Do Domestic Investors Have an Information Advantage?
Evidence from Indonesia

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Abstract

Using transaction data from the Jakarta Stock Exchange, I find three pieces of evidence which indicate that domestic investors have an information advantage over foreign investors. First, foreign investors systematically buy at higher and sell at lower intra-day prices than domestic investors. Second, foreign investors tend to sell prior to large positive returns. Finally, the permanent impact of foreign purchases is smaller than that of domestic purchases. Over time, prices at which foreign investors trade have worsened, while foreign selling prior to positive returns has disappeared.

1 Introduction

Despite the tremendous increase in international capital flows during the 1990s, home bias is still a prevailing feature of equity portfolios (Ahearne et al. 2001). One possible explanation for home bias is that foreigners face higher information costs than domestic investors (see Lewis 1999). However, the hypothesis that domestic investors possess superior information has always been controversial. One reason for this controversy is that foreign investors tend to have a significant amount of investment experience and expertise, and are thus in a better position to evaluate firms' prospects. On the other hand, foreign investors could be at a disadvantage because information about companies has to travel physical as well as cultural distances. In addition, outside of the U.S., rules against insider trading are poorly enforced (Bhattacharya and Daouk 1999). The empirical evidence on this issue is mixed. While Choe, Kho and Stulz (2000) using Korean data, and Hau (2001) using German data find that foreigners are at a disadvantage, Seasholes (2000) using Taiwanese data and Grinblatt and Keloharju (2000) using Finnish data make a convincing case that foreigners do better than local investors. Furthermore, Kang and Stulz (1997) using Japanese data find no difference in the performance of domestic and foreign investors.

The question of information asymmetries in international equity markets is important for at least two reasons. First, when domestic investors have better information, foreign investors may be reluctant to invest in local securities. This generates home bias, implying insufficient risk sharing and excessive volatility in consumption and resulting in welfare losses. Information asymmetries lead to fewer capital flows which in turn lead to an inefficient allocation of world savings. In particular, they leave developing countries with inefficient levels of capital. Second, there are now arguments to replace debt finance with equity (see Rogoff 1999). Equity flows have typically been far smaller then debt flows. The Asian crisis underlined the disadvantages of debt. In order to facilitate the shift from debt to equity it is important to understand the nature of the asymmetries that exist in these markets.

How can one find out who has the information advantage? There is a surprising variety of approaches used in the literature. Virtually every study tries to infer information asymmetries using a different method. The specific method employed usually depends on the type and detail of data used, and more importantly, on the underlying theoretical model. In an early study, Brennan and Cao (1997) make inferences from the the correlation between aggregate flows and returns. Grinblatt and Keloharju (2000) look at whether foreigners are better than domestic investors at buying future

winners and selling future losers. Hau (2001) compares trade-to-trade profits of foreign and domestic traders. Seasholes (2000) looks at whether foreigners buy or sell prior to positive or negative earnings surprises. Choe, Kho and Stulz (2000) use a variety of approaches including a comparison of the prices at which domestic and foreign investors trade, patterns of net buying prior to large returns and the price impact of foreign and domestic trades.

This paper investigates information asymmetries in Indonesia. It uses transaction data from the Jakarta Stock Exchange (JSX). The most critical aspect of the data is that every transaction record contains information on whether the buyer or seller was a domestic or foreign investor. To my knowledge this data has never been explored in the context of information asymmetries. [1]

My research strategy combines methods which were used in previous studies of information asymmetries. I chose to do this because the multitude of approaches used previously makes it difficult to asses whether different findings should be attributed to different methods or to differences in information asymmetries across countries. Combining different methods in one study using one data set can uncover whether different methods are responsible for different results. Currently, I focus on papers by Choe, Kho and Stulz (2000)(CKS hereafter) and Seasholes (2000). I chose these papers for three reasons. First, both my paper and CKS use transaction data. Since transaction data which distinguish between trades by foreign and domestic investors are rare, investigating whether CKS's results for Korea hold in a different country, Indonesia, will provide additional and useful evidence. Second, CKS and Seasholes arrive at contradictory conclusions. While CKS find that domestic investors have an information advantage, Seasholes finds the opposite. Finally, both CKS and Seasholes consider East Asian emerging markets.

The data in this paper span nearly 7 years from January 1995 through September 2001. This is the longest sample period than in any previous study of this type. I carry out the analysis for different sub periods and investigate whether information asymmetries change over time. In summary, this paper contributes to the debate on information asymmetries between foreign and domestic investors in three ways: it uses a previously unexplored dataset; it combines several different methodologies; and it looks at how information asymmetries change over time.

The remainder to the paper is organized as follows. I begin with a brief description of the data. I then compare the intra-day prices at which domestic and foreign investors trade. Next, I

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[1] I found only two academic studies that used data from the JSX. Bonser-Neal, Linnan and Neal (1999) use pre 1995 data to estimate transaction costs. Comerton-Forde (1999) looks at the impact of opening procedures on market efficiency on the Australian and Jakarta Stock Exchanges.

look at whether foreign or domestic investors can anticipate large returns and good or bad news announcements. Finally, I compare the price impact of domestic and foreign trades. The last section concludes.

2   Data Description

Indonesia has two stock exchanges: JSX and Surabaya Stock Exchange. They are about equal in market capitalization, but JSX accounts for over 90% of combined trading volume. The JSX consists of several trading boards. Since 1995 virtually all trading on the JSX takes place through an automated system. The regular board, which accounts for 98% of all trades is an order-driven system operating as a continuous auction. Brokers enter their orders which are then matched by the computer according to price and time priorities. There is also a negotiated board where prices are agreed upon by two brokers, and a crossing board where a trade is done by one broker who has two orders to buy and sell at the same price and quantity. Before September 1997, Indonesia had a 49% limit on foreign ownership and a foreign board where stocks that reached this limit were traded among foreigners. I consider only regular board transactions in this paper.

My data consists of records for each transaction on the JSX from January 1995 until the end of September 2001. Each record contains the date, stock code, transaction price and volume of shares. Most importantly, each transaction record indicates whether the customer represented by the selling and buying brokers is a domestic or foreign investor. In addition, since April 1996, each transaction record contains the buy and sell order number. Therefore, it is possible to identify whether the trade was buy or sell initiated. Finally, from January 1999 on, each transaction has a time stamp with the hour, minute and second of when the trade was executed.

Table 1 shows a few descriptive statistics of the data. The number of firms traded on the JSX has steadily increased from 235 in 1995 to nearly 300 in 2001. Also, the number of firms that were traded every day jumped from 5 in 1995 to 33 in 2001. No single firm was traded every day throughout the entire sample period. The number of trades has increased every year since 1995 and reached a total of well over 20 million by the end of September 2001. Approximately a quarter of these trades involved foreigners on one or both sides of the transaction. Trading volume expressed in dollar value traded shows tremendous fluctuations. Part of these fluctuations can be attributed to the movement in the exchange rate. 1998 stands out as a particularly low volume year. A striking feature of the data is that the foreign share in the trading volume has steadily declined from 58% in 1995 to a

mere 7% in 2001. Net foreign inflows are small compared to foreign trading volume and also show considerable fluctuations. For example, in 1997 foreigners took $430 million out of Indonesia - over two thirds of the net inflow over the past two years. Market capitalization also shows signs of the Asian financial crisis with a drop of more than 84% in market value from the end of 1996 to the end of 1998.

