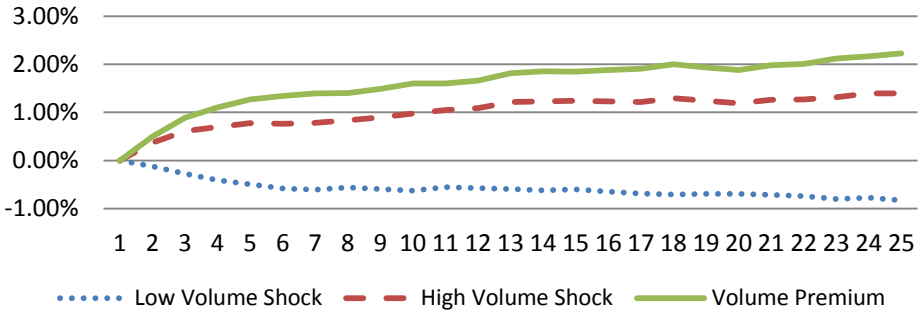


Figure 1B: Median Cumulative Return over Test Periods- Medium Firms

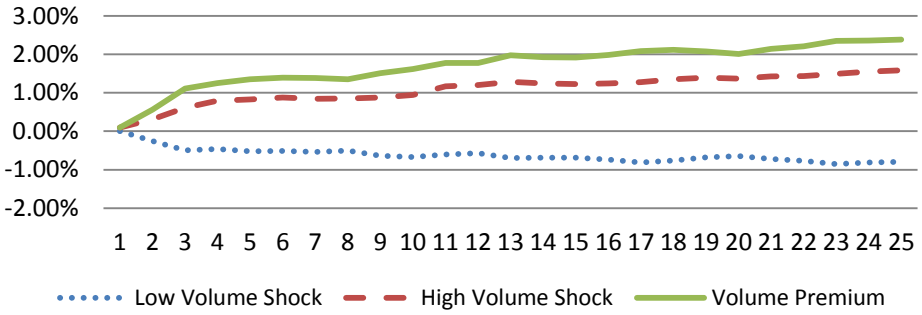


Figure 1C: Median Cumulative Return over Test Periods- Small Firms

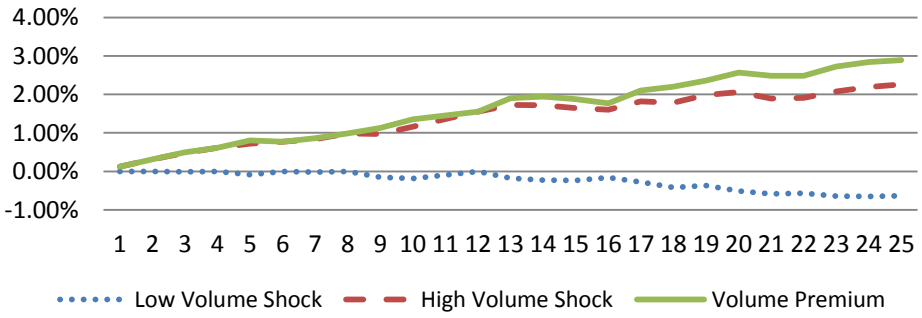


Figure 2: Evolution of the Median Cumulative Return of Stocks with Positive and Negative Volume Shock in Developed/Emerging Markets

For stocks from all countries, emerging markets only, and developed markets only, I form an equally-weighted portfolio at the end of every 50 trading days according to the trading volume of each stock during that day. A stock is classified into the high (low) volume portfolio if the trading volume on the 50th day is among the top (low) 10% of trading volumes in the previous 49 days. The median cumulative return of the high (low) volume portfolio and the median return difference between these two portfolios are plotted over the subsequent 25 trading days.

Figure 2A: Median Cumulative Return over Test Periods- All Countries

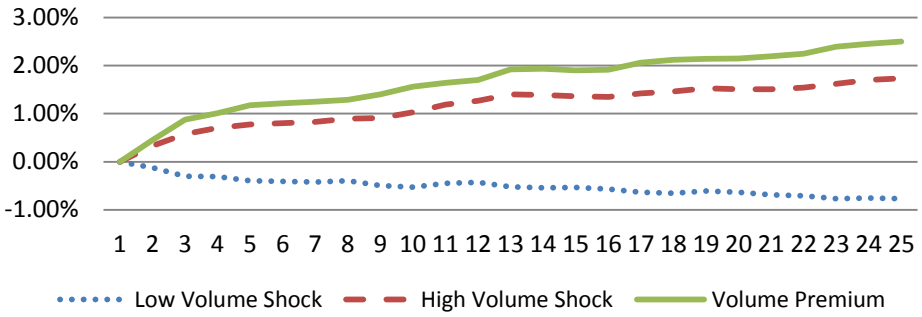


Figure 2B: Median Cumulative Return over Test Periods- Emerging Countries

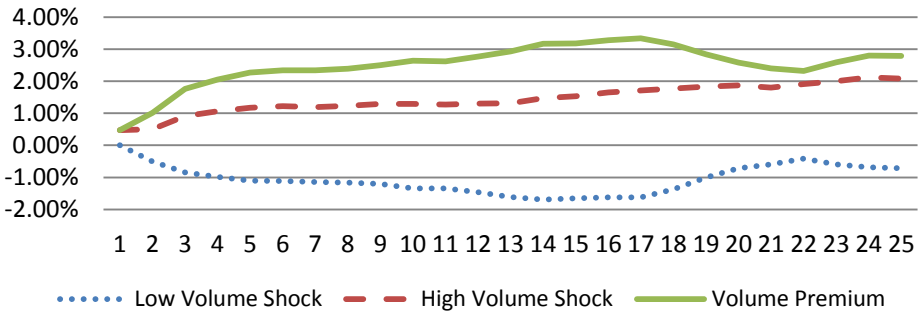
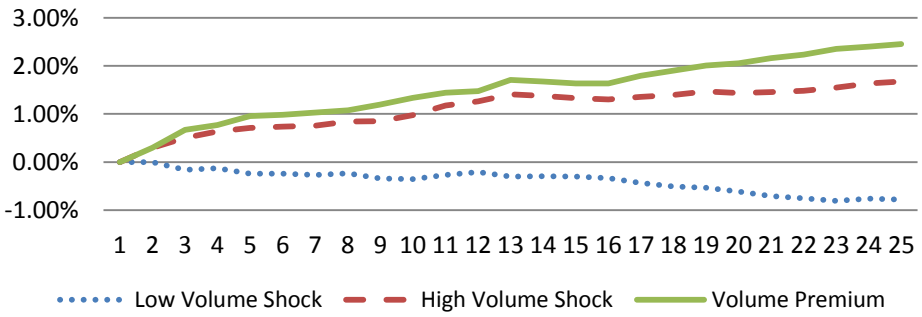


Figure 2C: Median Cumulative Return over Test Periods- Developed Countries



Bibliography

Essay 2

Blume, Lawrence, David Easley, and Maureen O'Hara, 1994, Market statistics and technical analysis: The role of volume, The Journal of Finance 49, 153-181.

Bushman, R. M., J. D. Piotroski, and A. J. Smith, 2004, What determines corporate transparency?, Journal of Accounting Research 42, 207-252.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2008, The law and economics of self-dealing, Journal of Financial Economics 88, 430-465.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, Journal of Financial Economics 33, 3-56.

Fama, Eugene F., and James D. MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, Journal of Political Economy 81, 607-636.

Gervais, Simon, Kaniel Ron, and Dan H. Mingelgrin, 2001, The high-volume return premium, The Journal of Finance 56, 877-919.

Lo, Andrew W., and Jiang Wang, 2006, Trading volume: Implications of an intertemporal capital asset pricing model, The Journal of Finance 61, 2805-2840.

Merton, Robert C., 1987, A simple model of capital market equilibrium with incomplete information, The Journal of Finance 42, 483-510.

Meulbroek, Lisa K., 1992, An empirical analysis of illegal insider trading, The Journal of Finance 47, 1661-1699.

Newey, Whitney K., and Kenneth D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, Econometrica 55, 703-708.

Osborne, M. F. M., 1959, Brownian motion in the stock market, Operations Research 7, 145-173.

Porta, Rafael La, Florencio Lopezde Silanes, Andrei Shleifer, and Robert W Vishny, 1998, Law and finance, Journal of Political Economy 106, 1113-1155.

ESSAY 3

Disclosure and the Information Role of Abnormal Trading Volume: Evidence from U.S. Cross-listings

1. Introduction

1.1 Motivation

The adverse impact of information asymmetry has been studied extensively since the seminal paper of Akerlof (1970). Much of the research has been devoted to examining the relationship between information asymmetry and the *proper* functioning of the financial market. The empirical evidence has found that information asymmetry between investors and firms leads to an increased cost of capital (Diamond and Verrecchia, 1991), increased bid/ask spreads (Garleanu and Pedersen, 2004), increased cost on analyst coverage (Brennan and Subrahmanyam, 1995), IPO underpricing (Ellul and Pagano, 2006), and a discount in asset prices (Chan, Menkveld, and Yang 2008),among others. A possible solution to mitigate the information asymmetry problem is to have managers disclose the full extent of any private information. Such disclosure can be mandatory (Fishman and Hagerty, 1995), voluntary (Boot and Thakor, 2001), or even strategic (Goto, Watanabe, and Xu, 2009).

Researchers have explored several methods to test the economic consequences of increased disclosure. Harvey and Huang (1991) examined the impact of private information disclosure by looking at the pattern of intraday volatility of the U.S. dollar-Euro exchange rate and the U.S. dollar -Japanese yen exchange-rate. They found that USD volatilities peak during U.S. trading hours, implying the potential importance of U.S. macroeconomic announcements. Leuz and Verrecchia (2000) found lower bid/ask spreads and increased share turnover for a sample of German firms that switched to an international reporting regime (the IAS or U.S.

GAAP) and found lower. Cready and Hurtt (2002) proposed a return/trading activity-based metrics that is able to increase the power of tests designed to detect investor response around an earnings announcements.

However, given that the information environment in the U.S. market is already rich in disclosure relative to other countries, it is difficult to access the economic consequences of increased disclosure in a U.S setting.

