

Chapter II: Literature Review

2.1 Literature review on price discovery

The literature review on price discovery reveals two methods of contribution to price discovery, Gonzalo and Granger (1995) and Hasbrouck (1995). Gonzalo and Granger (1995) propose to decompose the stock price into the permanent and transitory components where components are linear combinations of price X_t alone and do not involve any lagged values of X_t . They assume that there is no long run Granger causality between each component. On the other hand, Hasbrouck (1995) proposes the information share method that assumes that different series of price will finally cointegrate in the long run and the price can be modeled by the vector error correction model. The decomposition of the price can be modeled as the vector moving average representation of the error and the information share can be computed using variance decomposition method. The common trend is defined as a function of the innovations that involves current and lagged value of X_t . The detailed model is presented in the research methodology section.

2.2 Empirical study on price discovery

Harris et al. (1995) and Hasbrouck (1995) studied price discovery across different US equity markets that trade similar securities. They find that most of the price discovery occurs in the largest market, the New York Stock Exchange which is due to high trading volume and frequency. Fong and Zurbruegg (2003) adopt Hasbrouck (1995) method and Gonzalo and Granger (1995) to investigate the price discovery between the local floor members and local floor broker at the Sydney Futures Exchange (SFE) and find out that the local floor broker contributes to about 1/3 of the total price discovery and Well above the amount of trading activity. Chakravarty, Gulen and Mayhew (2003) adopt the Hasbrouck (1995) method to investigate on the price discovery in the option market and security market. They find out that the information share attributes to the option market ranging between 12% and 23% with the average of 17%. The degree of

price discovery is higher when the option volume is higher and stock volume is lower and greater for high volatility stocks.

Huang (2002) and Barclay, Hendershott and McCormick (2003) focus on the ECNs on the Nasdaq market and document that ECNs are the preferred destination for the informed traders. Hasbrouck (2003) studies the index futures markets and finds a significantly larger information share associated with the electronically traded E-Mini contracts. Kurov and Lasser (2004) attributes that the information in the E-Mini contracts is attributed to the locals. Anand and Chakravarty (2004) analyze the price discovery across the trade sizes in the options markets and argue that the small and medium size trades are responsible for price discovery. Recently, Anand and Subrahmanyam (2005) use the same technique in order to explore the price discovery between market intermediaries and clients. They find that the intermediaries account for a majority of price discovery in spite of fewer trades and volumes. The price discovery attributable to the market intermediaries ranges between 55% and 62% although the trade value accounts for only 37% and trade volume account for 40 percent. They conclude that the market intermediaries exhibit the evidence of better informed trading. Despite extensive research on price discovery, no specific paper addresses the issue of which trader type between the retail customers and foreign investors contribute to price discovery and whether the foreign investors are informed traders.

2.3 Existing literature on trader type and informed trading

Early research focuses on asymmetric information in trades between large and small investors. Researchers on the impact of the information disclosure on the trading behavior of institutional investors (large traders) and retail investors (small traders) argue that the retail investors make smaller trades and are at an informational disadvantaged. Easley and O'Hara (1987) assert that the large trades, presumably originated by institutions are expected to be associated with greater adverse selection costs than small trades.

Grossman and Stiglitz (1980) support that investors are likely to obtain a higher return if they are willing to spend time and resources to analyze and uncover the new information. In a capital market in which information is heterogeneous and information collection and processing are costly, small traders with limited resources are likely to be uninformed noise trade whereas the investors with large quantity or institutional investors are more likely to possess private information. Kraus and Stoll (1972) document the price pressure caused by institutional traders.

Lee (1992) uses small and large trade as a proxy for institutional investors and retail investors. They report that the reaction of retail investors to earnings announcement is laker and slower. Chiyachantana et al. (2004) argues that regulation Fair Disclosure encourages the institutional investors to trade less because they possess less private information and retail investors will trade more as they have a better access to market information. Corwin and Lipson (2005) assert that the type of traders, especially institutional traders, is the primary determinants of commonality in order flow and return. Kothare and Laux (1995) argue that the widening of the spreads is statistically explained by increases in institutional ownership and trading. Research that focuses on the relationship between the institutional ownership and level of informed trading assert the positive relationship between the institutional ownership and information asymmetry. These research include work done by Kothre and Laux (1995), Heflin and Shaw (2000), Sarin, Shastri and Shastri (2000), dennis and Iston (2001).