Throughout this paper I compare my results to those of CKS who use Korean data, and with those of Seasholes who uses Taiwanese data. Therefore, a brief comparison of the Indonesian market with these markets is in order. The JSX is the smallest of the three with market capitalization of about $26 billion at the end of the year 2000 compared to $247 billion in Taiwan and $148 billion in Korea. Foreign ownership is somewhat greater in Indonesia than in Korea. Choe, Kho and Stulz (1999) report that about 6% of Korean stocks were owned by foreigners in 1997. The JSX factbook reports that foreign ownership in that year was 25%.

A comparison along another dimension may be important. CKS use time period from December 1996 to November 1998. For most of this two year period, Korea was in a severe financial crisis during which the Korean stock market plunged 75% in dollar terms. It is possible that their results are affected by the special circumstances surrounding this crisis. My dataset covers both pre and post crises period. Another important comparison is that CKS have data to differentiate between institutional and individual investors. My data distinguishes only between foreingers and domestic investors. Unfortunately, at this point I have no information as to how much of the domestic trading is by institutions vs. individuals. The facts that mutual funds are not widely spread in Indonesia and that there are nearly 200 brokers suggest that a large portion of the domestic trading is by individuals.

3 Do foreigners trade at worse prices?

This section investigates whether there are any systematic differences in average intra-day prices at which foreign and domestic investors trade. I follow CKS's method and select only days when both domestic and foreign investors trade the same stock. Next, I calculate the trade weighted average of the price at which domestic investors bought the stock. I do the same for foreign investors. I take the difference between these two averages and normalize it by the trade weighted average price at which the stock was traded during that day. Scaling the difference in prices by the average price ensures that the differences are comparable across stocks and time. In summary, I consider the

following expression:

$$bdif_{i,t} = \frac{B_{i,t}^D - B_{i,t}^F}{A_{i,t}}$$

where $B_{i,t}^D$ is the trade weighted average purchase price of stock i on day t paid by domestic investors; $B_{i,t}^F$ is defined analogously for foreign investors; and $A_{i,t}$ is the trade weighted average price of a stock i on a day t. The differences in prices at which investors *sell* a stock are calculated analogously. The scaled differences are first averaged across stocks for each day and then across days. Standard errors are calculated using the variation in daily averages. This is done because the price differences for different stocks on the same day are unlikely to be independent. The assumption that average daily differences are independent is more reasonable. This independence is necessary for t-statistics to be valid. Equally weighted averages are shown in table 2. The t-statistics test whether average difference in prices paid by domestic and foreign investors are different from zero. The first two columns show that the difference is significantly negative for purchases and significantly positive for sales. This means that foreigners buy at significantly higher and sell at significantly lower prices than domestic investors. Foreigners systematically trade at worse prices than domestic investors, suggesting that domestic investors may have an information advantage. These results are strikingly similar to those found in CKS. They find that foreign money managers pay 0.14% more than domestic individual investors. This is identical to my result for all foreigners compared to domestic investors. [2] The differences in sell prices appear somewhat higher in Indonesia than in Korea. I find that foreigners sell at prices that are 0.24% lower than the prices at which domestic investors sell; CKS find the corresponding difference to be only 0.16%. Interestingly, consistent with CKS's result, I find that foreigners trade at worse prices when they sell than when they buy.

I repeat the above analysis for the three sub periods as shown in table 2. In each sub period the qualitative differences in prices paid by foreign and domestic investors are the same as in the full sample. [3] Also, the asymmetry between sales and purchases is consistent over time, although the most dramatic difference is during the crisis period of 1997-1998. There is an indication that the prices at which foreigners trade have worsened since 1995 and 1996. Table 2 indicates that foreigners buy at progressively higher prices than domestic investors. In 1995/1996 the cost of round trip in a stock was about 0.16% higher for a foreign investor than for a domestic investor. Between 1997 and 2001 this difference almost tripled to 0.47%. As CKS point out, the economic significance of this difference depends on the amount of trading an investor does. If an investor holds a stock for

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[2] The t-statistics are also remarkably close.

[3] Although not reported, the differences are statistically significant for every year in the sample.

one year, the difference in performance between domestic and foreign investors will be only 0.47%. However, if an investor buys and sells his portfolio 10 times a year, the return of a foreign investor will be 4.7% lower than that of a domestic investor.

One concern is that the differences in intra-day price paid by foreigners and domestic investors are driven by differences in trade sizes. In Indonesia, an average domestic trade is about 35% smaller than an average trade by a foreign investor. Large purchases/sales must offer premium/discounts to compensate other traders for the provision of liquidity. This concern is addressed in the last six columns of table 2 where the differences in prices are calculated separately for three different trade sizes. Every day all trades are split into three groups according to the traded value. Small, medium and large trades are indicated by 1, 2 and 3 respectively. I find that the differences are the same across different trade sizes except for large purchase trades in 1995-1996 where the difference is statistically insignificant.

To check the robustness of the above results, I weigh the differences for each stock and day by the daily trade value rather than weighing the differences equally. Table 3 shows results using trade weighed averages. I find that for the whole sample, results are statistically significant and qualitatively the same as in the equally weighted procedure, although the differences between foreign and domestic prices are somewhat smaller. [4] Across sub-periods it appears that between 1995 and 1998 foreigners no longer buy at significantly higher prices, but they still sell at lower prices. In the most recent sub-sample, foreigners both buy and sell at worse prices for all trades as well as across different trade sizes. In summary, there is strong evidence that foreign investors trade at worse intra-day prices than domestic investors. This suggests that domestic investors have at least a short term information advantage.

4   Are foreigners better able to anticipate events?

This section examines the behavior of foreign investors around large positive and large negative returns. If foreign investors tend to sell prior to positive returns and buy prior to negative returns, they may be at an information disadvantage. Returns are classified as "large" when abnormal returns exceed 5% in absolute value. The abnormal returns are residuals in a regression on a constant and the return on the JSX composite index. To examine foreigners' behavior around these returns I

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[4] That the differences decrease is similar to the result of CKS. They found that using the trade weighted procedure, the differences for all trades are no longer significant, though they are significant for some trade sizes.

look at daily net foreign value bought divided by the market capitalization of the stock. Under this definition, foreign net buy is equal to domestic net sell. If a stock is not traded during a particular day, the observation is treated as missing. If a stock is not traded by foreigners but is traded by domestic investors, foreign net buy is equal to zero. I proceed in two steps: first, I look at the behavior around all large positive and negative returns; and second, I consider only large positive or negative returns which coincide with news announcements.

4.1 Foreign net buys around large returns

Figure 1 shows foreign net buys for the period five days prior and five days after large positive returns. If domestic investors can anticipate the positive returns better than foreigners, foreign net buys should be negative prior to the positive return. The first panel presents the results for the full sample. The graph shows that for three days prior to the positive return, foreign investors are significant net sellers. The average net foreign buy over five days preceding a large positive return is significantly negative. This means that domestic investors are buying stocks during the five days prior to a large positive return, perhaps because they posses valuable information which is revealed later on. On the day of the positive return, foreigners are significant net buyers. After the event, net foreign buys are statistically insignificant.