As a consequence more recent studies examine the cross-country variations in the level of disclosure and their economic effects. For example, Bailey, Andrew, and Salva (2006) examined the absolute return and the volume reactions to earnings announcements for non-U.S. firms that cross-list in the U.S. For a sample of 427 cross-listings they found that market reactions typically increased after a cross-listing, especially for firms from developed markets and for firms seeking OTC/144A ADR listings. Goto, Watanabe, and Xu (2009) proposed a theoretical model arguing that stock returns should exhibit a stronger reversal when greater disclosure is enforced after cross-listing. Their empirical evidence, using a panel of foreign firms that list their shares as ADRs, is consistent with the theoretical evidence in that there is a significant reduction of return reversal after firms cross-list. This appears to be especially true for firms experiencing dramatic changes in disclosure environments such as those firms that cross-list as Level II or Level III ADRs or for firms from emerging markets and code-law countries.

The methodology suggested in the prior literature provides considerable insight as to how to measure the economic consequences of increased disclosure. However, most of aforementioned studies examine the return and trading activities separately. To overcome this hurdle, Kim and Verrecchia (2001) suggest an alternative approach that involves studying stock return and trading activity jointly.

1.2 Theory and Testable Hypothesis

Kim and Verrecchia (2001) introduced a theoretical model in which market makers infer the better informed investor's perception of firm value from abnormal trading volume when a firm defers disclosure. Using the Taylor expansion, the authors expressed the log of the absolute value of returns as a function of volume innovation (i.e. the deviation of abnormal volume from the long-run mean):

$$E_{N_t^*}\left[\log\left|\frac{\Delta P_t(N_t^*)}{\mu_{t-1}}\right| V_t, N\right] = R(V_t) = R(V_0) + R'(V_0)(V_t - V_0) + o(V_t - V_0) \quad (1)$$

where N_t^* is the number of order; V_t is the trading volume at time t; μ_{t-1} is the realized firm value at time t-1; V_0 is the certain proxy for the long-run average of trading volume; and $o(V_t - V_0)$ stands for the higher moment function of volume innovation.

Kim and Verrecchia (2001) showed that the dependence of price change on abnormal volume change should decrease as the degree of information asymmetry increases or the range of disclosure regime increases. Specifically they showed that $\partial R'(V_0)/\partial\Omega < 0$ where Ω represents the degree of information asymmetry; and $\partial R'(V_0)/\partial\delta < 0$ where δ represents the range of the disclosure regime. The intuition is that as the information asymmetry increases, the adverse selection problem for the informed trader worsens. As a result, the market makers demand a higher discount in the price when they buy stock from informed investors in order to cover the risk of trading against private information. Since such a discount reduces the expected profit of trading from private information, the informed trader will, all else equal, be less likely to carry out informed trading. Thus, when there is abnormal trading volume in a market with high information asymmetry and the informed trader face a high adverse selection cost, a market maker will assign a lower probability of informed trading to any abnormal trading volume. As a result, the expected adverse selection cost in the bid/ask spreads quoted by market makers will be

lower. Furthermore, the range of price fluctuation should be smaller in this setting. In other words, the dependence of a price change on abnormal trading volume will be lower.

On the other hand, in an information environment with a low degree of asymmetry, an informed trader will be more likely to trade since adverse selection cost is low. Hence, a market maker who is at an information disadvantage will be more likely to adjust his quote given abnormal trading volume, and he will rely more on abnormal trading volume as his information source. Hence, $\partial R'(V_0)/\partial\Omega < 0$ indicates that the market maker's reliance on abnormal trading volume innovation as an information source is negatively correlated with the degree of information asymmetry.

When a firm commits to a broader disclosure regime, the deferral of disclosure will indicate a more extreme outcome. In turn, this outcome will exacerbate adverse selection and render informed trading less likely. Thus, when a firm commits to a more stringent and transparent information regime, the reliance on trading volume is lower. In other words, the reliance of absolute price change on abnormal trading volume $R'(V_0)$ decreases as the firm experiences a significant enhancement in its disclosure environment. Although this argument is conditional on the deferral of information release, Kim and Verrecchia (2001) show that a firm's commitment to a broader disclosure regime unconditionally decreases its reliance on abnormal trading volume given that $R'(V_0) > 0$ before commitment (Corollary 3). One explanation is that the commitment to a more stringent disclosure regime provides the market maker with more valid information channels from which he/she can infer a firm's true value. As a result, whether or not a firm chooses to defer a disclosure, market makers rely less on trading volume as a source of information. Hence the information role of abnormal trading volume is "crowded out" by other sources.

Cross-listing by foreign firms in the U.S. provides an ideal setting to test empirically the economic consequences of increased disclosure within the Kim and Verrecchia (2001) framework. First, there are high cross-country variations in the level of firm disclosure. Emerging market firms have much lower disclosure levels than firms from developed markets. For example, the average index of disclosure in periodic filings (Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2008) for a sample of emerging markets is only 0.554, when compared to 0.812 for a sample of developed markets. Theoretically, firms from emerging markets should experience the largest benefit in the disclosure environment by cross-listing in the United States. Second, a foreign firm can choose its level of cross-listing in U.S., which in itself implies a different disclosure requirement. For example, firms that cross-list on major U.S. exchanges (the NYSE, NASDAQ, and AMEX) must fully reconcile with U.S. GAAP. To that end, such firms need to file Form 20-F and Form F-6 with the SEC. However, for firms that cross-list on the over the counter market (OTC) or under Rule 144A (private placements market), additional disclosure requirements are fairly minimal. Specifically, firms that cross-list on the OTC market are exempt from filing Form 20-F under Rule 12g3-2(b) and (according to Rule 144A) firms that cross-list are exempt from filing Form 20-F.

This unique feature accordingly, allows one to propose two key hypotheses in this study. The first hypothesis examines the relationship between home market information asymmetry and private information content in the event of abnormal trading volume. According to Kim and Verrecchia (2001), the market maker will rely less on the volume innovation for firms located in a country with high information asymmetry, and vice versa. Therefore, the first hypothesis states:

Ho: In a country characterized by high information asymmetry, abnormal trading volume will provide a lower informational content.

As a follower, the second hypothesis examines the impact of cross-listing on the information role of abnormal trading volume. Since foreign firms cross-listed as Level II and III ADRs are subject to stringent disclosure requirements, and the disparity between emerging market firms' local GAAP and U.S. GAAP is particularly large, I predict that market makers for firms from emerging markets that cross-list as Level II and Level III ADRs rely less on abnormal trading volume as a source of information. While for firms that cross-list as OTC/144A ADRs, since they are not required to commit to stricter U.S. disclosure environment, I predict little change in the reliance on abnormal trading volume as a source of information for market makers. Put simply, the second hypothesis states:

Ho: For firms that cross-list as Level II or Level III ADRs, the information role of trading volume should decrease, especially for firms from emerging markets. While for firms that cross-list as OTC/144A ADRs, the information role of abnormal trading volume will be unaffected.

1.3 Literature Review

To get a more detailed understanding on the economic consequence of the information environment on trading, I next present a review on the relevant literature. The literature on the price-volume relationship can be traced back to Osborne (1959). In his model, the stock price changes according to a diffusion process that has variance dependent on the quantity of transactions, which implies a positive relationship between trading volume and absolute price changes. Since the seminal work of Osborn, abundant empirical research has documented a positive correlation between absolute price changes and trading volume for both equity and future markets across various time intervals even though the correlation is often weak especially so when using transactions data (Karpoff, 1987).

The information implication of the trading volume has been studied extensively since Beaver (1968). In his study, Beaver suggested that volume is a useful tool in determining how much disagreement exists with the arrival of new information. Blume, Easley, and O'Hara (1994) followed up by developing models in which traders use a prior periods' trading volume to draw inferences on the quality of the informed traders' signals, which are important in estimating payoffs to security holders. In other models on the role of trading volume such as Campbell, Grossman, and Wang (1993) and Wang (1994), trading volume is shown to help in learning about the expected returns on a risky asset. Harris and Raviv (1993) build a model based on differences in opinions that can explain the positive volume-absolute price change correlation and the positive autocorrelation in volume.

The next wave of studies chose to indirectly measure the change in the information environment following cross-listing. Coffee (1999) suggested that enhanced protection provided by the U.S. securities laws can attract more U.S market intermediaries, which fosters a richer information environment. Baker, Nofsinger, and Weaver (2002) found that cross-listing increased analyst following and media coverage. Lang, Lins, and Miller (2003) found that firms that cross-listed their stocks receive greater analyst coverage, and, in turn, improved earnings forecast accuracy. Lang, Raedy, and Yetman (2003) show that cross-listed firms have better financial accounting reporting quality than non-cross-listed firms. Leuz, Lins, and Warnock (2009) provide evidence on large block transactions and increased U.S. and institutional ownership around the time of cross-listing. The authors conjecture that these institutional investors help gather information and disseminate it such that the cross-listed firm’s information environment improves significantly.

1.4 Main Result

Using a panel of 837 ADRs from 25 emerging market countries and 26 developed market countries that cross-list in the U.S as either Level II/III ADRs or OTC/144A ADRs, I found strong evidence that supports the two proposed hypotheses. First, before firms cross-list as Level II or Level III ADRs, abnormal trading volume for firms from developed markets provides more information than for firms from emerging markets. The reason is that informed traders in developed markets face lower adverse selection costs when they decide to submit their orders. This in turn increases the likelihood of informed trading when abnormal trading volume occurs. This finding is also consistent with prior work which shows that firms have high firm-specific stock return variation in developed markets and a low firm-specific return variation in emerging markets (Jin and Myers, 2006).

Second, after foreign firms cross-list as Level II/III ADRs, the information role of trading volume weakens significantly for firms from emerging markets but strengthens for firms from developed markets. Given that the level of disclosure is almost two times higher for emerging market firms that cross-list as Level II/III ADRs,[4] incremental disclosure becomes an important substitute for trading volume as a source of information.

Third, to examine further whether the home country disclosure level has any impact on the information role of trading volume after cross-listing, I added three home country disclosure indices to the regressions. The indices are: (a) disclosure in periodic filings (Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2008); (b) a financial disclosure intensity variable based on accounting reports (Bushman, Piotroski, and Smith, 2004); and (c) the extent of disclosure index

[4] The average index of disclosure in periodic filing for the emerging market sample is 0.554. Note that this index is set to 1 for the United States (Djankov, La Porta, Lopez-de-Silanes and Shleifer, 2008).

from the World Bank's Doing Business Database.[5] I found that the impact of cross-listing as a Level II/III ADRs on the information role of abnormal trading volume is positively related to the disclosure environment in the home country. In other words, the poorer the home country disclosure environment, the less useful abnormal trading volume is after cross-listing.

Fourth, foreign firms that cross-list as OTC/144A ADRs do not see significant changes in the information role of trading volume. This finding is consistent with the fact that their incremental disclosure requirement is minimal. These result hold even after controlling for changes in market liquidity, analyst coverage, ownership structure, and endogeneity, if any, in the cross-listing decision.