As more information on different trader type is available, focuses of the research change to studies whether the foreign investors have better information than the retail domestic customers. The information advantage may arise from better company analysis or better access to the order flow. Theories support both sides. One supporting argument in favor of the domestic investors is that information does not have to travel over physical, linguistic, or cultural distances. Counter argument suggests that the foreign investors may possess information advantage because they have a significant amount of investment experience and expertise and resources.

Empirical evidences between different trader types provide mixed results. Choe, Kho, and Stulz (2001) using Korean data, and Hau (2001a) using German data find that foreigners are at a disadvantage. Seasholes (2000) using Taiwanese data, Grinblatt and Keloharju (2000) using Finnish data, and Froot and Ramadorai (2001) using a cross section of 25 countries make a convincing case that foreigners do better than local investors. Kang and Stulz (1997) using Japanese data find no difference in the performance of domestic and foreign investors.

Extensive studies have been employed to investigate on the issue to provide the evidence of better informed trading. The previous studies reveal several methods to explore the issues. Way (1994) use return and volume relationship. Brennan and Cao (1997) investigate on the correlation between aggregate monthly capital inflow and stock returns. Kang and Stulz (1997) calculate average monthly excess returns earned by foreign investors in Japan. The return on the foreign portfolio is calculated as the foreign ownership weighted average of returns on Japanese stocks. This approach provides a measure of relative performance in terms of returns but the returns are measured monthly. Grinblatt and Kolaharju (2000) measure the performance of foreign and domestic investors by comparing a group's tendency to buy future winning stocks and sell future losing stocks.

Seasholes (2000) investigates that Taiwanese stock exchange. He looks at net foreign buying prior to positive and negative earnings surprises and he concludes that foreigners tend to buy prior to positive and sell prior to negative earnings surprises. He regress the daily returns on the foreign portfolio on the market returns and finds out that foreigners generate above risk-adjusted returns and he uses a bivariate VAR of market returns and aggregate flows to find out whether foreign net inflows predict returns. He concludes that the foreign flows are related to the returns as a result of price pressure of foreign purchases.

Choe et al. (2001) find that foreign investors buy at higher and sell at lower intraday prices than foreigners. This method measures the information advantage in the

short run but it cannot distinguish between information asymmetry and investment style. Froot, O'connell and Seasholes (2001) uses covariance matrix between net inflows and equity and currency return. Froot and Ramadorai (2001) attempt to distinguish between the information advantage and price pressure hypotheses. Using data on institutional equity flows from the United States to a cross section of 25 countries, they find that foreign purchases predict not only prices in foreign markets, but also prices of closed-end country funds and they conclude that the foreigners have better information than local investors.

Dennis (2002) looks at the issue between the ownership by the institution and informed traders. Stahel (2002) uses the return and volume relationship and conclude that the return autocorrelation following high trade volume and relates the conditional daily return autocorrelation to the informed trading. Lee, Liu, Roll and Subrahmanyam (2004) investigate the issue of informed trading in TSE and use marketable order imbalance method to measure the degree of informed trading. Dvorak (2005) proposes an information advantage hypothesis and tests it using the spectral decomposition techniques. Nonetheless, no research has been done in the attempt to decompose the bid-ask spread in the trading transaction to explore the components of asymmetric information based on different traders' type. With mixed results, it is worth exploring the issue of whether the foreign investors possess important information about the evolution of the order flow and trade based on this information.

None of the research has been done to study the difference in price discovery by trader type in the electronic auction market. With available transactional data provided by SET, it offers us with an opportunity to explore the price discovery issue among different trade types. Rather than using the levels of volume and volatility or order imbalance as in Lee et al. (2004), we investigate the issue by adopting the Hasbrouck (1995) method to measure the contribution to price discovery by each trader type.