Turning to the results for the same three sub-samples that were considered in the previous section, it appears that foreigners have recently done better at anticipating positive returns than they did in the past. In the earliest sub-sample, foreigners are significant net sellers during the four days prior to positive returns. Foreigners did the worst during the 1997-1998 time period when they were net sellers on all five days prior to positive events. During this time period, domestic investors took full advantage of their superior ability to predict positive returns. In contrast, between 1999 and 2001 foreign buying prior to the event is statistically insignificant. This may be an indication that the information asymmetry between domestic and foreign investors improved over time.

Figure 2 shows the behavior of foreign net buys around large negative returns. If domestic investors are better informed, net foreign buys should be positive prior to negative returns. However, the full sample results show that this is not the case, and that foreigners are not statistically significant buyers or sellers prior to negative returns. This suggests that domestic investors do not have private information about price declines. It is unclear why there would be any difference between private information about positive events and private information about negative events. If domestic investors can anticipate positive returns as shown in figure 1 they should also be able to anticipate

negative returns. Yet figure 2 shows that if they do have this private information they do not trade to profit from it.

The three sub-samples show that only in the most recent sub-sample do foreigners buy prior to negative returns, indicating that during this time period domestic investors profit from their superior information. This suggests that the information asymmetry has increased over time, which is opposite of the inference made from the behavior prior to positive returns. Comparing these results with CKS shows that in Korea there is stronger evidence of information asymmetries. CKS find that foreigners are significant sellers prior to positive returns *and* significant buyers prior to negative returns. Also, the magnitude of net buys (as a percentage of market capitalization) is roughly 50 times higher in Korea than in Indonesia. [5] CSK find that foreign net buys are on average 50 basis points during the 5 days prior to positive returns, while I find the magnitude of net buys to be only 1 basis point. This means that during the 5 days, foreign ownership changes by only 5 basis points. The economic significance of this change in ownership depends on the initial level of ownership. If foreigners initially own 25% of the stock, the 5 basis points change in ownership translates to 25 basis points difference in returns. Depending on the frequency of these events, the ability of domestic investors to anticipate positive returns could result in economically significant differences between domestic and foreign returns.

4.2   Foreign net buys around news announcements

Even a cursory look at figures 1 and 2 shows that on the day of large positive returns, foreigners are always significant net buyers, while they are net sellers on the days of negative returns. This raises a concern that perhaps large returns are not related to a revealed information but rather, are due to price pressure from foreign buying and selling. As Seasholes (2000) argues, the relationship between returns and flows is endogenous. This possibility does not invalidate the preceding analysis, but makes it more difficult to detect informed behavior. If large returns are not related to information, there is no reason why domestic or foreign investors would buy or sell prior to these returns. A better way to detect informed behavior is to identify large returns which are due to information revelation and not price pressure. Seasholes tries to isolate information events by looking at the effects of earnings announcements. The timing of the announcements should not be be related to foreign flows. If domestic investors have inside information or are able to predict the news, they

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[5] This assumes that CKS express the net buys in their table 4 in fractions rather than percentages. I am checking with CSK to confirm this.

should buy prior to good news and sell prior to bad news.

I collect data on news wires from the major Asian real time news provider, AFX News. The data covers the period from April 1, 1999 through September 2001. Each day there are between 20 and 30 news stories that match the keyword Jakarta. Each story is posted at London time, and I convert this to Jakarta time. If a story occurred after JSX trading hours it is treated as if it occurred the next day. The few stories that are posted on Saturday and Sunday are treated as having occurred on Monday. I identified 3846 stories specific to 184 companies listed on JSX. I keep only company specific news and omit all political, macroeconomic and other stories. Stories which appear on days with abnormal returns of greater than 5% are classified as good news. Bad news is classified analogously. There are 422 news announcements that are classified as good, and 311 bad.[6] I use the same method as in the previous subsection but only returns which coincide with news announcements are included. As only information events are considered this method should add power to my tests . The cost is that news data span a shorter time period and the number of observations is therefore substantially lower.

The first panel in figure 3 shows the net foreign buys around good news. There is no evidence that foreigners are significant net sellers or buyers prior to good news. They do, however, react to good news by buying on the day of the news and they continue to buy on the next day. Thus, the behavior around good news is the same as that surrounding the large positive returns during the 1999-2001 subsample. The second panel in figure 3 shows that foreigners are net buyers prior to bad news, but the average net buy is significant only at a 10% level of confidence. Overall, the results using news announcements are the same as those using all large returns.

How do these results compare to those by Seasholes? Using data from Taiwan he found that foreigners are better informed than domestic investors, i.e. they tend to buy prior to good news and sell prior to bad news. In order to compare my results to his, I widen the window to 22 days prior to the event which is the length used in his study. Interestingly, when using this time frame I also find that foreigners tend to buy prior to good news, although this result is significant only at a

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[6] The 5% threshold is very conservative for detecting "important" news. Seasholes identifies good and bad news by comparing the actual earnings with their forecasts as provided by I/B/E/S. The price reaction to good news is only about 2% and to bad news about -3% (see table 4 in Seasholes(2000)). I use all news rather than earnings news. If only earnings news are used, the number of good news drops to 110 and the number of bad news to 64. The results using earnings news are very similar to those using all news.

10% level of confidence. [7] However, in contrast to Seasholes findings, I find that foreigners are also significant buyers prior to bad news as shown in the last panel of figure 3. Thus, using Seasholes' method on my data yields the result that domestic investors have an information advantage.

Overall, the results in this section point to the conclusion that domestic investors have an information advantage. The results are not as strong as those found in by CSK in Korea, but they are far from the opposite conclusion found by Seasholes in Taiwan. In addition, the evidence does not appear stable over time and there seems to be a puzzling asymmetry between trading patterns prior to negative and positive returns. In particular, I find that earlier in the sample domestic investors buy prior to positive returns but do not sell prior to negative returns. This pattern is reversed in the most recent sub-sample when domestic investors sell prior to negative returns but do not buy prior to positive returns.

5   What is the price impact of foreign vs. domestic trades?

The previous section looked at foreign flows around large returns. This section does the reverse: it looks at returns around large foreign flows. It investigates the price impact of net foreign and domestic order imbalances on prices. If foreign or domestic investors trade as a result of information that they have, their trades should be associated with a permanent change in prices. Underlying this proposition is the assumption that shifts in the demand for stocks create no permanent changes in prices, i.e. excess demand curves are horizontal. There is evidence from developed markets that demand curves for stocks in fact slope down (see Shleifer (1986), and Kaul, Mehrotra and Mork (2000)). One reason for downward sloping demand curves is disagreement among investors over the value of securities (see Varian(1985)). Given that this disagreement is likely greater in emerging markets, excess demand curves are likely to be even more inelastic in emerging than in developed markets. Nonetheless, there are at least three reasons why looking at the price impact of foreign vs. domestic trades is a useful exercise for the purposes of this paper. First, I can compare the price impact of foreign and domestic investors. While all large trades may cause permanent price changes, large *informed* trades should have a greater impact than large *uninformed* trades. Hence, comparing the impact foreign and domestic imbalances of the same size can identify which trades contain more information. The second reason is that in Indonesia, traders know whether a particular order is by

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[7] The magnitude of net buys is strikingly similar to that of found in Seasholes, i.e. about 40 basis points on a cumulative basis over the 22 day period.

a foreign or domestic investor.[8] If traders believe that demand from a particular class of investors contains more or less information, they can immediately update their valuations. Hence, trades by the class that is believed to have more information should have a more permanent effect on prices. For example, if domestic investors believe that foreign purchases reveal that stocks' prospects are bright, foreign buys should have a permanent effect on prices. Finally, I would like to establish a benchmark for the price impact of foreign and domestic trades in Indonesia and compare it to that found by CKS in Korea.