In the next section, I describe the methodology and data used in this essay. In Section 3, I present the empirical results and alternative explanations on the Level II/III ADRs sample. Section 4 contains the corresponding results for the OTC/144A sample. In Section 5, I address the endogeneity concern. Section 6 concludes.

2. Methodology and Data

2.1 Methodology

To test the economic consequences of increased disclosure from cross-listing, I drew on the theory in Kim and Verrecchia (2001) and then constructed a baseline regression as follows:

$$log|R_{i,t}| = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot V_{i,t} \cdot ADR + e_{i,t} \quad (2)$$

where $R_{i,t}$ is the home market stock i's return on date t; ADR is a cross-listing dummy that equals 1 if the trading day occurs after the cross-listing and 0 otherwise; and $V_{i,t}$ is the home market stock's volume innovation (i.e. the detrended daily turnover). Stock turnover is defined as the daily trading volume divided by the number of shares outstanding. The total number of

[5] http://rru.worldbank.org/doingbusiness

shares outstanding is computed by dividing a firm's daily market capitalization by its daily stock price. The detrending process is modeled as follows:

$$V_t = \log(turnover_t) - \frac{1}{N}\sum_{i=-1}^{-100}\log(turnover_{t+i}) \quad (3)$$

where

$$\log(turnover_t) = \log(turnover_t + 0.00000255) \quad (4)$$

I added a constant to avoid problems associated with zero volumes (Llorente, Michaely, Saar and Wang, 2002).

β_1 measures the dependency of absolute log-returns on abnormal trading volume from which the market makers infer the degree of informed trading. Kim and Verrecchia's (2001) model predicts that, as β_1 decreases monotonically with the degree of information asymmetry in the local stock market, it is more positive in a low information asymmetric market. This is because, when an informed trader is faced with a lower adverse selection cost, abnormal trading volume is a more useful information source for the market maker. On the other hand, when the market is dominated by high information asymmetry, an informed trader will refrain from trading because of the associated trading cost. Hence, the effect of volume on log-returns is less positive and perhaps even negative. β_2 describes the impact of cross-listing (commitment to a more timely and transparent information environment) on the relative importance of trading volume in inferring the degree of informed trading. The coefficient β_2 is expected to be negative if the firm commits to a stringent disclosure policy given that β_1 is positive (Corollary 3; Kim and Verrecchia, 2001). In other words, log-returns become less dependent on trading volume as a source of information in determining firm value.

2.2 Data

The main sample includes all Level II and Level III ADRs traded on the AMEX, NASDAQ, or NYSE as of April 15, 2008. The sample combines the JP Morgan ADR universe (424 ADRs) and the Bank of New York ADR universe (647). I use the JP Morgan Global ADR Universe database to identify the underlying stocks through their underlying ISIN and SEDOL number. This procedure identifies 587 ADRs. When there were multiple ADRs from the same underlying firm simultaneously traded on the major U.S. exchanges, the earliest cross-listing date is treated as the date of cross-listing. When more than two ADRs were cross-listed on the same day, they were treated as one unique observation. When more than two ADRs are cross-listed on the same day, they are treated as a single observation. The stock price and trading volume data of underlying stocks are retrieved from DataStream.

When the underlying home country firms have multiple stocks listed on their domestic stock exchanges, I defined the primary home market stock as the one that was listed the earliest. I compiled the adjusted daily price data, the daily trading volume, and the daily market value of the underlying stock from DataStream. Since the return-volume dynamics crucially relies on the accuracy in measuring the turnover and returns series, I carefully screened the data following Ince and Porter (2006). Specifically, I set missing values to any return observation exceeding 200% that was reversed within one day. Furthermore, if R_t or R_{t-1} is greater than 200% and $[(1 + R_t)(1 + R_{t-1}) - 1 < 50\%]$, I set both R_t and R_{t-1} to a missing value. I also discarded daily volume observations that exceeded the number of shares outstanding for a given stock.

The base date of the ADR price history in DataStream is used as the effective date of cross-listing. To make sure that the home market stock was actively traded around the cross-listing of its ADR, I required the home market stock to have at least one valid observation of

price and volume during the 5 trading days prior to the cross-listing date. In addition, the latest trading day is taken as the event day of cross-listing. Furthermore, to render sufficient statistical precision to the parameter estimates in Equation (2), I require that each firm has sufficient observations both before and after the cross-listing of its ADR (at least 252 non-missing daily observations both before and after the cross-listing). This filtering procedure reduces the sample size significantly to 253 ADR-underlying-stock pairs. Finally, I set the regression window to be a 4-year period from 504 trading days before cross-listing to 504 trading days after cross-listing. I applied the same data collection and filtering procedure to the OTC/144A sample firms. The final sample included OTC/144A 584 ADR-underlying-stock pairs.

Table 1 summarizes the number of firms in the sample by country and effective year. The sample is grouped by firms from developed and emerging markets following the IMF's definition. The final sample consists of 837 ADRs from 25 emerging market countries and 26 developed market countries that cross-listed on a major U.S stock exchange (Level II/III ADRs) or on the OTC/144A market between 1984 and 2007. Foreign firms from developed markets issued 174 Level II/III ADRs and 415 OTC/144A ADRs, and foreign firms from emerging markets issued 79 Level II/III ADRs and 169 OTC/144A ADRs. As shown in table 1, ADR listings were sparse in the 1980s. The number of ADR listings generally grew steadily until 2001 and has decreased since 2002, especially for the sample of emerging market companies following the enactment of the Sarbanes-Oxley Act.

Table 2 summarizes the main variables used in the empirical estimation of this essay. To test whether these variables are significantly different both before and after cross-listing, I computed two-sample Wilcoxon test statistics (W-tests). Foreign firms usually increase their shares outstanding after cross-listing regardless of the listing venue or the level of country

development. This is consistent with Reese and Weisbach (2002) who report that equity issues increase following all cross-listings, regardless of the level of home country shareholder protection. However, such an increase is more significant for firms that cross-list on a major U.S stock exchange. For firms that cross-list as Level II/III ADRs, the outstanding shares increase by 62.5% if they are from a developed market (the W-statistic is -33.14) and by 55.9% if they are from an emerging market (the W-statistic is -32.06). Consistent with prior literature (Domowitz, Glen, and Madhavan, 1998; Noronha, Sarin, and Saudagaran, 1996) daily trading volume also increases significantly for firms that cross-list on major U.S. exchanges. The increase is 32.6% and 27.2% for firms from developed markets and emerging markets, respectively. However, stock turnover decreases for firms that cross-list on major U.S stock exchanges due to a sharp increase in the number of shares outstanding. For foreign firms cross-listed as an OTC/144A ADR, stock turnover increases only slightly. Illiquidity, measured as the ratio of the absolute stock return to the dollar trading volume (Amihud, 2002), generally decreases except for firms from emerging markets that cross-list as Level II/III ADRs. For these firms, the illiquidity measure remains unchanged with a Wilcoxon test statistic of -0.08. To test the effect of analyst activity, I collected the number of analysts covering the home market stock each year from the I/B/E/S summary database. For a firm that cross-lists on a major U.S. stock exchange, the median number of analysts covering the stock increases from 15 to 17 for a firm from a developed market and it increases from 8 to 12 if the firm is domiciled in an emerging market. For a firm that cross-lists as an OTC/144A ADR, the number of analyst increases from 12 to 14 if it is from a developed market and from 7 to 9 if it is from an emerging market. The magnitude of the increase is on average consistent with Lang, Lins, and Miller (2003) who reported that firms from emerging code law countries with an ADR have four more analysts than firms that do

not have an ADR, whereas firms from developed markets or common law countries have only one more analysts, on average.

Cross-listing has also been shown to change the ownership structure of the foreign firm. From the Worldscope database, I collected data on the closely held ownership of cross-listed firms. The ownership represented the proportion of equity owned by corporate officers, directors, and immediate family members, by individual shareholders representing more than 5% of the equity, by other corporations (except shares held in a fiduciary capacity by financial institutions), and by pension/benefit plans and trusts. For developed market firms that cross-listed as Level II/III ADRs, closely held ownership decreases from 47.3% to 44.19% (but is insignificant with a W-test statistic of 0.52). However, if the firm comes from an emerging market, the average percentage of closely held ownership increases significantly from 43.90% to 57.52% (the W-statistic is -2.07). For foreign firms that cross-list on the OTC/144A market, the percentage of closely held ownership increases for firms from developed markets and for those from emerging markets. However, the increase is only marginally significant for firms from developed markets and it is not significant for firms from emerging markets (at the 0.01 level).

3. Level 2 and 3 ADRs

3.1 Preliminary Result

Table 3 presents the preliminary results of the fixed effect panel regressions of the baseline model for an unrestricted sample of foreign firms that cross-list as Level II/III ADRs. We take this subsample since they experience the most dramatic changes in the disclosure environment. The estimation window is from 2 years before to 2 years after the effective cross-listing date. For the full sample, β_1 (the dependency of absolute log-returns on abnormal trading volume) is significantly positive. This indicates that the market maker relies on volume

innovation as an important source of information before cross-listing. The sign of β_2 (the impact of cross-listing on the information role of abnormal trading volume) is negative but not significant. Considering the wide cross-sectional variation on home country disclosure environments, it is possible that some cross-listings have the opposite impact on the information role of trading volume, which may lead to the statistical insignificance of β_2 for the full sample.

I further divided the full sample into developed market firms and emerging market firms according to the IMF's definition. The subsample results provide strong support for Hypotheses 1 and 2. More specifically, according to Hypothesis 1, the trading volume of firms from countries characterized by high information asymmetry provide lower information content since the high adverse selection cost associated with informed trading reduces the likelihood that informed trading will occur. In other words, β_1 will be higher for developed market firms. According to Table 3, β_1 for developed market firms is 0.2143, which is 36.6% higher than that of its counterpart in emerging market firms (0.1568). β_1 is statistically significant at the 1% confidence level for both developed and emerging markets. This implies that abnormal trading volume in developed markets embodies more private information. According to Hypothesis 2, β_2 should decrease if increased information release crowds out abnormal trading volume's function of being an information source (i.e., the quantity effect). As might be expected, cross-listing could also increase the dependence on abnormal trading volume as an information source. Notice that the decrease of information asymmetry could lead to a higher probability of informed trading during periods of abnormal trading volume because of lower adverse selection cost (i.e., the quality effect). If the quality effect outweighs the quantity effect, β_2 could indeed be positive. As shown in Table 3, β_2 is -0.0387 and significant at the 0.01 confidence level for firms in emerging markets. This suggests that the quantity effect appears to denominate. In other words,

commitment to a much timelier and broader disclosure regime provides a new and valid information channel for market makers, which, in turn, decreases his reliance on abnormal trading volume as an information source.

