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TRADING IN STYLE: RETAIL INVESTORS VS. INSTITUTIONS

Abstract

We examine the comparative trading performance of retail investors using an exhaustive sample of trades made by all investors in a stock market. Retail investors trade systematically at better prices than institutions, especially domestic institutions. We also find evidence of retail investors having a comparative advantage when trading stocks in their preferred trading style. These findings are consistent with retail investors rationally utilizing their trading flexibility and information made available to them. Based on a population of retail trades, our findings challenge the stereotype arising from earlier studies that retail investors are noise traders.

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Trading in style: Retail investors vs. institutions[1]

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Abstract

We examine comparative trading performance of retail investors using an exhaustive sample of trades made by all investors in a stock market. Retail investors trade systematically at better prices than institutions, especially domestic institutions. We also find evidence of retail investors having a comparative advantage when trading stocks in their preferred trading style. These findings are consistent with retail investors rationally utilizing their trading flexibility and information made available to them. Based on a population of retail trades, our findings challenge the stereotype arising from earlier studies that retail investors are noise traders.

Key words: Retail and institutional investors, trading performance, style investing, foreign investors, market microstructure

1. Introduction

Much of the extant literature labels individual or retail investors as ignorant, uninformed, and trading on noise and sentiment, while viewing institutional investors as sophisticated and informed traders (see, e.g., Barber and Odean, 2008; Kaniel et al., 2008; Kumar, 2009b; Nofsinger and Sias, 1999). Several studies report corroborating findings (e.g., Barber and Odean, 2000; Barber et al., 2009a, 2009b; Foucault et al., 2011; Kumar and Lee, 2006). Notably, the evidence dubbing retail investors noise traders is based largely on transactions by clients of a discount brokerage house. Using a more extensive dataset, recent studies report informed trading activities by retail investors (e.g., Kaniel et al., 2012; Kelly and Tetlock, 2013, 2017). As reviewed by Kelly and Tetlock (2013), retail investors, unlike institutions, trade for themselves, and therefore, have clear incentives to make informed trades. The findings of Fong et al. (2014) suggest that when retail investors have access to information, they rationally utilize it and enjoy trading profits. These emerging insights cast doubt on the far-reaching conclusion that retail investors are noise traders.

Even when information is accessible and retail investors rationally utilize them, a fundamental question appears to remain unanswered: just how far can these inputs get retail investors? Can retail investors ever perform at the level of institutions, or do they still lag behind institutions? In addressing these questions, we also account for the stock characteristics known to reflect investors' common style preferences. Although style investing has long been common practice in the investment community (e.g., Chan et al., 2002; Cronqvist et al., 2015), evidence on comparative investor performance across known investment styles appears to be lacking to date. Investors may invest in a certain style after observing its past return and extrapolating that past return will persist

(Barberis and Shleifer, 2003). Thus, when investors focus on a certain style, they may perceive some comparative advantage in analyzing and trading stocks in the style, which is not present in other styles. As is standard in the literature (e.g., Chan et al., 2002; Kumar, 2009a; Wahal and Yavuz, 2013), we base our analysis on the size, value-growth and momentum-contrarian dimensions.

In examining comparative trading performance of investors, we exploit the proprietary dataset made available to us by the Stock Exchange of Thailand (SET). Unlike a dataset from an individual brokerage house, this dataset contains all orders and transactions made by *all* investors in the Thai stock market, and also allows us to identify exactly whether a given trade is initiated by a retail investor or institution, or even a foreign investor. Unlike in the U.S. and several other developed markets, moreover, brokerage houses in Thailand are required by law to provide their clients with research services (i.e., analyst reports) at no extra cost, thereby giving all retail investors the opportunity (complementing their incentives) to make informed trades.

We find that local retail investors (henceforth, retail investors) generally pay 6.2 basis points (bps) less than local institutions when buying, and receive 4.0 bps more when selling. This makes an average roundtrip trade 10.2 bps more expensive to execute for local institutions than for retail investors. Whether they are buying or selling, such outperformance of retail investors persists across the known investment styles. In particular, retail investors exhibit a pronounced preference for small-cap stocks, and consistently, outperform local institutions by a larger margin when buying these stocks. This pattern is consistent with retail investors having a comparative advantage in analyzing and trading small-cap stocks (Kelly and Tetlock, 2013). This evidence of retail investors trading at better prices than institutional investors

domiciled in the same market cannot be explained by conditions that are likely to put retail investors at a price advantage independently of their trading decisions or skills.