I conduct two studies at different frequencies as was done by CKS. One is an intra-day study using five minutes intervals and the other is an inter-day study using daily data. In both studies, I use only price setting rather than all trades for each type of investor. A price setting buy is defined as a trade where the buy order arrives after the sell order. This means that I look at the impact of foreign trades that were initiated by foreigners, and the impact of domestic trades that were initiated by domestic investors. It is reasonable to expect that price setting trades are information driven. The foreign price setting order imbalances are calculated as the number of shares in price setting buys minus the number of shares in price setting sells. The difference is divided by total share volume traded during the day. The domestic order imbalances are calculated analogously. Note that since only price setting trades are included, foreign imbalance is not necessarily equal to the negative of the domestic imbalance. The ten largest imbalances for each stock over the sample period are included in my calculations. The means of these largest imbalances for foreign and domestic investors, in both the intra-day and inter-day studies, are not statistically different. Therefore, I will be comparing the impact of trades of the same size.

5.1 Intra-day study

Each trading day is divided into 60 intervals of 5 minutes each. [9] Since the time stamp on each transaction starts only in January 1999, I use the period from 1999 through 2001 in this subsection. There are many intervals when certain stocks are not traded. I therefore have to make an assumption about returns during those intervals. I assume that when a stock is not traded the return is zero. [10] I calculate raw returns in period t as $log(\frac{P_t}{P_{t-1}})$ where P_t is the last price at which the stock was

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[8] Orders by foreign investors are shown in a separate column of the order book, which is available to all traders in real time.

[9] On Friday there are only 48 intervals as trading is two hours shorter than on Monday through Thursday.

[10] This is not the only way to do it. Different assumption regarding return processes in intra-day studies are discussed in Barclay and Litzenberger(1988). For example, I could have treated non-trading intervals as missing or, as Barclay

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traded in period t. I conducted the analysis using mean adjusted returns. These are defined as raw returns minus the mean return over the same time of day interval. Since there is very little intra-day pattern in returns, the results are the same.

Figure 4 shows five minute interval returns around large foreign and domestic price setting imbalances. Cumulative returns over the 10 periods prior to the large imbalance $CAR(-10, -1)$ are also calculated. The total effect of the event is defined as the return in the period of large imbalance plus the next period return $CAR(0, +1)$. The total effect can be divided into the permanent and temporary effects. The permanent effect is the cumulative return from the event through the next ten periods, $CAR(0, +10)$; and the temporary effect is the cumulative return from the period after the event through the next ten periods, $CAR(+1, +10)$. The results show that large price setting imbalances of both foreign and domestic investors have a significant immediate impact on prices. Both foreign and domestic purchases have an immediate impact of about 3% which is somewhat larger than the -1.5% impact of sales. In all cases there are statistically significant reversals from the initial impact ranging from 27 to 52 basis points. However, the immediate impact is far from fully reversed within the 50 minutes after the large imbalance.

I now investigate which class of traders have a more permanent impact on prices and thus identify trades which contain more information. Foreign purchases have a larger permanent impact on prices than domestic purchases. The difference is 0.54% which is statistically significant, though it has hardly any economic significance. Similarly, foreign sales have a larger permanent impact. The difference is only 0.27% and is not statistically significant. In summary, at the 50 minutes horizon the difference in the permanence of price impact between foreign and domestic investors is small.

The preceding results are similar to those found by CKS. They also find that at a five minute frequency the differences between the permanent impact of foreign and domestic trades are small. Interestingly, they also find that the impact of purchases is greater that the impact of sales. However, the magnitude of the price impact in Korea is considerable smaller than that found here for the JSX. The difference is about two percentage points for sales and less than one percentage point for sales. This indicates that the JSX market is probably less liquid than the Korean stock exchange.

and Litzenberger (1988) do, assume that stock returns follow a continuous time process and assign a particular return to each interval.

5.2 Inter-day study

It is possible that intra-day day frequency is not appropriate to investigate the permanence of the price impact of foreign and domestic trades. Therefore, this section investigates the price impact using daily frequency. Specifically, I look at daily returns 10 days before and 10 days after large price setting imbalances. The time period used in this section starts in April 1996, since that is when information on price setting trades begins. I conduct the analysis using three different definitions of returns: raw returns, returns adjusted for day of the week effect and market adjusted returns, i.e. returns exceeding the return on the JSX composite index. The results are almost identical using these three definitions. Therefore, I present only results for market adjusted returns. These appear in figure 5. The first panel shows that foreign purchases have a large impact of about 3% on the day of the large imbalance. About third of that impact is reversed the next day and the rest of the impact is reversed over the course of the next 10 days. Thus, large foreign purchases have no permanent impact on prices. This means that when foreigners make large purchases, they tend to experience losses for the next 10 days. Turning to the next panel, large domestic purchases have an immediate impact of about 2.5%. Over the course of the next 10 days, only 2 basis points are reversed. Thus, unlike foreign, domestic purchases have a permanent impact on prices. This suggests that domestic purchases contain more information than foreign ones.

The story is quite different for large sales. Foreign sales have a large negative impact of almost -4%. The immediate impact is not reversed within the ten days after the imbalance. As for domestic sales, the immediate impact is much smaller, about -1%. As in the case of foreign investors, it is also permanent. Foreign sales have a greater permanent effect and the difference of about 3% is statistically significant. The inference to be drawn is that foreign sales contain more information than foreign purchases. Therefore, I am left with an ambiguous conclusion: the impact of purchases suggests that domestic trades contain information, while the impact of sales suggests the opposite. It is unclear why foreign sales should contain information while purchases do not. One possibility is that the asymmetry may have to do more with price pressure than with information. If domestic investors are credit constrained, it may be difficult for them to arbitrage away leftward shifts in foreign demand for local stocks. This problem does not arise in the case of rightward shifts in foreign demand. Exploring this possibility is beyond the scope of this paper.

How do these findings compare to those of CKS ? Their results unambiguously suggest that foreign trades contain less information that trades by domestic individual investors. They find that large foreign trades, whether purchases or sales, have no permanent impact on prices. In contrast,

both purchases and sales of domestic individual investors have a permanent impact on prices. Though not reported, I conducted this analysis for my three sub-samples as well. The findings are similar to the results from the full sample. In all three subsamples foreign purchases have no permanent effect, while domestic purchases do. In the first two subsamples, foreign sales have a greater permanent impact than domestic sales, but in the most recent one the difference is statistically insignificant. Thus, if only the most recent sub-sample were considered, the conclusion would unambiguously be that domestic trades contain more information than foreign trades.