Chapter III: Research Hypotheses

Theory suggests that the foreign investors may be more informed than the domestic investors due to the better available resource and access to information. Grossman and Stiglitz (1980) support that, within a capital market where information is heterogeneous and information collection and processing are costly, small traders with limited resources are likely to be uninformed noise trade whereas the investors with large quantity or institutional investors are more likely to possess private information. This enlightens on the issue of Thai stock exchange whether the institutional investors and foreign investors who are regarded as informed traders really possess such advantageous information and utilize such information. This can be observed from the behavior of trading pattern. On the other hand, domestic investors have advantages in that they have more understanding about the local culture and market behavior. Empirical study on whether the domestic investors or the foreign investors are the informed traders provide mixed results. With available information on the trades based on several trader types, this brings us to the second hypothesis.

Hypothesis 1

- H_{1a}: There is a significant difference in the contribution to price discovery among different trader type in the Stock Exchange of Thailand.
- H_{1b}: If the contribution to price discovery among different traders' type is different, foreign investors have a higher contribution to price discovery and is regarded as informed traders.

Hypothesis 2

- H_{2a}: The contribution to price discovery differs among different trader type with respect to the market capitalization of the share.
- H_{2b}: The contribution to price discovery differs among different trader type with respect to the foreign turnover (volume) of the share.

H_{2c}: The contribution to price discovery differs among different trader type with respect to the foreign ownership of the share.

H_{2d}: The contribution to price discovery differs among different trader type with respect to total number of transaction (trade frequency) of the share.

Chapter IV: Data

The data used for the study consists of the transactional data for 50 stocks of the Stock Exchange of Thailand 50 Index (SET50) for the year 2003. Stocks listed in the SET50 index represent the stocks with the highest liquidity, market capitalization and free float in the Stock Exchange of Thailand (SET). The 50 stocks account for about 60 percent of the total market capitalization and represent the stocks with the highest trading volume. Foreign share in the trading volume represents about 27 percent of the total volume traded and 21 percent of number of transactions. Foreign share in the trading value represents about 27 percent of the total value traded. There are two reasons of the use of only 50 most liquid stocks listed in the SET50 index. Firstly, it allows us to investigate information advantage for stocks with both high and low number of trades. Secondly, Bruce (2007) argues that some of the foreign institutions are not allowed to trade the stocks with low market capitalization and low liquidity. Using the stocks in the SET50 index helps us to investigate the issue of information advantage in the stocks that allow equal chance of trading for both domestic investors and foreign investors. Inclusion of the small-cap stocks with less liquidity would put downward bias on the degree of informed trading in the absence of foreign investors and institutional investors.

SET has adopted an electronic limit order trading system that takes place in the automated auction system with time and price priority rule. Brokers submit the limit orders or marketable limit orders with price, quantity and instruction to buy or sell. The orders are submitted into the electronic order trading system to match with the waiting orders in the limit order book. All of the orders need to submit through the securities brokers who are the members of the SET. Three possible outcomes of the submitted orders are: (1) Successful executed trades (2) Waiting orders in the limit order book which may be left in the book until the closing or cancelled by the submitted customers (3) Automatic cancellation at the closing. The trading time runs between 10:00 a.m. and 12:30 p.m. in the morning and between 14:30 p.m. and 16:30 p.m. in the afternoon.

This paper utilizes the transaction data obtained from the exclusive database of SET. The database provides the data on the order and trade information on tick-by-tick basis. The exclusive data files provided by the SET are order file and deal file. In the order file, the data set contains all of the historical transactional limit buy order, limit sell order, market buy order and market sell order in terms of order price, order volume and order value for all stocks and all trading boards. It also provides the order submission date and time, type of trades submitting the order, type of orders, trading board type, order status (Matched or cancelled or remaining orders) and quantity of the orders matched and remaining quantity. In the deal file, the data set contains the historical transactional buyer-initiated and seller-initiated trades in terms of executed price, trade size and trade value for all stocks and all trading boards. It also provides the trading date and time, deal confirmation number, type of buyers and sellers who trade, type of orders, trading board type, buy order and sell order time and buy order number and sell order number.