Due to their superior resources and technology, foreign investors, being international investors, are often viewed as more informed about local stocks than even local institutions (see, e.g., Dvorak, 2005). Nevertheless, the debate is far from settled. Our dataset allows us to benchmark retail investors against the investor type that is potentially more sophisticated than local institutions, thereby further addressing the issue of how far the mandated information availability can get retail investors. When buying, retail investors persistently underperform foreign investors regardless of investment styles. However, the opposite holds when selling. Consistent with their preference for small-cap stocks, retail investors' sale outperformance is also by far largest for these stocks. To the extent that institutions are relatively constrained when selling (Keim and Madhavan, 1996), this variation in comparative performance is in line with retail investors rationally utilizing their greater trading flexibility and the information made available to them by law.

Our work joins the growing literature that reports information-based trading by retail investors. We extend the existing insights by examining comparative trading performance of retail and institutional investors, and document systematic outperformance of retail investors over institutions, especially those that are domestic. We also extend the existing literature by accounting for the known investment styles, and find evidence consistent with retail investors having a comparative advantage in analyzing and trading stocks in their preferred style. Hence, the evidence in our study indicates that retail investors with ready access to information can trade at better prices than institutions. In addition, our work contributes to the largely unsettled literature on the information advantage of foreign investors over local investors. The evidence in our

study points out that such an information advantage may well vary between the times foreign investors take and close their long positions in local stocks.

Our hypothesis development is discussed next. Section 3 gives the details of our dataset and empirical methods. Empirical results are presented in section 4, and section 5 concludes our work.

2. Hypothesis development

One well-documented phenomenon in investment practices is style investing. Investors may focus on a certain style (i.e., category of stocks, instead of individual stocks) as they perceive some comparative advantage in analyzing and trading stocks in the style, which is not present in other styles. For instance, as institutions follow and focus on large stocks (possibly due to liquidity and depth), retail investors are likely to develop a competitive advantage in accumulating novel information about small stocks (see Kelly and Tetlock, 2013). Wealth constraints may well prevent retail investors from specializing in large-cap stocks, which often are high-price stocks and require a relatively large outlay to buy a minimum lot. Indeed, wealth constraints facing retail investors may also give institutions another incentive to focus on large stocks.

As reported in several prior studies, institutions exhibit preferences for large-cap, growth, and past-winner stocks (e.g., Badrinath and Wahal, 2002; Chan et al., 2002; Gompers and Metrick, 2001; Grinblatt et al., 1995). Based on a dataset consisting of clients of a single discount brokerage house, Kumar (2009a) reports retail investors' aggregate preferences for small-cap, value, and past-loser stocks. Wahal and Yavuz, (2013, p. 137) point out that the size and value-growth characteristics are the "now ubiquitous" dimensions for style investing. As noted by Kaniel et al. (2008, p. 300), ". .. there is widespread agreement in the literature that individuals tend to be contrarian, at

least in the short term . ..". Since valuation rises and falls as price changes, retail investors' preference for value stocks and institutions' preference for growth stocks are in line with their respective contrarian and momentum behaviors.

Given the differing style preferences of retail and institutional investors, the comparative advantage hypothesis implies that retail investors should exhibit relatively strong comparative, or even superior, performance when trading small-cap and value stocks as well as past losers. At the same time, institutions should outperform retail investors when trading large-cap and growth stocks as well as past-winners.

Retail investors in general should have much greater trading flexibility than institutions, especially when selling. To a large extent, trading activity by institutions is typically constrained by their stated investment objective and liquidity requirements. In contrast, retail investors do not face such constraints in acting on their private information or choosing the timing for trade execution. Moreover, while purchases by institutions are likely to be based on private information, their sales are often initiated to close their long positions to realize the required target return or for other liquidity reasons (Keim and Madhavan, 1996). Consequently, institutional purchases are likely to contain more information than sales.[2] Together with the greater trading flexibility available to them, such asymmetry in the informativeness of institutional purchases and sales implies the possibility that retail investors trade at better prices than institutions when selling. If retail investors are noise traders, however, they should trade systematically at worse prices than institutions regardless of whether they are buying or selling, or of their preferred style.

[2] The well documented asymmetric price impacts of institutional purchases and sales provide empirical support for this informativeness asymmetry (see Chiyachantana et al., 2004).

3. Data and methodology

3.1 The dataset

Our exhaustive dataset provided by the SET covers all trades and orders by all investors during the period 2003-2013. The dataset identifies investor types; order price, volume and submission time; as well as transaction volume, price and time for buyers and sellers. Time stamps of trades and orders are recorded up to 1/100 of a second. These features allow us to identify exactly the investor type that initiates trades, i.e., sends the price-setting order. Being a fully automated limit-order market with no specialists, trades made on the SET are free from the inventory effect due to specialists' risk aversion typical in the U.S. markets, thereby enabling cleaner inferences about investors' trading decisions. Accordingly, the SET also presents itself as a suitable ground to examine comparative performance of different investor types. The three investor types in our dataset are: local retail (individual) investors; domestic (local) institutions; and foreign institutions.