6   Conclusion

This paper used several different approaches to infer whether domestic investors have an information advantage. While the inferences are not always unambiguous, they point to the conclusion that domestic investors have an information advantage. The strongest piece of evidence comes from the fact that foreigners systematically trade at worse intra-day prices than domestic investors. Also, there is evidence that domestic investors buy prior to positive returns suggesting, that they posses information that is only revealed later on. Finally, domestic purchases contain more information than foreign purchases.

The direction of change in information asymmetries over time appears ambiguous. The intra-day prices at which foreign investors trade have worsened substantially in recent years. Conversely, the superior ability of domestic investors to predict returns disappeared in the most recent sub-period. The conclusion that domestic purchases contain more information than foreign purchases is stable over time.

In comparison with Korea, information asymmetries in Indonesia do not appear as severe. Specifically, I do not find that foreigners buy 5 days prior to negative returns, nor do I find that foreign sales contain more information than domestic sales. However, foreign investors in Indonesia trade at even worse prices than foreign investors in Korea. Like CKS, I find that foreigners trade at worse prices when they sell than when they buy. The fact that this finding is the same in both countries suggests that it reflects a more general phenomenon rather than a special feature of one market or the other.

In comparison with the work of Seasholes on Taiwanese data, I find that foreign buying 22 days prior to *good* news is positive but statistically weak. Contrary to Seasholes' finding, foreign buying 22 days prior to *bad* news is positive and statistically significant. Therefore, domestic investors

appear to have an information advantage. Both CKS' and Seasholes' methods lead to the same conclusion when applied to Indonesian data. This suggests that information asymmetries in Taiwan may indeed be different than those in Korea and Indonesia. The interesting question is what makes the asymmetry in the Taiwanese market go the other way?

A number of other questions remain to be answered. In particular, what is the nature of the information advantage that domestic investors seem to have? Is it inside information or does it reflect better access and ability to analyze public information? Does the information asymmetry differ across firms? Is it more severe for small than large firms? Does it differ across industries or export intensity? What can be done to eliminate the asymmetry? These and many other questions are left for future research.

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Table 1: Description of JSX market during the sample period

The second column is the number of firms that were traded at least once during the sample period. The third column is the number of firms that were traded every day during the sample period. Foreign volume is calculated as foreign value bought plus sold divided by 2. Number of foreign trades is the number of trades where one or both parties are foreigners. Net foreign inflow is foreign value bought minus foreign value sold. Market capitalization is as of the end of the period.

year	no. of firms		no. of trades(mil.)		trading vol. ($bl.)		net inflow ($bl.)	market cap.($bl.)
	at all	every day	all	foreign	all	foreign		
1995	236	5	0.6	0.3	6.8	3.9(58%)	0.50	82.5
1996	252	10	1.7	0.8	18.6	9.5(51%)	0.11	131.5
1997	284	26	2.9	1.3	30.7	13.4(44%)	-0.43	36.3
1998	287	4	3.4	1.1	8.2	2.8(34%)	0.19	19.6
1999	289	22	4.4	1.0	15.9	4.2(26%)	0.56	53.4
2000	293	39	4.5	0.6	13.0	1.6(12%)	-0.08	25.0
2001	299	33	2.9	0.2	7.0	0.5(7%)	0.14	24.4
Full	343	0	20.3	5.4	100.2	35.9(36%)	0.99	24.4

Table 2: Equally weighted differences in intra-day prices paid by domestic and foreign investors

Differences in equally weighted average price paid for a stock by domestic and foreign investors during that day are scaled by average price of the stock during the day and expressed in percentages. The differences are averaged across stocks for each day and then across days. Standard errors are calculated using the variation across days. The number of stocks per day varies from 38 to 84 depending on how many stocks in a day were traded by both foreign and domestic investors. Trade sizes 1, 2 and 3 indicate day specific trade value groups where 1 is the smallest.

| | all trades | | by trade size | | | | | | |
| | purchases | sales | purchases | | | sales | | |
			1	2	3	1	2	3
1995-2001 Days: 1658								
difference dom-for	-0.14	0.24	-0.2	-0.11	-0.08	0.22	0.25	0.21
t-stat H_0: diff=0	-11.29	16.76	-12.8	-9.22	-7.62	9.83	21.44	19.38
1995-1996 Days: 495								
difference dom-for	-0.05	0.11	-0.22	-0.06	0.02	0.15	0.18	0.11
t-stat H_0: diff=0	-3.32	5.75	-11.42	-4.27	1.42	2.92	13.54	9.54
1997-1998 Days: 492								
difference dom-for	-0.14	0.33	-0.18	-0.13	-0.08	0.3	0.37	0.29
t-stat H_0: diff=0	-4.62	10.91	-5.13	-4.39	-3.26	8.18	13.66	13.3
1999-2001 Days: 671								
difference dom-for	-0.21	0.26	-0.2	-0.13	-0.16	0.21	0.22	0.21
t-stat H_0: diff=0	-11.68	11.75	-8	-7.8	-9.24	7.12	11.97	11.65

Table 3: Trade weighted differences in intraday prices paid by domestic and foreign investors

Differences in trade weighted average price paid for a stock by domestic and foreign investors during that day are scaled by average price of the stock during the day and expressed in percentages. The differences are averaged across stocks for each day and then across days. Standard errors are calculated using the variation across days. The number of stocks per day varies from 38 to 84 depending on how many stocks in a day were traded by both foreign and domestic investors. Trade sizes 1, 2 and 3 indicate day specific trade value groups where 1 is the smallest.

| | all trades | | by trade size | | | | | |
| | purchases | sales | purchases | | | sales | | |
			1	2	3	1	2	3
1995-2001 Days: 1658								
difference dom-for	-0.04	0.17	-0.11	-0.05	-0.04	0.24	0.21	0.17
t-stat H_0: diff=0	-3.34	13.39	-4.44	-2.75	-3.07	8.61	10.95	13.19
1995-1996 Days: 495								
difference dom-for	0.02	0.1	0.02	0.06	0.03	0.13	0.16	0.1
t-stat H_0: diff=0	1.62	8.19	0.86	2.84	1.89	6.08	9.06	7.44
1997-1998 Days: 492								
difference dom-for	0	0.18	-0.05	0.03	0.01	0.24	0.25	0.18
t-stat H_0: diff=0	0.08	7.58	-1.42	1.32	0.34	6.2	9.15	7.54
1999-2001 Days: 671								
difference dom-for	-0.08	0.19	-0.23	-0.14	-0.07	0.28	0.2	0.18
t-stat H_0: diff=0	-3.93	8.46	-4.35	-4.31	-3.84	4.97	5.38	8.28