For firms from developed markets, the story is different. The β_2 coefficient is 0.0457 and it is significant at the 1% confidence level. This finding suggests that the effect of increased disclosure on the information role of abnormal trading volume is transmitted mainly through a decrease in information asymmetry of an existing information channel. It seems that the quantity effect may be only marginal and it is dominated by the quality effect.

The results from Table 3 suggest that the home market information environment may also play an important role in determining the effect of cross-listing on abnormal volume's information content. To verify this, I control for the country level disclosure measure in the baseline regression. I include the following variables in rotation: (a) the index of disclosure in periodic filing (DLLS_DISL) from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008), (b) the financial disclosure intensity variable (BPS_DISL) from Bushman, Piotroski, and Smith (2004) based on accounting reports, and (c) the extent of the disclosure index from the World Bank's Doing Business Database (WB_DISL). The estimated expanded regression becomes

$$\ln\left|(R_{i,t})\right| = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot V_{i,t} \cdot ADR + \beta_2 \cdot V_{i,t} \cdot ADR \cdot DISL + e_{i,t} \quad (5)$$

Each disclosure index measures a different aspect of the firm's disclosure environment. For example, DLLS_DISL concerns the disclosure regarding related party transactions. BPS_DISL is based on information which is highly proprietary in nature and useful to outside investors for valuing firms' securities. This variable is measured on the basis of the prevalence of disclosures concerning research and development (R&D) expenses, capital expenditures, product and geographic segment data, subsidiary information, and accounting treatments. Finally,

WB_DISL covers approval procedures, requirements for immediate disclosure to the public and shareholders of proposed transactions, requirements for disclosure in periodic filings and reports and the availability of external reviews on transactions before they take place.

According to Table 4, after controlling for the country level disclosure index, cross-listing decreases the reliance on abnormal trading volume as the source of information in all three regressions in columns 1 through 3. The marginal effect of the home country disclosure environment on the cross-listing's impact on the information content of trading volume is significantly positive at the 0.01 confidence level. In other words, for a firm that comes from a country with a reasonably good disclosure environment, cross-listing in the United States improves the information environment by decreasing information asymmetry of existing information channels. However, for firms from a poor disclosure environment, the improvement comes mainly from the expansion of the information source. According to the estimated coefficients from Table 4, firms are likely to have a better information environment in terms of quality instead of quantity if they are from a country with a DLLS_DISL higher than 0.8 (such as Australia), from a country with a BPS_DISL higher than 8.92 (such as Belgium), or from a country with a WB_DISL higher than 8.72 (such as France). To the best of my knowledge, very little research in finance has tried to disentangle the effect of the improvement of information quality and the effect of the expansion of information channels when examining the impact of cross-listing on foreign firm's information environment. One exception is Lang, Lins, and Miller (2003). This study find that the increase in the number of analysts for firms from emerging markets is significantly higher than it is for firms from developed civil law countries. However, the difference in the improvement of forecasting accuracy is not statistically significant at 0.01 level.

3.2 Alternative Hypothesis

3.2.1 Illiquidity issue

As shown in Table 2, liquidity generally improves after foreign firms cross-list in the United States. This finding is consistent with prior literature (Diamond and Verrecchia, 1991; Leuz and Verrecchia, 2000). Such changes in the microstructure may complicate our inference regarding the relationship of the log absolute return and abnormal trading volume. For example, improving liquidity could decrease the price impact of abnormal trading volume, which may in turn reduce the correlation between absolute return and abnormal trading volume. In an attempt to control for the illiquidity effect, I directly control for stock illiquidity, measured as the ratio of absolute stock return to its dollar volume following Amihud (2002):

$$ILLIQ_{it} = \frac{|R_{it}|}{VOLD_{it}} \tag{6}$$

where R_{it} is the return on stock i in time t and $VOLD_{it}$ is the volume in dollars. This illiquidity ratio gives the response of price to the associated order flow or trading volume. As suggested by Avramov, Chordia, and Goyal (2006), the information in Amihud's illiquidity measure is not subsumed by the information in turnover. Amihud's illiquidity measure and turnover measure different behaviors and are only mildly correlated.[6]

Specification 1 in Table 5 reports this regression result, which remains similar to the preliminary result reported in Table 3. After controlling for illiquidity, the reliance on abnormal trading volume increases for firms from developed markets and is significant at the 0.05 confidence level. For firms from emerging markets, the coefficient is -0.041 and is significant at the 0.01 confidence level. For the full sample, the coefficient is -0.021 and is significant at the 0.01 confidence level. This finding suggests that, after controlling for the change in market

[6] The cross-sectional correlation between turnover and Amihud illiquidity measure is only −0.08.

liquidity, cross-listing decreases the market marker's reliance on abnormal trading volume as an information source. The illiquidity measure is significantly positively correlated with absolute return, indicating that less liquid stocks tend to have higher daily volatility. In sum, the results suggest that enhanced disclosure can affect the reliance of absolute return on abnormal trading volume beyond the liquidity effect.

3.2.2 Additional Information Sources

Firms that are cross-listed in the U.S. usually are significantly larger than their domestic counterparts. They tend to have higher growth rates before cross-listing although the growth rate reverts to normal two years after cross-listing. Cross-listed firms are also R&D intensive (Pagano, Roell, and Zechner, 2002). If analysts do follow better firms (Baker, Nofsinger, and Weaver, 2002; Rajan and Servaes, 1997) and can foster the production of industry and market wide information (Fernandes and Ferreira, 2008; Piotroski and Roulstone, 2004), then the change, if any, in the information environment may not be due to cross-listing *per se*, but to analysts' information production. It is also possible that more stringent disclosure environment after cross-listing reduces the information acquisition cost and induces more analyst coverage. The direction of causality is open to empirical testing.

To separate the effect of analyst coverage, I added an interaction term between volume innovation and the number of analysts each year in the regression analysis. This regression result is reported in Specification 2 of Table 5. The marginal impact of analyst coverage on the slope coefficient in a regression of log absolute-returns on abnormal trading volume is significantly positive for the full sample and for the subsample of developed market firms(significant at the 0.01 level). This indicates that greater analyst coverage decreases the degree of information asymmetry and adverse selection cost (Brennan and Subrahmanyam, 1995). The coefficient on

the interaction term between volume innovation and the ADR dummy (β_2) is significantly negative for the full sample at the 0.01 confidence level but this is not true for developed market firms. This suggests that, after controlling for the change in market liquidity and the change in the analyst activity, cross-listing as Level II/III ADRs generally provides an additional valid information channel, which, in turn, reduces the market maker's reliance on abnormal trading volume as an information source. However, this is not statistically significant for firms from developed markets where the information environment is already rich. For firms from emerging markets, the coefficient on the interaction term between volume innovation and the number of analysts is positive but not significant. This suggests that analysts in emerging markets do not appear to reduce information asymmetry. However, the coefficient on the interaction term between volume innovation and the ADR dummy is still negative and significant at the 0.1 level, suggesting that cross-listing seem to expand the information channels of these firms.

Although the number of analysts increases for firms from both developed markets as well as emerging markets, its implication on the information environment may be different. First, the increase in analyst coverage is much more significant for firms from emerging markets. For firms from developed markets, the median number of analysts increases by 2 or 13.3% in relative magnitude while, for firms from emerging markets, the median number of analysts increases by 4 or 50% in relative magnitude. Second, in developed markets where the information environment is already rich, the influence of greater analyst coverage on the information environment appear to be marginal. However, such an increase may be crucial for a firm from an emerging market. To test this hypothesis, I include an additional interaction term between volume innovation, the number of analysts, and the ADR dummy to capture the differential impact of analyst coverage on a firm's information environment. The result is reported in

Specification 3 of Table 5. For the full sample, increased analyst coverage from cross-listing reduces the market maker's reliance on trading volume as suggested by the significantly negative coefficient on the interaction term between volume innovation, the number of analysts, and the ADR dummy. After controlling for the effect of greater analyst coverage, cross-listing is not significant in explaining the dynamics between the log absolute return and abnormal trading volume. For firms from developed markets, both greater analyst coverage and the firm's cross-listing behavior does not affect the reliance of log absolute return on abnormal trading volume. However, greater analyst coverage for firms from emerging markets significantly weakens the information role of abnormal trading volume. The coefficient on the interaction term involving volume innovation, the number of analysts, and the ADR dummy is -0.0043 and significant at the 0.05 confidence level. The impact of cross-listing itself is not significant after I control for the effect of analyst behavior. This suggests that increased analyst coverage may have caused the attenuation of the reliance on abnormal trading volume as an information source.

3.2.3 Changes in Ownership Structure

It's well known that ownership structure of the foreign firm also interacts with the foreign firm's cross-listing behavior. Doidge, Karolyi, Lins, Miller, and Stulz (2009) found that foreign firms with fewer controlling shareholder stock holdings are more likely to cross-list, especially for firms from emerging markets. Cross-listing can also produce important changes in a firm's ownership structure. Bradshaw, Bushee, and Miller (2004) found that U.S. institutional holdings increase around cross-listings, especially when foreign firms are required to conform to U.S. GAAP. Ferreira and Matos (2008) and Leuz, Lins, and Warnock (2009) showed that institutions tend to overweight firms that are cross-listed in the U.S. To the extent that institutional investors have access to information that is too costly for others to acquire (Lev, 1988) and possess more

resources for information processing (Shiller and Pound, 1989), the increased participation of institutional investors should enhance the information environment for cross-listed firms.

Abundant empirical research supports this informational role of institutional investors. For example, Jiambalvo, Rajgopal, and Venkatachalam (2002) documented that more institutional holdings leads to more timely stock prices; Piotroski and Roulstone (2004) showed that institutional trading accelerates the incorporation of the firm-specific component of future earnings news into the stock price; and Fernandes and Ferreira (2008) found that foreign firms with a higher percentage of closely held shares have a higher firm-specific return variation. A change in the institutional holding of cross-listed firms also seems to change the investor base of the company. With different investment horizons and liquidity constraints, more institutional holdings may create a more liquid trading environment.