Unlike U.S. stock markets, the SET operates in two trading sessions per trading day: from 10.00 am to 12.30 pm, and from 2.30 pm to 4.30 pm. Stocks are included in our sample if they are traded by all three investor types in a given session. Since the SET is an order-driven market, we identify price-setting orders using executed marketable limit orders.[3] In an order-driven market, marketable limit orders demand immediacy and are likely to reflect information-based trading (e.g., Lee et al., 2004). In total, around 333,000 stock-session observations are included in the full sample. We obtain other

[3] We also repeat all of our tests using limit orders, and the results (untabulated) are similar. All of our untabulated results are available upon request.

data (i.e., the SET value-weighted index, prices, market capitalization, and PE ratio) from Datastream.

3.2 Investment styles

To account for style preferences, we divide the stocks in our sample into categories based on their characteristics. Guided by the literature, these include size, value-growth and contrarian-momentum dimensions. Similar to prior studies (e.g., Teo and Woo, 2004), we adopt the breakpoints of bottom 30%, middle 40% and top 30% in sorting stocks into style portfolios along the three dimensions. The known continuations and reversals of style returns (Barberis and Shleifer, 2003; Teo and Woo, 2004) imply that the size (i.e., market-cap), value-growth and past-return characteristics of stocks may well change over time. To allow stocks to switch categories as their characteristics change over time, we sort stocks each year. For the size and value-growth portfolios, we sort stocks on their average market capitalization and PE ratio, respectively, observed during December of the preceding year. For the contrarian-momentum portfolios, we sort stocks on their six-month past return (Jegadeesh and Titman, 1993), i.e., buy-and-hold return over July 1 and December 30 in the preceding year.

Table 1 reports summary statistics on the composition of our sample. Panel A shows that, for both purchases and sales, trades by retail investors by far dominate the trading activities in the sample. Such dominance is consistent with the common perception that an emerging market is a retail market, rather than an institutional market. Interestingly, foreign institutions appear more active in trading than local institutions. As shown in Panel B, the dominance of retail trades appears notably larger among small-cap stocks (around 76%) than large-cap stocks (around 52%). The

opposite holds for institutional trades, whether they be local or foreign. These patterns across size styles lend support to the view that as institutions enjoy scale economies in following large stocks, retail investors specialize in gathering unique information about small stocks (Kelly and Tetlock, 2013, 2017). At variance with the pronounced preferences of retail investors along the value-growth and contrarian-momentum dimensions reported by Kumar (2009a), Panels C and D show that our sample retail investors exhibit notably weak preferences across styles in these dimensions. Unlike those in Kumar's sample who are clients of a discount broker, retail investors in our sample have ready access to information at no extra cost, and may therefore, behave more similarly to institutions.

3.3 Measuring trading performance

As a measure of trading performance, we adopt the trade price ratio employed by Choe et al. (2005, p. 802). First, we calculate for each stock *i* the volume-weighted average price $(vwap_{i,t})$ for all trades (purchases or sales, separately) made during session *t*. Second, we calculate the volume-weighted average price for trades initiated by investor type A $(vwap_{i,t}^{A})$. To calculate a trade price ratio for investor type A, we divide $(vwap_{i,t}^{A})$ by $(vwap_{i,t})$. For purchases, if the price ratio is greater (less) than one, the investor type A buys a stock at a higher/worse (lower/better) price than investors on average. For sales, similarly, the price ratio below (above) one implies that investor type A sells a stock at a lower/worse (higher/better) price than investors on average.

This method has also been adopted by several studies as a measure of trading performance (e.g., Agarwal et al., 2009). As pointed out by Choe et al. (2005), the price ratio is straightforward, easy to interpret, and circumvents the need for an asset pricing

model. Standard inference can be applied to assess the statistical significance of differences in price ratios.