Figure 1: Daily foreign net buys around large positive returns

Net buys for each stock are calculated as a percentage of net value bought in market capitalization. Large positive daily returns for each stock are defined as abnormal returns exceeding 5%. Event windows which overlap an earlier window for the same stock are excluded from the sample. Observations are averaged across stocks for each day and then across days. Dots represent net buys. Hyphens represent net buys +/- two standard errors. The avg(-5,-1) and avg(+1,+5) are the average net buys over the 5 days prior and after large returns respectively. The avg diff is the difference between net buys prior and net buys after the event. T-statistics are in parentheses.
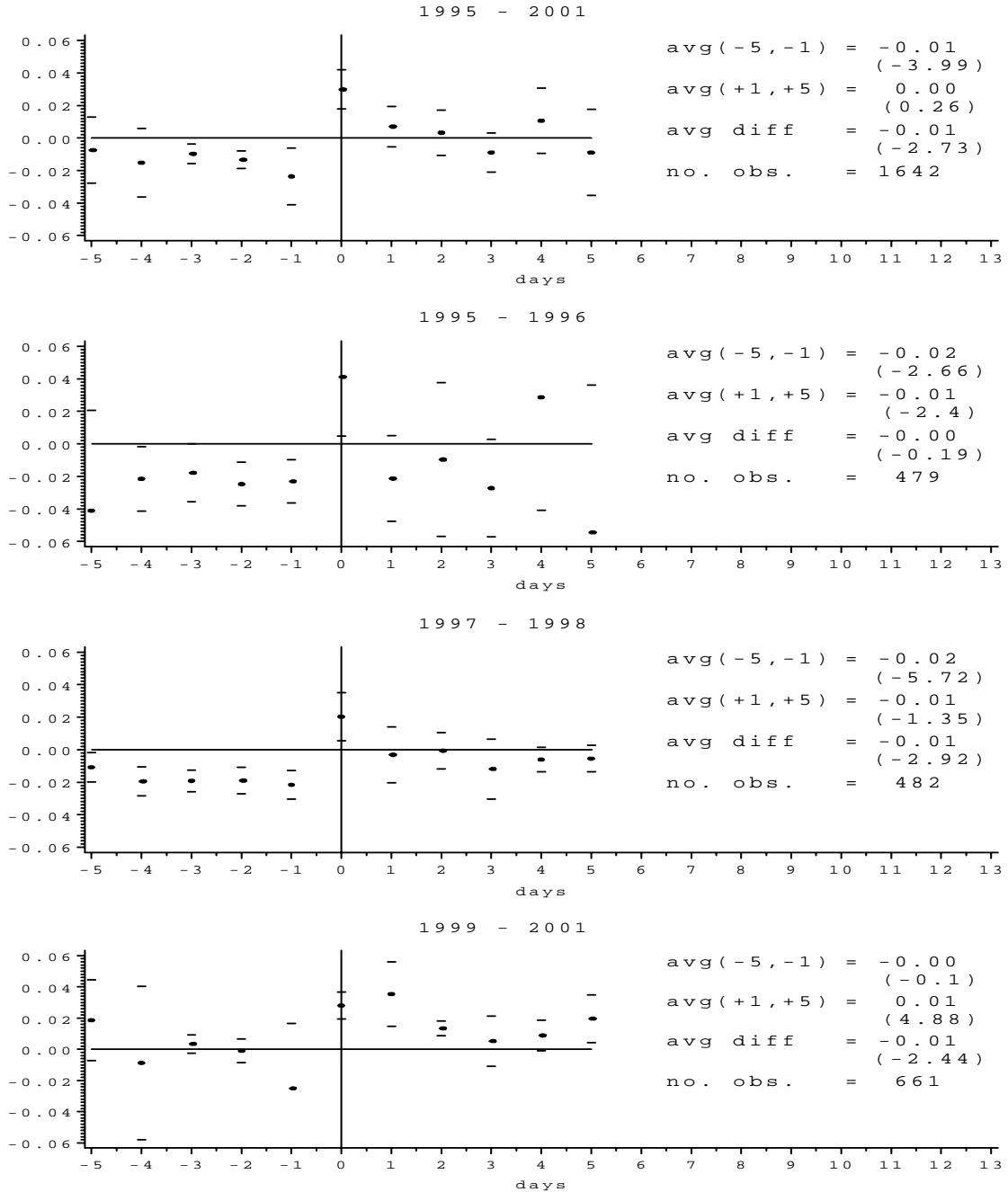
Figure 2: Daily foreign net buys around large negative returns

Net buys for each stock are calculated as a percentage of net value bought in market capitalization. Large negative daily returns for each stock are defined as abnormal returns below -5%. Event windows which overlap an earlier window for the same stock are excluded from the sample. Observations are averaged across stocks for each day and then across days. Dots represent net buys. Hyphens represent net buys +/- two standard errors. The avg(-5,-1) and avg(+1,+5) are the average net buys over the 5 days prior and after the large returns respectively. The avg diff is the difference between net buys prior and net buys after the event. T-statistics are in parentheses.

1995 - 2001

avg(-5,-1) = 0.00
                  (1.02)
avg(+1,+5) = -0.01
                  (-5.74)
avg diff   = 0.01
                  (3.9)
no. obs.   = 1639

1995 - 1996

avg(-5,-1) = -0.00
                  (-0.04)
avg(+1,+5) = -0.02
                  (-5.8)
avg diff   = 0.02
                  (2.65)
no. obs.   = 480

1997 - 1998

avg(-5,-1) = -0.00
                  (-1.01)
avg(+1,+5) = -0.02
                  (-6.7)
avg diff   = 0.01
                  (3.15)
no. obs.   = 479

1999 - 2001

avg(-5,-1) = 0.01
                  (4.01)
avg(+1,+5) = 0.00
                  (1.7)
avg diff   = 0.01
                  (1.34)
no. obs.   = 660
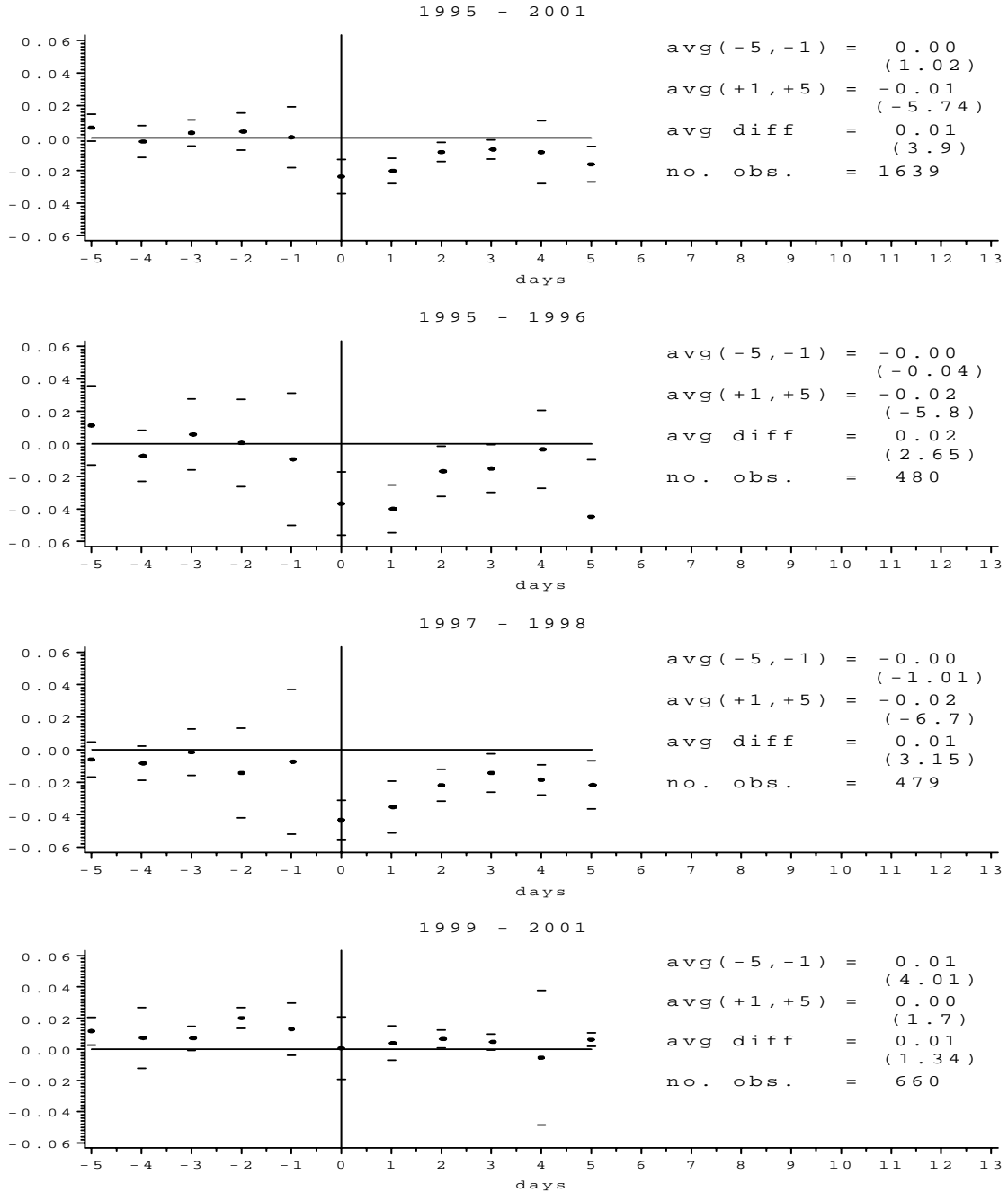
Figure 3: Daily foreign net buys around news announcements, 1999-2001