To control for the impact of change in the ownership structure, I added an additional ownership variable CHO (closely-held-ownership) into the regression set-up. Closely-held-ownership is the percentage of closely held shares that represents the proportion of equity owned by corporate officers, directors, and immediate family members; by individual shareholder holdings representing more than 5%; by other corporations (except shares held in a fiduciary capacity by financial institutions); and by pension/benefit plans and trusts. This variable is drawn from the Worldscope database.

The impact of this additional ownership variable is reported in Specification 4 of Table 5. For the full sample, closely held ownership from cross-listing increases the market maker's reliance on trading volume as suggested by the significantly positive coefficient on the interaction term among volume innovation, the percentage of closely held ownership, and the ADR dummy (significant at the 0.01 level). After controlling for the effect of closely held

ownership, cross-listing on the major U.S. exchanges significantly reduces the reliance on abnormal trading volume. For firms from developed markets, controlling for the ownership structure does not alter the previous result that the firm's cross-listing behavior does not affect the reliance of log absolute return on abnormal trading volume. For firms from emerging markets, the coefficient on the interaction term among volume innovation, the percentage of closely held ownership, and the ADR dummy is -0.0035 and significant at the 0.01 confidence level. The impact of cross-listing remains significantly negative after controlling for the effect of ownership structure.

4. OTC/144A Sample

So far, the empirical testing has focused on cross-listing on major U.S. stock exchanges that require firms to follow U.S. GAAP and, hence a stricter disclosure requirements. The sample also includes 584 foreign firms that listed in the U.S on the over-the-counter (OTC) market by means of the OTC Bulletin Board or Pink sheets or that are privately placed according to Rule 144A. These two types of listings offer limited stock liquidity and require only minimal SEC disclosure and no GAAP reconciliation. According to the theoretical arguments presented in Kim and Verrecchia (2001), there should not be see any significant revision in the information role of abnormal trading volume after cross-listing. To test this hypothesis, the entire analysis is conducted on the OTC/144A sample. The results are reported in Table 6.

Specification 1 reports the baseline regression result for the OTC/144A ADRs. Consistent with Hypothesis 3, the interaction term between volume innovation and the ADR dummy does not yield a significant coefficient (β_2). This indicates that the minimal requirement of disclosure on the OTC listing and private placement market does not bring any new information that is significant enough to replace the information role of abnormal trading volume. Specification 2

controls for market liquidity and the result is qualitatively the same. The coefficient on the illiquidity measure is 0.0005 and it is significant at the 0.01 confidence level, suggesting that less liquid stocks tend to have higher daily price volatility. Specifications 3 and 4 control for the effect of analyst coverage before cross-listing and the marginal impact of analyst coverage after cross-listing, respectively. The analyst coverage before cross-listing strengthens the information role of abnormal trading volume. However, any added analyst coverage from cross-listing does not significantly change the dynamics between the volume innovation and log absolute return. Specification 5 further controls for the effect of ownership structure. Increased closely held ownership significantly increases the reliance on abnormal trading volume, which is consistent with the empirical evidence on the information gathering ability of institutional investors. The coefficient on the interaction term between volume innovation and the ADR dummy (β_2) is not significant in all five specifications.

In sum, consistent with the fact that the foreign firms cross-listing as OTC/144A ADRs are not subject to stringent disclosure requirements of the U.S capital market, their cross-listing does not significantly change the information role of abnormal trading volume.

5. Endogeneity in the Cross-listing Decision

Selection bias of the cross-listing sample remains a concern in this essay. It is possible that certain unobserved latent variables that are unique to the cross-listed firm determine the observed dynamics of the absolute log return and abnormal trading volume around cross-listing. To alleviate this endogeneity issue, the Heckman (1979) two-step estimation procedure is adopted. I first estimate the probit model of the foreign firms' cross-listing decision and then use the estimated cross-listing probabilities to measure λ, the inverse mills ratio that corrects for self-

selection. In the second stage, I re-estimate the main regression using the interaction term between λ and the volume innovation as a further control variable.

The probit model of the cross-listing probability follows the estimation methodology in Doidge, Karolyi, and Stulz (2004) and Fernandes and Ferreira (2008). The information for the stocks from the 51 sample countries in this study is collected from DataStream. All firms that had their stock cross-listed in the U.S. capital market whether they were listed on a major U.S. stock exchange, the OTC market, or were privately placed through the 144A channel are excluded. There were 31,042 foreign firms that never cross-listed in the U.S. For each firm, I download the annual leverage ratio (defined as the ratio of long-term debt to total assets); the firm size (defined as the logarithm of the market capitalization in U.S. dollars); and the logarithm of the book-to-market equity ratio. The country variables include the legal origin (common law dummy variable), accounting standards, judicial efficiency from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), and the log GDP per capita from the World Bank.

To that end, two probit models are estimated. Model 1 predicts the probability of the firm cross-listing in U.S., whether it is listed as a Level II/III ADR or as an OTC/144A ADR. Model 2 separately predicts the probability of the firm cross-listing on a major U.S. stock exchange and the probability of it cross-listing on the OTC/144A market. The inverse mills ratio from each model: $\lambda_{U.S.}$, $\lambda_{EX.}$, $\lambda_{OTC.}$ is then computed.[7] The inverse mills ratio was then interacted with volume innovation and added to the main regression as a further control variable. The regression result is reported in Table 7.

Panel A of Table 7 uses the inverse mills ratio $\lambda_{U.S}$ that corrects for self-selection into the U.S. market as a control variable. The main result remains qualitatively similar to the baseline

[7] The probit model regression result is not reported in the paper to save space. The result is available upon request.

regression. The coefficient on volume innovation (β_1) is higher in developed market firms than in emerging market firms. This finding suggests that abnormal trading volume in developed markets embodies more private information. Both β_1 in developed markets and emerging markets are significant at the 1% confidence level. The coefficient on the interaction term between volume innovationand the ADR dummy (β_2) is -0.0755 and it is significant at the 1% confidence level for firms from emerging markets. This finding suggests the importance of abnormal trading volume as an information source diminishes in emerging markets. For firms from developed markets, β_2 is positive and not significant. For the OTC/144A sample, β_2, again, is not significant.

Panel B uses the inverse mills ratio $\lambda_{EX.}$ that corrects for self-selection in a major U.S. stock exchange as a control variable for the Level II/III ADRs and it uses λ_{OTC} that corrects for self-selection in the OTC/144A market as a control variable for the OTC/144A ADRs. The results remain similar to those presented in Panel A.

In sum, the evidence seems to show that self-selection bias does not affect the observed dynamics of the absolute log return and abnormal trading volume around cross-listing.

6. Conclusions

This essay examines the economic consequences of increased disclosure by examining the information role of abnormal trading volume. The empirical testing is conducted by analyzing the home market log absolute return and turnover series for 253 foreign firms that cross-listed as Level II/III ADRs and 584 foreign firms that cross-listed as OTC/144A ADRs. The sample covers 26 developed market and 25 emerging market countries. The empirical testing is in line with the theoretical framework advanced by Kim and Verrecchia (2001). The authors introduced a model in which the market maker infers the better informed investor's

perception of firm value from the trading volume. They expressed the log of absolute value of returns as a function of volume innovation (i.e. the abnormal volume deviation from the long-run mean). Their model predicted that, when a firm commits to a timely and broader disclosure regime, the reliance on abnormal trading volume as an information source is reduced. Another prediction is that the information content in abnormal trading volume is positively related to the degree of information asymmetry. The cross-listing data assembled herein provides an ideal setting to empirically evaluate the theoretical predictions in two ways since (a) there is wide cross-country variation in terms of home market information asymmetry (the disclosure environment for firms from developed markets is much richer than that for firms from emerging markets); and (b) cross-listing on major U.S stock exchanges or on OTC/144A markets has significantly different implications on the information environment for cross-listed firms. Firms that cross-list on major U.S stock exchanges have to fully reconcile with U.S. GAAP and register with the SEC. However, for firms that cross-list on OTC/144A markets additional disclosure requirements are minimal.

This paper provides strong evidence supporting these theoretical predictions. First, abnormal trading volume of firms from developed markets provides more information before cross-listing on major U.S stock exchanges. Second, the information role of trading volume weakens significantly for firms from emerging markets but strengthens for firms from developed markets after cross-listing on major U.S. exchanges. Third, the weaker the home country disclosure environment, the less useful is trading volume after cross-listing. Fourth, foreign firms that cross-list as OTC/144A ADRs do not experience significant changes in the information role of trading volume. This finding is consistent with the fact that their incremental disclosure

requirement is minimal. This result holds even after controlling for change in market liquidity, analyst coverage, ownership structure, and endogeneity, if any, in the decision to cross-list.

The empirical findings in this essay suggest that the slope coefficient in a regression of the stock's log absolute return on abnormal trading volume can be a useful tool for measuring the economic consequences of shifts in disclosure regimes. However, the results should be interpreted with caution for two main reasons. First, the effects of increased disclosure on the information role of trading volume is hard to isolate from other factors that might drive a firm's cross-listing decision, such as the expansion of an institutional investor base. Second, other hidden and possibly unobservable information sources might drive the relationship. Although, this essay does attempt to downplay this concern by including the number of analysts as a possible proxy, it is difficult to completely rule out this argument.

Table 1: Number of Sample Firms by Country of Origin, and ADR Effective Year

This table presents the distribution of cross-listings by country and year. Panel A presents the sample from the developed markets while panel B shows the emerging market sample. The data is collected from DataStream. The Developed/Emerging market classification follows the IMF's definition.