In addition, there are three trading boards at SET, main board, odd lot board and foreign board. Our study focuses on the main board which represents the main trading board with highest order submission and trade. In addition, the number of trades on the main trading board represents 95 % of the total trading which is considered significant.

The order file and deal file do not provide us with the information on who initiate the orders that lead to execution. In order to classify the trader's initiation as buyer-initiated or seller-initiated, I observe the deal time and the order submission time. Buyer-initiated trades are those trades in which deal price occur at the best quoted ask whereas seller-initiated trades are those trades in which deal price occurs at the best quoted bid. The deal file represents all the trades occurred at the best bid and best ask. The deal file provides us with buy-order and sell-order submission time. Given the deal time and order submission time, we can define the buyer-initiated trade as the trades in which the buy order time takes place after the sell order time whereas the seller-initiated trade as the trades in which the sell order time takes place after the buy order time. We, then, match the buy-order submission time and sell-order submission time for each transaction. We

do not use the tick test as in Hasbrouck (1991) since trade data is available. Lee and Ready (1991), Blume and Goldstein (1992) and Fong and Zurbruegg (2003) suggest the method to match the quote and transactions in the absence of order submission time. Fortunately, the deal file provides the order submission time of the executed deals which helps us to determine the initiation type.

There are four main traders who initiate the orders. This paper focuses on the contribution by several groups of traders to the price discovery. We construct the price series for each of the trader type. The deal file provides the data on the orders initiated by four groups of traders, retail customers, foreign investors, institutional investors and broker owned portfolio. The last two groups contribute to only 10 % of the number of trades. Fong and Zurbruegg (2003) argue that infrequent trading poses statistical problems of spurious lagged correlations which could lead to spurious conclusions. We combine the group of institutional investors and broker owned portfolio into one group. Unfortunately, the number of transaction of this group is too small. We exclude these two groups, leaving only retail customers and foreign investors in our study. Finally, the grouping procedure allows us to construct the second by second price series of two groups of investors, retail customers and foreign investors. We follow the procedures by Anand and Subrahmanyam (2005) to use the lag of 5 minutes for each price series. We interpolate the data for the second that the transaction does not occur and assume the constant trading price when the new trade has not taken place.

We only include the trade occurred during the regular trading time (9:30 a.m. to 00:30 p.m. and 02:30 p.m. to 04:30 p.m.) and exclude any trade that occurs during the call market period (before or after the market). In addition, we do not include any inter-day price changes. Regarding the frequency of the data, we follow Anand and Subrahmanyam (2005) to include only the day in which all traders type trade that stock and I require minimum of 50 trades in a particular stock in a trading day. This ensures the minimum number of trade to allow for sufficient liquidity for price discovery.

Descriptive Statistics

Table 1 presents the lists of all 50 stocks included in the study together with their corresponding industry, their market capitalization, average number of daily transaction, total number of trades, percentage of total volume traded by foreigners, percentage of value traded by foreigners and percentage of foreign ownership as of December 31, 2003. The stocks from the banking industry constitute the highest components accounting for about 20 percent followed by the finance and security industry and the telecommunication industry respectively. We can observe that only 20 percent of the stocks in the sample have greater market capitalization than 100 billion baht. Nonetheless, the variation in size ensures that we have got a good sample with various sizes.

Average number of trade per day also varies significantly ranging from 86 trades to 2571.70 trades which is more than 30 times. Average number of transactions (trade) per firm is about 182,604 trades while the median is 154,102 trades. The percentage of volume and value traded by foreigners is between 3.5% and 54% with the mean percentage at about 21 percent. The foreign holding ranges from 0.5% to 86% with the mean of 38 percent.