Net buys for each stock are calculated as a percentage of net value bought in market capitalization. Large negative daily returns for each stock are defined as abnormal returns below -5%. Event windows which overlap an earlier window for the same stock are excluded from the sample. Observations are averaged across stocks for each day and then across days. Dots represent net buys. Hyphens represent net buys +/- two standard errors. The avg(-5,-1) and avg(+1,+5) are the average net buys over the 5 days prior and after large returns respectively. The avg diff is the difference between net buys prior and net buys after the event. T-statistics are in parentheses.


good news

avg(-5,-1) = 0.01
(1.06)
avg(+1,+5) = 0.03
(2.69)
avg diff = -0.02
(-1.49)
no. obs. = 203

bad news

avg(-5,-1) = 0.01
(1.66)
avg(+1,+5) = 0.02
(1.11)
avg diff = 0.01
(0.38)
no. obs. = 154

good news

avg(-22,-1)= 0.02
(1.84)
avg(+1,+22)= 0.01
(3.02)
avg diff = 0.00
(0.35)
no. obs. = 159

bad news

avg(-22,-1)= 0.03
(2.19)
avg(+1,+22)= 0.00
(0.31)
avg diff = 0.02
(1.27)
no. obs. = 113

22

Figure 4: Intra-day percentage returns around large price setting order imbalances, 1995-2001

The sample includes the ten largest price setting order imbalances during a 5 minute intervals. The imbalances are calculated as the number of shares bought minus number of shares sold divided by total volume for the stock during the day. Event windows which overlapped an earlier window for the same stock are excluded fr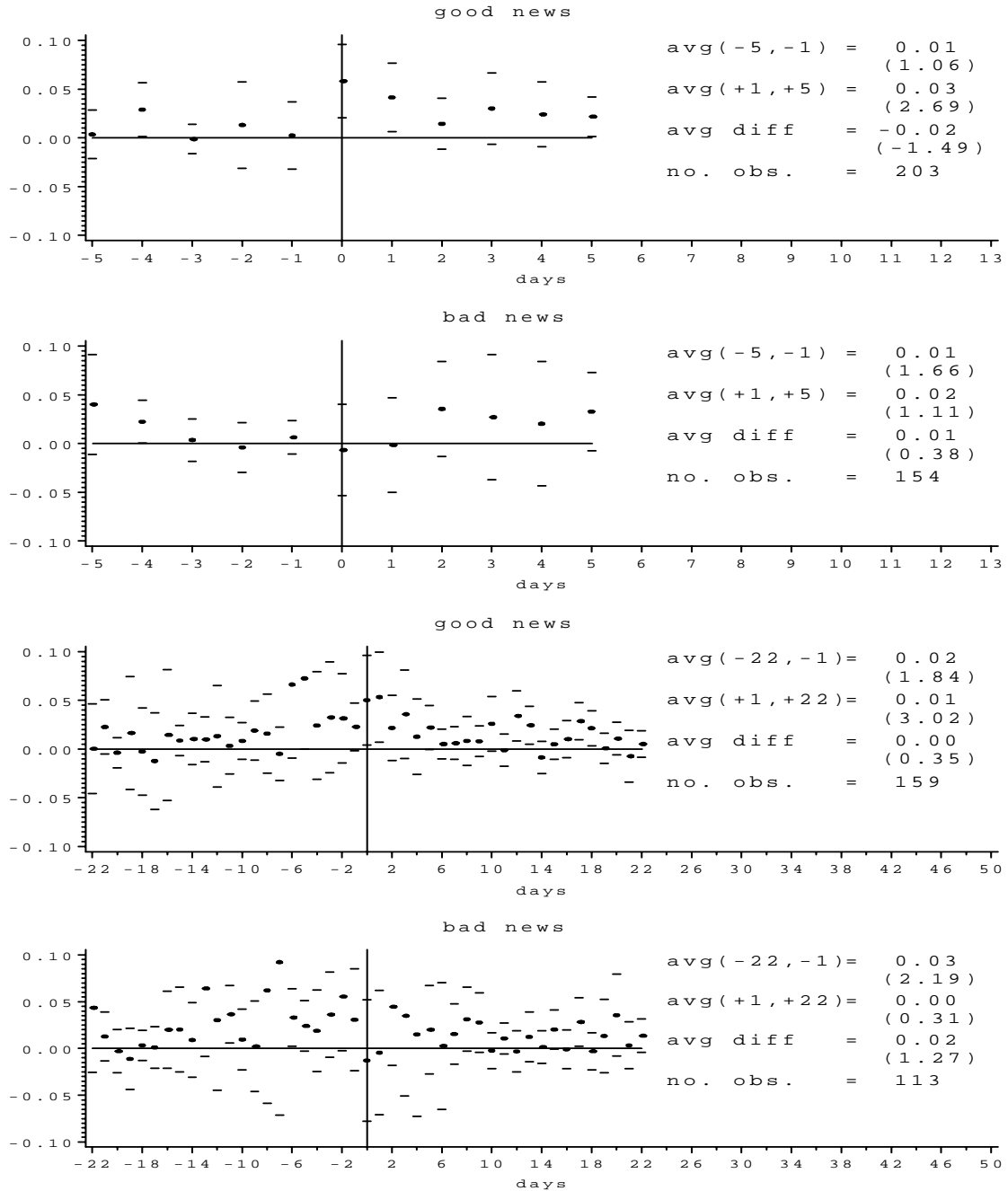om the sample. Observations were averaged across stocks for each day and then across days. Dots represent percentage returns. Hyphens represent returns +/- two standard errors. The CAR(-10,-1), CAR(0,+1), CAR(0,+10), and CAR(+1,+10) are the cumulative returns from days -10 to -1, 0 to +1 (total effect), 0 to +10 (permanent effect) and +1 to +10 (temporary effect) respectively. T-statistics are in parentheses.