Panel A:	Developed Markets																								OTC/ 144A	Level II/ III	All
Country	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07			
Australia	1	2	0	4	2	1	1	4	3	4	4	4	5	4	3	3	4	3	5	4	9	13	3	8	**70**	**24**	**94**
Austria	0	0	0	0	0	0	0	0	0	1	1	0	3	1	1	0	1	1	0	0	0	1	0	0	**10**	**0**	**10**
Belgium	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	**2**	**2**	**4**
Canada	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**1**	**1**
Denmark	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	0	2	**5**	**2**	**7**
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	**2**	**0**	**2**
France	0	0	0	0	0	0	0	1	0	3	2	2	3	2	0	0	4	11	3	2	3	0	1	2	**25**	**14**	**39**
Germany	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	7	2	3	0	1	2	1	2	**17**	**3**	**20**
Greece	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	1	1	0	1	0	0	0	0	0	**4**	**3**	**7**
HK	0	0	0	0	1	2	0	0	4	8	16	9	9	4	1	5	3	3	4	2	5	0	0	1	**70**	**7**	**77**
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	1	**4**	**0**	**4**
Israel	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	2	0	0	**3**	**4**	**7**
Italy	0	0	0	0	0	2	0	0	0	0	2	0	1	0	3	1	0	0	1	1	0	1	0	2	**9**	**5**	**14**
Japan	0	0	0	0	0	0	0	0	2	3	5	1	0	3	2	0	2	4	3	6	6	2	7	2	**41**	**7**	**48**
Korea	0	0	0	0	0	0	1	3	1	1	3	1	1	0	0	3	2	2	1	4	0	1	2	0	**17**	**10**	**26**
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	**0**	**3**	**3**
Netherlands	0	0	0	0	1	2	0	0	0	0	2	2	0	0	1	1	0	3	2	0	0	1	1	0	**9**	**7**	**16**
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	**0**	**2**	**2**
Norway	0	0	0	0	0	0	0	0	0	1	2	2	3	0	1	0	0	0	0	1	0	0	0	0	**4**	**6**	**10**
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	**2**	**0**	**2**
Singapore	0	0	0	0	0	3	0	1	1	1	0	3	0	2	0	0	1	1	0	0	1	0	0	0	**14**	**0**	**14**
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	**3**	**0**	**3**
Sweden	1	1	1	2	0	1	2	0	0	0	1	2	0	1	2	0	3	1	0	1	0	0	1	1	**11**	**10**	**21**
Switzerland	0	0	0	0	0	0	0	0	1	1	0	2	1	0	0	1	4	1	0	0	0	1	0	0	**7**	**5**	**12**
Taiwan	0	0	0	0	0	0	0	0	2	0	1	1	3	4	2	8	5	2	6	8	3	3	1	1	**39**	**11**	**50**
UK	0	0	0	1	1	1	4	2	3	3	6	7	4	6	10	5	9	9	3	5	5	3	1	7	**47**	**48**	**95**
Total	2	3	1	7	5	12	10	11	17	26	47	40	34	29	32	31	48	46	38	34	35	32	18	30	**415**	**174**	**589**

(Continued)

Panel B:	Emerging Markets																										
Country	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	OTC/ 144A	Level II/ III	All
Argentina	0	0	0	0	0	0	0	0	0	1	2	1	0	1	0	0	1	1	0	0	0	0	1	0			
Brazil	0	0	0	0	0	0	0	0	0	0	4	0	0	3	3	2	3	4	4	1	0	0	1	0	**13**	**12**	**25**
Chile	0	0	0	0	0	0	0	0	1	2	5	2	0	2	0	1	0	0	1	0	1	1	0	0	**0**	**16**	**16**
China	0	0	0	0	0	0	0	0	0	1	1	3	4	0	0	0	0	1	5	2	1	4	2	3	**21**	**6**	**27**
Colombia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	**2**	**0**	**2**
Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**0**	**1**	**1**
Ecuador	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**	**0**	**1**
Egypt	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	**2**	**1**	**3**
Hungary	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	**3**	**0**	**3**
India	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	3	8	5	0	1	2	8	9	2	**29**	**13**	**42**
Indonesia	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	**4**	**0**	**4**
Kenya	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**1**	**1**
Malaysia	0	0	0	0	0	2	0	0	1	3	0	0	0	0	1	1	0	0	1	0	0	2	0	0	**11**	**0**	**11**
Mexico	0	0	0	0	0	0	0	2	1	1	5	2	4	0	4	2	0	0	0	0	1	0	1	0	**11**	**12**	**23**
Pakistan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	**3**	**0**	**3**
New Guinea	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	**1**
Peru	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	**2**	**2**	**4**
Philippines	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	0	2	0	0	0	0	0	1	0	**4**	**3**	**7**
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	**3**	**0**	**3**
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	1	0	0	0	1	2	1	**10**	**1**	**11**
South Africa	0	0	0	0	0	0	0	0	0	0	5	3	2	3	0	1	0	5	3	2	1	0	1	1	**25**	**2**	**27**
Sri Lanka	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**	**1**
Thailand	0	0	0	0	0	0	0	1	1	0	1	0	0	1	2	3	0	0	0	0	0	0	0	0	**9**	**0**	**9**
Turkey	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0	1	0	0	0	1	**7**	**1**	**8**
Venezuela	0	0	0	0	0	0	0	2	1	0	0	0	2	0	1	0	0	0	0	0	0	0	1	0	**6**	**1**	**7**
Total	0	0	0	0	0	2	0	6	6	10	25	14	18	18	21	14	16	20	14	8	7	18	21	10	**169**	**79**	**248**

Table 2: Summary Statistics

This table presents the median, standard deviation, and the number of observations of the key variables in this paper. Share outstanding is the amount of outstanding stock issued in the home stock market. It's calculated by dividing the market value of the home market stock by its daily stock price. The trading volume is the daily trading volume of the home market stock. The turnover is the daily turnover ratio measured by dividing the daily trading volume by shares outstanding. The illiquidity is measured as the ratio of absolute stock return to its dollar volume (Amihud, 2002). Analyst No. is the number of analysts covering the home market stock each year from IBES summary database. The closely held ownership represents the proportion of equity owned by corporate officers, directors, and immediate family members, by individual shareholder holdings representing more than 5%, by other corporations (except shares held in a fiduciary capacity by financial institutions); and by pension/benefit plans and trusts. To test whether the these variables are significantly different before and after cross-listing, I compute two-sample Wilcoxon tests (W-test) for both Level II/III ADR sample and the OTC/144A sample. ***, **, and * indicate statistical significance level at 1% , 5% and 10% respectively.

		Level 2 & Level 3 ADR						**OTC/144A**					
		Developed Markets			Emerging Markets			Developed Markets			Emerging Markets		
		Pre Cross-listing	Post Cross-listing	W-Test	Pre Cross-listing	Post Cross-listing	W-Test	Pre Cross-listing	Post Cross-listing	W-Test	Pre Cross-listing	Post Cross-listing	W-Test
Share Outstanding (Millions)	Median	56.84	92.39		148.97	232.46		206.52	267.54		323.30	352.55	
	Std.Dv	1584.00	1953.63	-33.14***	27163.22	27071.70	-32.06***	7073.25	7822.47	-33.41***	29986.34	15771.77	-14.22***
	Obs	78320	84720		34096	38043		183861	176986		73022	71,615	
Trading Volume (Millions)	Median	0.52	0.69		0.22	0.28		0.51	0.65		0.35	0.46	
	Std.Dv	13.51	14.26	-23.70***	18.41	16.31	-13.67***	11.42	12.34	-27.66***	12.99	12.87	-20.15***
	Obs	78320	84720		34099	38043		183861	176986		73022	71615	
Turnover (%)	Median	0.52	0.42		0.11	0.10		0.20	0.21		0.10	0.11	
	Std.Dv	15.45	16.24	7.26***	8.63	5.02	8.00***	16.45	16.07	-2.13**	14.49	14.70	-13.95***
	Obs	78320	84720		34096	38043		183861	176986		73022	71615	
Illiquidity (%)	Median	0.00020	0.00016		0.00087	0.00067		0.00048	0.00036		0.00145	0.00100	
	Std.Dv	0.40721	0.33749	5.71***	0.42872	0.42769	-0.08	1.09314	1.18841	11.07***	1.07679	0.94506	11.08***
	Obs	77557	84612		33907	37866		183313	176635		72564	71204	
Analyst No.	Median	15	17		8	12		12	14		7	9	
	Std.Dv	12.06	13.18	-32.01***	8.91	8.62	-44.56***	11.27	11.63	-32.59***	7.75	8.12	-39.04***
	Obs	374	303		162	125		723	732		301	320	
Closely Held Ownership (%)	Median	47.3	44.19		43.895	57.52		33.12	38.06		33.74	34.9	
	Std.Dv	25.70	24.70	0.52	22.89	20.89	-2.07**	24.69	25.29	-1.65*	26.55	28.72	-0.89
	Obs	115	67		58	32		552	195		229	95	

Table 3: Dynamic Relationship between Volume and Absolute Return around Cross-listing as Level II / III ADRs

This table reports the result from a firm fixed effect panel regression of the absolute value of the daily log return on daily volume innovation and the interaction between volume innovation and a cross-listing dummy, which equals 1 if the trading day occurs after the cross-listing and 0 otherwise:
$\left|\ln(R_{i,t})\right| = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot V_{i,t} \cdot ADR + e_{i,t-1}$. The volume innovation is defined as $V_t = \log(\text{turnover}_t) - \frac{1}{N}\sum_{i=-1}^{100} \log(\text{turnover}_{t+i})$ where: $\log(\text{turnover}_t) = \log(\text{turnover}_t + 0.00000255)$. The stock's turnover is defined as the daily trading volume divided by the number of shares outstanding. The sample stock is the home market stock that has its ADR listed on a major U.S. stock market (AMEX, NASDAQ or NYSE) as of April 15, 2008 and has at least 252 non-missing daily observations both before and after cross-listing. The Developed/Emerging market classification follows the IMF's definition. ***, **, and * indicate statistical significance level at 1% , 5% and 10% respectively. Standard errors are reported in parentheses.

	Full Sample	Developed	Emerging
Volume Innovation	0.1695***	0.1794***	0.1475***
	(0.004)	(0.0046)	(0.0079)
Volume Innovation*ADR	-0.0046	0.0457***	-0.0387***
	(0.0076)	(0.0100)	(0.0127)
Constant	-4.3705***	-4.4040***	-4.2885***
	(0.0034)	(0.0038)	(0.0070)
Observation	73329	52573	20756
R^2	0.0323	0.0395	0.0221

Table 4: The Impact of Home Country Corporate Disclosure on the Information Role of Trading Volume

This table reports the result from a firm fixed effect panel regression of the absolute value of the daily log return over daily volume innovation , the interaction between volume innovation and cross-listing dummy , and interaction term between volume innovation, cross-listing dummy and the country level of disclosure index, i e:
$\left|\ln(R_{i,t})\right| = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot V_{i,t} \cdot ADR + \beta_3 \cdot V_{i,t} \cdot ADR \cdot DISL + e_{i,t-1}$.
The volume innovation is defined as $V_t = \log(turnover_t) - \frac{1}{N}\sum_{i=-1}^{100} \log(turnover_{t+i})$ where: $\log(turnover_t) = \log(turnover_t + 0.00000255)$. The stock's turnover is defined as the daily trading volume divided by the number of shares outstanding. The sample stock is the home market stock that has its ADR listed on a major U.S. stock market (AMEX, NASDAQ or NYSE) as of April 15, 2008 and has at least 252 non-missing daily observations both before and after cross-listing. The country level disclosure variables include: (1) DLLS_DSIL: the index of periodic filing from Djankov, La Porta, Lopez-de-Silanes and Shleifer (2008). It's a component of the anti-self dealing index and ranges from 0 (no disclosure) to a perfect score of 1 (full disclosure); (2) BPS_DISL: Bushman, Piotroski and Smith (2004)'s financial disclosure intensity variable based on accounting report; (3) WB_DISL : the extent of disclosure index from World Bank's Doing Business Database. ***, **, and * indicate statistical significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses.