Table 2 presents the characteristic of the stocks in sample as a group. The classification criteria include number of transactions, percentage of foreign turnover and percentage of foreign ownership. The number of transaction for the stock with high level of number of transaction is significantly different from the one with low level of transaction. In addition, the average number of trade of stock with low foreign turnover is much higher than that of the stocks with large amount of foreign turnover. This provides the evidences of the inability of the foreign investors to invest in the large capitalization. From the table, the retail customers tend to trade more in the stocks with less foreign turnover and lower foreign ownership. In the stock with large amount of foreign turnover, the price tends to be higher. This exhibits the limitation of the

foreigners on the investment in large capitalization stock. Lastly, from the table, the retail customers dominate the trade both in terms of the number of transaction and the volume traded representing about 70 percent of total trade.

Table 3 presents the average number of transaction classified by trade type and stocks. The average of the number of transaction by retail customers is more than 5 times greater than that of the foreign investors. Nonetheless, there are some stocks such as BEC, ADVANC and SPL in which foreign investors account for more than 40 percent of trades. In addition, the table provides number of days that each stock trading passes the criteria of minimum 50 trades per day to be included in the sample for further study. The stocks with less number of days tend to be the stock with lower average daily number of transactions. Table 4 provides summary statistics of the deal file used in the study. One important characteristic is that the foreign investors trade, on average, with largest average deal price and deal value. This suggests the preference of the foreign investors for the large capitalization stock.

Chapter V: Methodology

Hasbrouck (1995) provides the econometric technique to estimate the contribution to price discovery for securities traded in multiple markets. Hasbrouck (1995) contends that the information shares arise from a random walk component. This allows for the assumption that the traders can update conditional expectations as new information enters into the market. He asserts that the stock prices on two exchanges are cointegrated, with a known vector of cointegration. When two price series are cointegrated, we can use the information shares method which is based on the reaction to price changes to measure each market's relative contribution to price discovery. This approach assumes that the price from both markets share a common random walk component referred to as the efficient price. The information share is measured as the contribution to the total variance of the common random-walk component. Let us formally state the econometric model adopted by Hasbrouck (1995). Let denote a price vector with dimension of 2×1 p including the stock price generated by two exchanges:

$$P_t = \begin{bmatrix} P_{ct} \\ P_{ft} \end{bmatrix} = \begin{bmatrix} V_t + e_{c,t} \\ V_t + e_{f,t} \end{bmatrix} \quad (1)$$

The common efficient price V_t is assumed to follow a random walk given by

$$V_t = V_{t-1} + u_t \quad (2)$$

Where $E(u_t) = 0$, $E(u_t^2) = \sigma_u^2$, and $E(u_t u_s) = 0$ for t is not equal to s . Then, by the Granger Representation Theorem (Engle and Granger (1987)), these cointegrated prices can be expressed as a vector error correction model of order N as:

$$\Delta p_t = A_1 \Delta p_{t-1} + \dots + A_n \Delta p_{t-n} + \gamma(z_{t-1} - \mu_z) + \varepsilon_t \quad (3)$$

Where p_t is a 2×1 vector of prices; A_t is a 2×2 matrix of autoregressive coefficients corresponding to lag l ; $\gamma(z_{t-1} - \mu_z)$ is the error correction term where γ is a 2×1 matrix of the coefficient of error correction term and $\mu_z = E(z_t)$; z_t is the difference between the price of the two series. The covariance matrix of the error term above can be expressed as:

$$\text{Cov}(\varepsilon_t) = E[\varepsilon_t \varepsilon_t'] = \Omega \quad (4)$$