foreign purchases

```
CAR(-10,-1)=    0.31
                (3.11)
CAR(0,+1)  =    3.07
                (24.36)
CAR(0,+10) =    2.67
                (18.53)
CAR(+1,+10)=   -0.27
                (-2.88)
no. obs.   =    605
```

five minute intervals

domestic purchases

```
CAR(-10,-1)=    1.16
                (8.86)
CAR(0,+1)  =    2.72
                (20.68)
CAR(0,+10) =    2.13
                (11.7)
CAR(+1,+10)=   -0.52
                (-4.43)
no. obs.   =    581
```

five minute intervals

foreign sales

```
CAR(-10,-1)=   -0.10
                (-1)
CAR(0,+1)  =   -1.75
                (-13)
CAR(0,+10) =   -1.39
                (-9.04)
CAR(+1,+10)=    0.52
                (5.6)
no. obs.   =    593
```

five minute intervals

domestic sales

```
CAR(-10,-1)=   -0.07
                (-0.69)
CAR(0,+1)  =   -1.34
                (-14)
CAR(0,+10) =   -1.12
                (-8.94)
CAR(+1,+10)=    0.31
                (3.25)
no. obs.   =    589
```
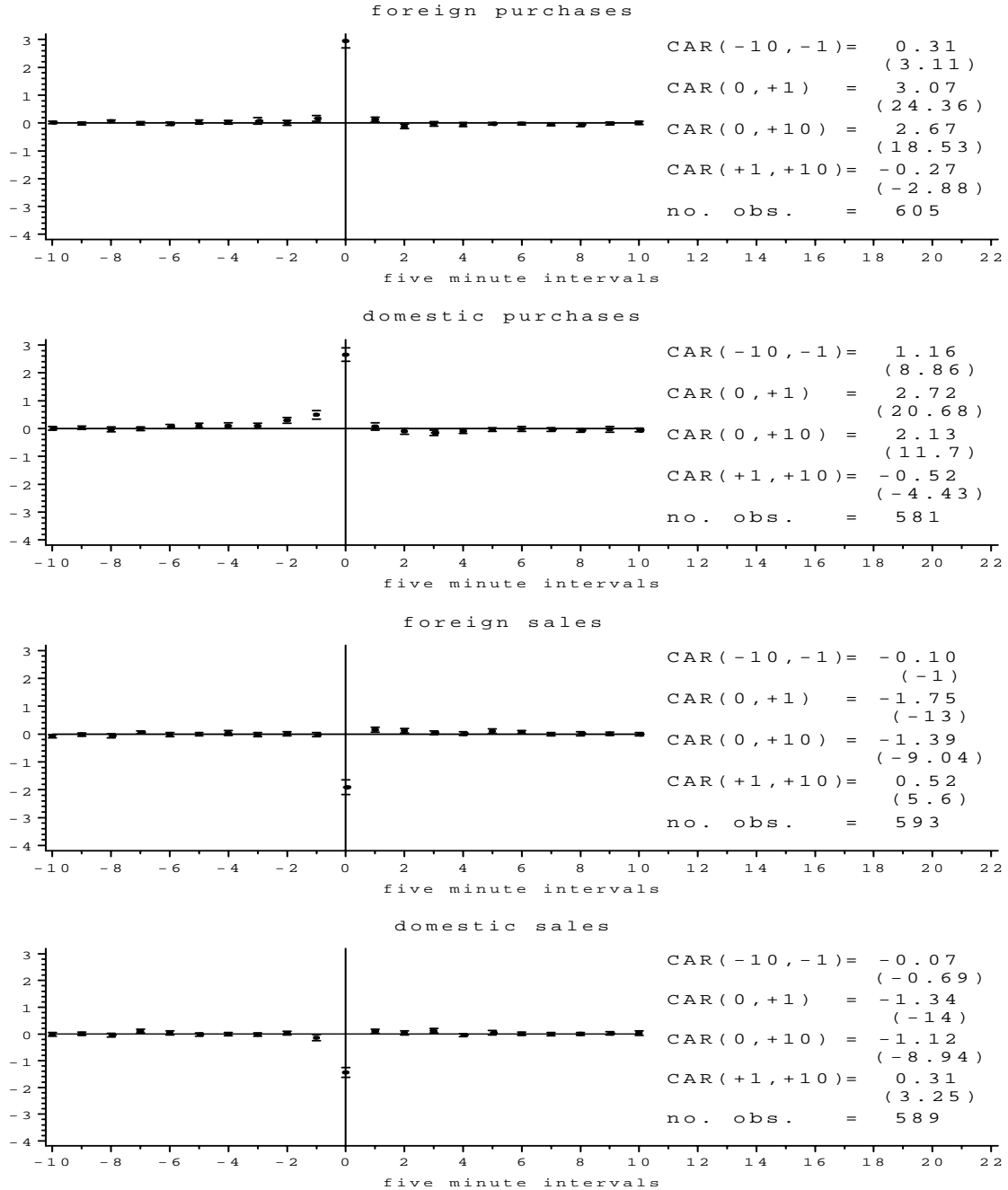
five minute intervals

23

Figure 5: Daily percentage returns around large price setting order imbalances, 1996-2001

The sample includes the ten largest net daily foreign purchases for each stock. Net daily foreign purchases are calculated as the number of shares bought minus number of shares sold divided by total volume for the stock on the day. Events which overlapped earlier windows for the same stock are excluded from the sample. The horizontal axis shows market adjusted percentage daily returns - i.e. returns exceeding the return on JSX composite index. Returns are represented by dots. Returns +/- two standard errors are represented by hyphens. The CAR(-10,-1), CAR(0,+1), CAR(0,+10), and CAR(+1,+10) are the cumulative returns from days -10 to -1, 0 to +1 (total effect), to +10 (permanent effect) and +1 to +10 (temporary effect) respectively. T-statistics are in parentheses.

foreign purchases

CAR(-10,-1)=   0.18
                (0.35)
CAR(0,+1) =   2.28
                (7.11)
CAR(0,+10) =   0.54
                (0.98)
CAR(+1,+10)=   -2.34
               (-4.55)
no. obs.   =   874

domestic purchases

CAR(-10,-1)=   -2.17
               (-4.43)
CAR(0,+1) =   1.69
                (6.13)
CAR(0,+10) =   1.57
                (3.01)
CAR(+1,+10)=   -0.49
                 (-1)
no. obs.   =   1012

foreign sales

CAR(-10,-1)=   -2.16
               (-4.64)
CAR(0,+1) =   -3.32
               (-9.71)
CAR(0,+10) =   -4.09
               (-6.71)
CAR(+1,+10)=   -0.41
               (-0.79)
no. obs.   =   907

domestic sales

CAR(-10,-1)=   -1.05
               (-2.11)
CAR(0,+1) =   -1.28
               (-5.35)
CAR(0,+10) =   -1.64
               (-3.39)
CAR(+1,+10)=   -0.49
               (-1.07)
no. obs.   =   1000

24