	(1)	(2)	(3)
Volume Innovation	0.1928***	0.1900***	0.1882***
	(0.0045)	(0.0046)	(0.0046)
Volume Innovation*ADR	-0.1089***	-0.3392***	-0.1274***
	(0.0144)	(0.0334)	(0.0258)
DLLS_DSIL*Volume Innovation*ADR	0.1357***		
	(0.0208)		
BPS_DISL*Volume Innovation*ADR		0.0038***	
		(0.0004)	
WB_DISL*Volume Innovation*ADR			0.0146***
			(0.0036)
Constant	-4.3463***	-4.3424***	-4.3663***
	(0.0036)	(0.0037)	(0.0038
Observation	63973	61304	59754
R^2	0.037	0.0362	0.0355

Table 5: Alternative Explanations: Illiquidity, Additional Information Sources, and Change in Ownership Structure

The control variables include Amihud's (2002)) illiquidity ratio: $ILLIQ_{it} = |R_{it}|/VOLD_{it}$, where R_{it} is the return on stock i in time t and $VOLD_{it}$ is the volume in dollars; the interaction term between the number of analyst and the volume innovation; and the interaction term among volume innovation, the number of analyst, and the ADR dummy; the interaction term between the percentage of closely held ownership (CHO) and the volume innovation; and the interaction term among volume innovation, the percentage of closely held ownership , and the ADR dummy. The volume innovation is defined as $V_t = \log(turnover_t) - \frac{1}{N}\sum_{i=-1}^{100}\log(turnover_{t+i})$ where: $\log(turnover_t) = \log(turnover_t + 0.00000255)$. The analyst number data is collected from the I/B/E/S database. The closely held ownership represents the proportion of equity owned by corporate officers, directors, and immediate family members, by individual shareholder holdings representing more than 5%, by other corporations (except shares held in a fiduciary capacity by financial institutions); and by pension/benefit plans and trusts. The ADR dummy equals to 1 if the trading day occurs after the cross-listing and 0 otherwise. The sample stock is the home market stock that has its ADR listed on a major U.S. stock market (AMEX, NASDAQ or NYSE) as of April 15, 2008 and has at least 252 non-missing daily observations both before and after cross-listing. The Developed/Emerging market classification follows the IMF's definition. ***, **, and * indicate statistical significance level at 1%, 5% and 10% respectively. Standard errors are reported in parentheses.

	Full Sample				Developed Market				Emerging Market			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Volume Innovation	0.1940***	0.1513***	0.1435***	0.2139***	0.2143***	0.1540***	0.1507***	0.2221***	0.1568***	0.1554***	0.1415***	0.1903***
	(0.0042)	(0.007)	(0.0076)	(0.0185)	(0.0049)	(0.0086)	(0.0094)	(0.0217)	(0.0081)	(0.0123)	(0.0137)	(0.0372)
Volume Innovation*ADR	-0.0207***	-0.0248***	0.0067	-0.1385***	0.0203**	0.0096	0.0238	0.0095	-0.0410***	-0.0267*	0.0221	-0.1957***
	(0.0078)	(0.0092)	(0.0156)	(0.0349)	(0.0102)	(0.0118)	(0.0201)	(0.0435)	(0.0129)	(0.0161)	(0.0263)	(0.0637)
Illiquidity	0.0098***	0.0213***	0.0211***	0.0376***	0.0189***	0.0149***	0.0147***	0.0321***	0.0071***	0.0398***	0.0398***	0.5192***
	(0.0008)	(0.0026)	(0.0026)	(0.0060)	(0.0018)	(0.0029)	(0.0029)	(0.0058)	(0.001)	(0.0056)	(0.0056)	(0.0624)
Volume Innovation *Analyst		0.0048***	0.0054***	0.0067***		0.0055***	0.0058***	0.0073***		0.0007	0.0023**	0.0041**
		(0.0004)	(0.0005)	(0.0007)		(0.0005)	(0.0006)	(0.0008)		(0.0009)	(0.0011)	(0.0019)
Volume Innovation *Analyst*ADR			-0.0023**	-0.0034***			-0.001	-0.0020			-0.0043**	-0.0062**
			(0.0009)	(0.0012)			(0.0011)	(0.0015)			(0.0018)	(0.0027)
Volume Innovation *CHO				-0.0018***				-0.0022***				-0.0008
				(0.0003)				(0.0003)				(0.0006)
Volume Innovation *CHO*ADR				0.0028***				0.0012				0.0035***
				(0.0006)				(0.0008)				(0.0010)
Constant	-4.3764***	-4.4289***	-4.4290***	-4.4289***	-4.4118***	-4.4600***	-4.4599***	-4.4289***	-4.2932***	-4.3503***	-4.3505***	-4.4289***
	(0.0034)	(0.0038)	(0.0038)	(0.0059)	(0.0038)	(0.0042)	(0.0042)	(0.0068)	(0.007)	(0.008	(0.008	(0.0116)
Observation	73193	59323	59323	25696	52500	43460	43460	17829	20693	15863	15863	7867
R^2	0.038	0.0416	0.0417	0.0433	0.0476	0.051	0.051	0.0573	0.025	0.0269	0.0273	0.035

Table 6: Dynamic Relationship between Volume and Absolute Return around Cross-listing as OTC / 144A ADR

This table reports the result from a firm fixed effect panel regression of the log absolute daily return over daily volume innovation and the interaction between volume innovation and cross-listing dummy which equal to 1 if the trading day occur after the cross-listing and 0 otherwise: $log\left|(R_{i,t})\right| = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot V_{i,t} \cdot ADR + Control + e_{i,t-1}$. The volume innovation is defined as $V_t = \log(turnover_t) - \frac{1}{N}\sum_{i=-1}^{100}\log(turnover_{t+i})$ where: $\log(turnover_t) = \log(turnover_t + 0.00000255)$. The stock's turnover is defined as the daily trading volume divided by the number of shares outstanding. The control variables include Amihud (2002)'s illiquidity ratio: $ILLIQ_{it} = |R_{it}|/VOLD_{it}$, where R_{it} is the return on stock i in time t and $VOLD_{it}$ is the volume in dollars; the interaction term between the number of analyst and the volume innovation; and the interaction term among volume innovation, the number of analyst, and the ADR dummy. The analyst number data is collected from the I/B/E/S database.; the closely held ownership represent the proportion of equity owned by corporate officers, directors, and immediate family members, by individual shareholder holdings representing more than 5%, by other corporations (except shares held in a fiduciary capacity by financial institutions); and by pension/benefit plans and trusts.; the ADR dummy equals to 1 if the trading day occurs after the cross-listing and 0 otherwise. The sample stock is the home market stock that has its ADR listed on the OTC market or privately placed (144A) as of April 15, 2008 and has at least 252 non-missing daily observations both before and after cross-listing. ***, **, and * indicate statistical significance level at 1% , 5% and 10% respectively. Standard errors are reported in parentheses.

	OTC/144A Sample				
	(1)	(2)	(3)	(4)	(5)
Volume Innovation	0.1804***	0.1961***	0.1402***	0.1394***	0.1568***
	(0.0022)	(0.0023)	(0.0039)	(0.0041)	(0.0074)
Volume Innovation*ADR	0.0051	0.005	0.0087	0.0124	-0.0082
	(0.0047)	(0.0049)	(0.0058)	(0.0089)	(0.0154)
Illiquidity		0.0005***	0.0074***	0.0074***	0.0072***
		(0.0000)	(0.0004)	(0.0004)	(0.0005)
Volume Innovation *Analyst			0.0068***	0.0069***	0.0070***
			(0.0003)	(0.0003)	(0.0004)
Volume Innovation *Analyst*ADR				-0.0004	-0.0007
				(0.0006)	(0.0008)
Volume Innovation *CHO					-0.0002
					(0.0001)
Volume Innovation *CHO*ADR					0.0007**
					(0.0003)
Constant	-4.2430***	-4.2460***	-4.3312***	-4.3312***	-4.3191
	(0.0022)	(0.0020)	(0.0023)	(0.0023)	0.0029
Observation	188010	187714	149975	149975	94237
R^2	0.045	0.0486	0.055	0.055	0.0584

Table 7: Correcting Self-selection Bias

This table reports the result from a firm fixed effect panel regression of the log absolute daily return over daily volume innovation and the interaction between volume innovation and cross-listing dummy which equals to 1 if the trading day occur after the cross-listing and 0 otherwise: $log\left|(R_{i,t})\right| = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot V_{i,t} \cdot ADR + Control + e_{i,t-1}$ The volume innovation is defined as $V_t = \log(turnover_t) - \frac{1}{N}\sum_{i=-1}^{100} \log(turnover_{t+i})$ where: $\log(turnover_t) = \log(turnover_t + 0.00000255)$. The stock's turnover is defined as the daily trading volume divided by the number of shares outstanding. The control variables include Amihud (2002)'s illiquidity ratio: $ILLIQ_{it} = |R_{it}|/VOLD_{it}$, where R_{it} is the return on stock i in time t and $VOLD_{it}$ is the volume in dollars; the interaction term between the number of analyst and the volume innovation; and the interaction term among volume innovation, the number of analyst, and the ADR dummy. The analyst number data is collected from the I/B/E/S database.; the closely held ownership represents the proportion of equity owned by corporate officers, directors, and immediate family members, by individual shareholder holdings representing more than 5%, by other corporations (except shares held in a fiduciary capacity by financial institutions); and by pension/benefit plans and trusts; λ_{US} , $\lambda_{EX,}$ and λ_{OTC} are the inverse mills ratio that correct for the self-selection bias from the probit model that predicts the probability of cross-listing in U.S, cross-listing on major U.S. stock exchanges or cross-listing as OTC/144A ADR respectively. The ADR dummy equals 1 if the trading day occurs after the cross-listing and 0 otherwise. The sample stock is the home market stock that has its ADR listed on the OTC market or privately placed (144A) as of April 15, 2008 with at least 252 valid daily observations both before and after cross-listing. ***, **, and * indicate statistical significance level at 1% , 5% and 10% respectively. Standard errors are reported in parentheses.