Using Wold theorem, the vector moving average representation of the error correction model is given by :

$$\Delta p_t = B_0 \varepsilon_t + B_1 \varepsilon_{t-1} + B_2 \varepsilon_{t-2} + \dots \text{ where } B_0 = I \quad (5)$$

where ε_t is a 2×1 vector of zero-mean innovations with variance-covariance matrix given by Ω which is of order 2×2 . Also notice that the identity matrix I , matrix B_1 , B_2 are 2×2 matrices and the sum of all moving average coefficients $B(1) = I + B_1 + B_2 + \dots$ has identical rows B . B is a 1×2 matrix and B_f represents the sum of all moving average corresponding to retail customer trade and B_e represents the sum of all moving average corresponding to foreign investors. Since B reflects the impact of innovations on the permanent price component rather than transitory components, the total variance of the implicit efficient price changes can be expressed as $\sigma_{\Delta p}^2 = B \Omega B'$. Following Hasbrouck (1995), the contribution to price discovery by each trader type is expressed as that trader type's contribution to this total innovation variance. Following Hasbrouck (1995), the information share of the foreign initiated trade is defined as

$$IS_f = \frac{B_f \sigma_f^2}{\sigma_T^2} \quad (6)$$

Where B_f represents the element corresponding to the foreign trade in the B vector. However, if price innovations across the group are correlated, then IS_f is not uniquely defined as above. Anand and Subrahmanyam(2005) estimate the upper and lower bounds given by IS upper and IS lower, by performing Cholesky factorizations of all possible rotations of the disturbance term, ε . The information share of each group is estimated using this technique.

In our case, we apply the Hasbrouck (1995) to investigate the stock price of the same security traded by different trader type. The contribution to the price discovery is defined as the variation in efficient price innovations attributed to each trader type. The method by Hasbrouck (1995) allows us to examine the contribution of each trader type to price discovery towards common price. We construct the second by second price series for each stock every trading day in 2003 with lag of 5 minutes following work done by Anand and Subrahmanyam (2005). Three price series for each of trader type are constructed. I use the expansion method allowed in SAS to interpolate the data during the time the data is not traded. This is to follow work done by Hasbrouck (2003), Chakravarty, Gulen and Mayhew (2004) and Kurov and Lasser (2004) for the inclusion of the last trade prices in the price vector. We combine the trades initiated by institutional investors and broker-owned portfolio as a group to allow for sufficient amount of trade transaction per day. We exclude the transaction during the call market and any inter-day price changes. Trade initiation is characterized by comparing the buy order time and sell order time of the executed trade. If the buy order time takes place before the sell order time, we classify it as the seller-initiated order and we can identify the trader type corresponded to the order. On the other hand, when the buy order time takes place after the sell order, the order is classified as the buyer-initiated order and we can identify the trader type for that order. This convenience allows us not to use the

method suggested by Lee and Ready (1991). After I screen the data, we construct the equation for Vector Error Correction Model (VECM) and Vector Moving Average equation. Then, we use Cholesky decomposition to rotate the axis to get the range of the variance decomposition.

We estimate information share for each stock for each trading day and compute the mean of these estimates to obtain the degree of price discovery by trader type. The information share for each trader type is obtained each day. Then we divide the information share into quartiles based on several characteristic such as foreign turnover, foreign holding, etc. following Hasbrouck (2003). We also use the conditioning variable, trade volume and number of transaction, to compute weighted mean of information share following Anand and Subrahmanyam (2005).

Chapter VI: Empirical Findings

We estimate information shares on a daily basis and average them to get the mean of information share. Table 5 presents the information share by stock classified by trader type. The information share for each stock is estimated on a daily basis and averaged across all trading days. There are 10,950 stock trading days used in the study. The number of transaction per day varies significantly across days and across stocks. The average information share of retail customers is about 44 to 45 percent whereas the average information share of the foreign investors is about 54 to 55 percent. The information share of the retail customer and foreign investors ranges from 30 percent to 70 percent. Out of 50 stocks, there are only 12 stocks (24 percent) in which the retail customers account for higher information share than the foreigners. The result of finding in the table indicates that the foreign investors are the major contributor to the price discovery of the share and are considered more informed traders. Table 6 prepares the summary statistics of the overall information share. All of the averages indicate that the foreign investors, on an average, contribute more to the price discovery of the stock. The difference between the mean of the two groups is about 10 percent. We perform the Wilcoxon signed rank test to test the difference between the information share between the retail customers and foreign investors. The result shows a significant difference between the information shares between two groups of investors at 0.01 percent level of significant.