	(A)				(B)			
	Level II/III ADR			**OTC/144A**	**Level II/III ADR**			**OTC/144A**
	Full Sample	Developed	Emerging		Full Sample	Developed	Emerging	
Volume Innovation	0.4385***	0.6286***	0.1990***	0.4404***	0.3239***	0.2286***	0.1503***	0.5197***
	(0.0667)	(0.0347)	(0.0498)	(0.0276)	(0.0632)	(0.0175)	(0.0315)	(0.0312)
Volume Innovation *ADR	-0.0174	0.0074	-0.0755**	-0.0185	-0.0184	-0.0064	-0.0766**	-0.0156
	(0.0458)	(0.0244)	(0.0360)	(0.0197)	(0.0459)	(0.0244)	(0.0360)	(0.0197)
Illiquidity	0.0285***	0.0058***	0.0748***	0.0073***	0.0292***	0.0067***	0.0750***	0.0073***
	(0.0066)	(0.0010)	(0.0078)	(0.0010)	(0.0066)	(0.0010)	(0.0077)	(0.0010)
Volume Innovation *Analyst	0.0058***	0.0037***	-0.0011	0.0050***	0.0072***	0.0079***	-0.0006	0.0048***
	(0.0012)	(0.0006)	(0.0013)	(0.0005)	(0.0011)	(0.0005)	(0.0013)	(0.0005)
Volume Innovation *Analyst*ADR	-0.0009	0.0008	-0.0005	-0.0007	-0.0011	0.0001	-0.0006	-0.0007
	(0.0015)	(0.0011)	(0.0021)	(0.0009)	(0.0015)	(0.0011)	(0.0021)	(0.0009)
Volume Innovation *CHO	-0.0022***	-0.0009***	0.0004	-0.0004***	-0.0025***	-0.0008***	0.0005	-0.0004**
	(0.0004)	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0002)
Volume Innovation *CHO*ADR	0.0005	0.0001	0.0018***	0.0008**	0.0008	0.0006	0.0018***	0.0007**
	(0.0007)	(0.0005)	(0.0007)	(0.0004)	(0.0007)	(0.0005)	(0.0007)	(0.0004)
Volume Innovation *λ_{US}	-0.0805***	-0.1567***	-0.0065	-0.0989***				
	(0.0236)	(0.0115)	(0.0179)	(0.0094)				
Volume Innovation * λ_{EX}					-0.0284	-0.0124***	0.0083	
					(0.0173)	(0.0035)	(0.0067)	
Volume Innovation * λ_{OTC}								-0.1254***
								(0.0106)
Constant	-4.3710***	-4.4212***	-4.2367***	-4.3783***	-4.3715***	-4.4214***	-4.2366***	-4.3782***
	(0.0073)	(0.0037)	(0.0079)	(0.0034)	(0.0073)	(0.0038)	(0.0079)	(0.0034)
Observations	16539	55367	15265	71499	16539	55367	15265	71499
R^2	0.0540	0.0698	0.0447	0.0601	0.0535	0.0669	0.0448	0.0604

Bibliography

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Akerlof, George A., 1970, The market for "Lemons": Quality uncertainty and the market mechanism, The Quarterly Journal of Economics 84, 488-500.

Amihud, Yakov, 2002, Illiquidity and stock returns: Cross-section and time-series effects, Journal of Financial Markets 5, 31-56.

Avramov, Doron , Tarun Chordia, and Amit Goyal, 2006, Liquidity and autocorrelations in individual stock returns, The Journal of Finance 61, 2365-2394.

Bailey, Warren, G.Karolyi Andrew, and Carolina Salva, 2006, The economic consequences of increased disclosure: Evidence from international cross-listings, Journal of Financial Economics 81, 175-213.

Baker, H. Kent, John R. Nofsinger, and Daniel G. Weaver, 2002, International cross-listing and visibility, Journal of Financial and Quantitative Analysis 37, 495-521.

Beaver, William H., 1968, The information content of annual earnings announcements, Journal of Accounting Research 6, 67-92.

Blume, Lawrence, David Easley, and Maureen O'Hara, 1994, Market statistics and technical analysis: The role of volume, The Journal of Finance 49, 153-181.

Boot, Arnoud W. A., and Anjan V. Thakor, 2001, The many faces of information disclosure, Review of Financial Studies . 14, 1021-1057.

Bradshaw, Mark T., Brian J. Bushee, and Gregory S. Miller, 2004, Accounting choice, home bias, and U.S. investment in non-U.S. Firms, Journal of Accounting Research 42, 795-841.

Brennan, Michael J., and Avanidhar Subrahmanyam, 1995, Investment analysis and price formation in securities markets, Journal of Financial Economics 38, 361-381.

Bushman, Robert M. , Joseph D. Piotroski, and Abbie J. Smith, 2004, What determines corporate transparency?, Journal of Accounting Research 42, 207-252.

Campbell, John Y., Sanford J. Grossman, and Jiang Wang, 1993, Trading volume and serial correlation in stock returns, The Quarterly Journal of Economics 108, 905-939.

Chan, Kalok, Albert Menkveld, and Zhishu Yang, 2008, Information asymmetry and asset prices: Evidence from the china foreign share discount, The Journal of Finance 63, 159-196.

Coffee, John, 1999, The future as history: The prospects for global convergence in corporate governance and its implications, Northwestern University Law Review 93.

Cready, William M., and David N. Hurtt, 2002, Assessing investor response to information events using return and volume metrics, The Accounting Review 77, 891-909.

Diamond, Douglas W., and Robert E. Verrecchia, 1991, Disclosure, liquidity, and the cost of capital, The Journal of Finance 46, 1325-1359.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2008, The law and economics of self-dealing, Journal of Financial Economics 88, 430-465.

Doidge, Craig, Andrew G. Karolyi, Karl V. Lins, Darius P. Miller, and Rene M. Stulz, 2009, Private benefits of control, ownership, and the cross-listing decision, The Journal of Finance 64, 425-466.

Domowitz, Ian , Jack Glen, and Ananth Madhavan, 1998, International cross-listing and order flow migration: Evidence from an emerging market, The Journal of Finance 53, 2001-2027.

Ellul, Andrew, and Marco Pagano, 2006, Ipo underpricing and after-market liquidity, Review of Financial Studies . 19, 381-421.

Fernandes, Nuno, and Miguel A. Ferreira, 2008, Does international cross-listing improve the information environment, Journal of Financial Economics 88, 216-244.

Ferreira, Miguel A., and Pedro Matos, 2008, The colors of investors' money: The role of institutional investors around the world, Journal of Financial Economics 88, 499-533.

Fishman, Michael J, and Kathleen M Hagerty, 1995, The mandatory disclosure of trades and market liquidity, Review of Financial Studies . 8, 637-676.

Garleanu, Nicolae, and Lasse Heje Pedersen, 2004, Adverse selection and the required return, Review of Financial Studies . 17, 643-665.

Goto, Shingo, Masahiro Watanabe, and Yan Xu, 2009, Strategic disclosure and stock returns: Theory and evidence from us cross-listing, Review of Financial Studies . 22, 1585-1620.

Harris, Milton, and Artur Raviv, 1993, Differences of opinion make a horse race, Review of Financial Studies . 6, 473-506.

Harvey, Campbell R, and Roger D Huang, 1991, Volatility in the foreign currency futures market, Review of Financial Studies . 4, 543-569.

Heckman, J James, 1979, Sample selection bias as a specification error, Econometrica: Journal of the econometric society 153-161.

Ince, S. Ozgur , and R. Burt Porter, 2006, Individual equity return data from Thomson DataStream: Handle with care!, Journal of Financial Research 29, 463-479.

Jiambalvo, J, S Rajgopal, and M Venkatachalam, 2002, Institutional ownership and the extent to which stock prices reflect future earnings, Contemporary Accounting Research 19, 117-145.

Jin, Li, and Stewart C. Myers, 2006, R2 around the world: New theory and new tests, Journal of Financial Economics 79, 257-292.

Karpoff, Jonathan M., 1987, The relation between price changes and trading volume: A survey, Journal of Financial and Quantitative Analysis 22, 109-126.

Kim, Oliver, and Robert E. Verrecchia, 2001, The relation among disclosure, returns, and trading volume information, The Accounting Review 76, 633-654.

Lang, Mark , Jana Smith Raedy, and Michelle Higgins Yetman, 2003, How representative are firms that are cross-listed in the united states? An analysis of accounting quality, Journal of Accounting Research 41, 363-386.

Lang, Mark H., Karl V. Lins, and Darius P. Miller, 2003, ADRs, analysts, and accuracy: Does cross listing in the united states improve a firm's information environment and increase market value?, Journal of Accounting Research 41, 317-345.

Leuz, Christian, Karl V. Lins, and Francis E. Warnock, 2009, Do foreigners invest less in poorly governed firms?, Review of Financial Studies 22, 3245-3285.

Leuz, Christian, and Robert E. Verrecchia, 2000, The economic consequences of increased disclosure, Journal of Accounting Research 38, 91-124.

Lev, Baruch, 1988, Toward a theory of equitable and efficient accounting policy, The Accounting Review 63, 1-22.

Llorente, Guillermo, Roni Michaely, Gideon Saar, and Jiang Wang, 2002, Dynamic volume-return relation of individual stocks, Review of Financial Studies . 15, 1005-1047.

Noronha, Gregory M., Atulya Sarin, and Shahrokh M. Saudagaran, 1996, Testing for micro-structure effects of international dual listings using intraday data, Journal of Banking & Finance 20, 965-983.

Osborne, M. F. M., 1959, Brownian motion in the stock market, Operations Research 7, 145-173.

Pagano, Marco, Ailsa A. Roell, and Josef Zechner, 2002, The geography of equity listing: Why do companies list abroad?, The Journal of Finance 57, 2651-2694.

Piotroski, Joseph D., and Darren T. Roulstone, 2004, The influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices, The Accounting Review 79, 1119-1151.

Rajan, Raghuram, and Henri Servaes, 1997, Analyst following of initial public offerings, The Journal of Finance 52, 507-529.

Reese, William A., and Michael S. Weisbach, 2002, Protection of minority shareholder interests, cross-listings in the United States, and subsequent equity offerings, Journal of Financial Economics 66, 65-104.

Shiller, Robert J., and John Pound, 1989, Survey evidence on diffusion of interest and information among investors, Journal of Economic Behavior & Organization 12, 47-66.

Wang, Jiang, 1994, A model of competitive stock trading volume, The Journal of Political Economy 102, 127-168.