Anand and Subrahmanyam (2005) suggest the information share should be controlled based on number of transaction and number of volume traded. They suggest that I should divide the information share by the average number of transactions or volumes traded to account for the difference in trading of each stock. I follow their methodology. The result is presented in panel A and panel B of the table 7. It is obvious that by controlling for number of transaction and the volume traded, the degree of information share becomes very apparent. The average controlled information share of the foreign investors increases substantially and is much higher than the information

share of the retail customers. The mean of information share for foreign investors controlled by the proportion of transaction is more than 4 times greater than that of the retail customers. The result is less compelling but still very strong for the mean of information share controlled by volume traded. This evidence suggests that even though the foreigners trade less number of stocks but the contribution to price discovery is strong.

In table 8, we group the simple average of the information share of each stock by market capitalization, foreign turnover, foreign ownership and number of transaction. The information share of foreign investors is larger than that of the retail customers in every classification. The information share is larger for the companies with large market capitalization and high amount of foreign turnover. The information share grouped by foreign ownership does not produce much different outcome. However, it is worth noting that the information share of foreign investors tend to be larger for stocks with less number of transaction while it is opposite for the retail customers. This may be due to the fact that the stocks with high frequency may not provide much opportunity for the foreigner to discover the price since it takes short time to converge to random walk price. On the other hand, there is a high level of information share when the stocks are traded more frequency which may be due to liquidity need. Table 9 presents the result of the information share controlled by proportion of number of transaction traded and by volume traded. The controlled information share shows similar pattern to the simple average of information share but with a much greater degree. One contradiction to the early result is that the controlled information share is not directly related to the market capitalization and foreign turnover and the controlled information share is very strong when the stocks are traded more frequently.

From all the results presented earlier, we can draw a conclusion that the foreign investors are the major contributor to price discovery. This can be related to the better information that the foreign investors have while the domestic retail customers do not.

Robustness Check

We estimate the information share for each group of investors using the transactional data for every five minutes. The transaction price in each five minutes range is an average transaction price executed within that five minutes. The sample size of the total number of transactions per stock per day is equal to 54 samples. This lowers the degree of extrapolation used with the transaction price by seconds. We follow Hasbrouck (1995) and the result of the information share by stock and number of stock day for each stock is presented in table X. The result confirms our earlier price discovery result. Foreign investors are the major contributors of the price discovery representing about 39 to 65 percent of the price discovery whereas the retail customers contribute about 34 to 61 percent. There are 12 stocks in which the retail customers contribute more. The summary statistics of the information share estimate is presented in table XI. The Wilcoxon signed rank test shows a significant difference between information share of two groups of investors at 1 percent level of significant. Table XII presents the estimate of the information share estimates controlled by the number of transactions and the percentage of volumes traded. After we account for the proportion of volume traded and the proportion of number of transaction, the degree of price discovery by the foreign investors is significantly higher than that of the retail customers. The Wilcoxon signed rank test shows a significant difference between information share of two groups of investors at 1 percent level of significant.

Chapter VII: Conclusion

Our research finds out that the foreign investors are indeed informed traders and contribute to the price discovery as measured by information share. The information share varies by stocks but, in our sample of 50 stocks, about 80 percent of the stock show that the contribution to price discovery of the foreign investors is greater than the retail customers. We use 10,950 stock trading days in the study and the number of transaction per day varies significantly across days and across stocks. About 54-55 percent of the discovery is contributed by the foreign investors. The information share of the retail customer and foreign investors ranges from 30 percent to 70 percent. Out of 50 stocks, there are only 12 stocks (24 percent) in which the retail customers account for higher information share than the foreigners. The result of finding in the table indicates that the foreign investors are the major contributor to the price discovery of the share and are considered more informed traders. Our finding supports previous literature which endorses the better information that foreign investors possess. We further investigate the characteristic underlying the degree of informed trading and find out that the highest degree of price discovery by foreign investors occur with stocks with large market capitalization and high foreign turnover while the price discovery is indifferent among stocks with different foreign holding. This supports our contention about the better information that the foreign investors have.