3.4 Determinants of trading performance: control variables

We also investigate whether the trading performance differentials between retail and institutional investors across investment styles, if any, are explained by or stand up to conditions that can put a given investor type at a price disadvantage compared to another type, independently of informedness. To do so, we employ the following regression framework:

$$(1) \qquad Price\ Ratio_{i,t}^{A-B} = \beta_0 + \sum_{j=1}^{2} \beta_j D_{i,t,j} + \sum_{j=3}^{k} \beta_j X_{i,t,j} + \varepsilon_{i,t}\ ,$$

where $Price\ Ratio_{i,t}^{A-B}$ denotes the trade (purchase or sale) price ratio differential between investor types A and B (A minus B) for stock i during session t. Together with the intercept term, the two dummy variables, $D_{i,t,j}$, are our variables of interest and correspond directly to the subsamples along each style dimension defined in section 3.2 (also Table 1). For the size sorting, $D_{i,t,1}$ and $D_{i,t,2}$ take the value of 1(0) for medium-cap and large-cap stocks, respectively (otherwise). For the value-growth sorting, similarly, these two dummies represent stocks in the medium and growth groups, and the medium and past-winner groups for the momentum-contrarian sorting. $X_{i,t,j}$ represents a vector of our control variables, which are largely borrowed from Choe et al. (2005). Because institutions typically trade large positions, reduction in liquidity may put them in a disadvantaged price position relative to retail investors. Extant microstructure literature suggests that liquidity dries up when volatility rises, trading volume falls, bid-

ask spreads widen (e.g., Chordia et al., 2000), and during market declines (e.g., Hameed et al., 2010). Thus, our first set of control variables include the average price volatility, turnover, bid-ask spread and contemporaneous market return. We also control for the difference in trade value between a pair of investor types. Given the depth of standing orders at a particular point in time, the typically large trade size of institutions may exacerbate their price disadvantage, especially when they trade aggressively due to information or otherwise. Our next two control variables are a price run-up and PE ratio. The known positive-feedback behavior of institutions implies that they may typically buy (sell) the stock after its price and/or valuation has risen (fallen). Being contrarians, in contrast, implies that retail investors trade after price has moved in their favor. To this extent, retail and institutional investors may trade at different prices because they have different innate trading behaviors, rather than different levels of sophistication. The difference in their wealth constraints also can give rise to trade price differentials, especially for purchases, between retail and institutional investors. The relatively severe wealth constraints facing retail investors are likely to prevent them from aggressively buying large-cap (and often, high-price) stocks, which require a relatively large outlay to buy a minimum lot, even when they become informed. In contrast, institutional investors are unlikely to face such wealth constraints and likely to trade large-cap stocks at better prices. Thus, we also control the market cap of stocks. For parsimony, the definitions of our control variables are given in Table 4.

With three series of price ratio differentials in our study (namely: retail investors vs. local institutions; retail investors vs. foreign investors; and local institutions vs. foreign investors), we estimate three regressions for each style sorting. Since the three investor types in our data essentially trade among each other, the regression errors are

likely to be correlated. Hence, we estimate the regressions using seemingly unrelated regression (SUR) method.

4. Empirical results

Table 2 reports trade price ratios for retail investors, local institutions, and foreign investors in the full sample, as well as the ratio differentials. Retail investors buy at the price that is 4.0 bps ($99.96 - 100.00 = -0.04$) lower than the average price paid by all investors during the same trading session. At variance with the common perception that institutions are sophisticated and informed traders, the purchase price paid by local institutions is 2.2 bps higher than the session average. When buying, in other words, retail investors pay less than local institutions by 6.2 bps. When selling, retail investors also receive more than local institutions: by 4.0 bps. This outperformance implies that retail investors incur roundtrip transaction costs that are 10.2 basis points smaller than the costs to local institutions. Retail investors also exhibit unconditional outperformance over foreign investors, who are international institutions often viewed as more sophisticated than local institutions: by 5.2 and 8.5 bps when buying and selling, respectively. However, the outperformance of retail investors does not appear to be systematically larger in magnitude when selling.

Taken together, the Table 2 results, which are based on a population of retail trades in the market, stand in sharp contrast to the stereotype that retail investors are noise traders. Indeed, the results raise a clear possibility that retail investors may be better informed than even the well-endowed international investors. In the following subsections, we seek to gain a further understanding of comparative performance of retail investors by analyzing how they perform across different stock categories.

4.1 Comparative purchase price performance across styles

Considering the known style preferences of retail investors and patterns of trading volume observed in Table 1, the comparative advantage hypothesis implies that they should pay less than institutions when buying small-cap stocks, past losers, and to a lesser extent, value stocks. As reported in Panel A of Table 3, retail investors pay less than local institutions across all size categories. The magnitude of this outperformance also monotonically decreases in the size of the stocks, in line with retail investors having a comparative advantage over local institutions in analyzing and trading small-cap stocks. However, retail investors pay less than foreign investors only when buying large-cap stocks: they pay more than foreign investors when buying medium- and small-cap stocks. This pattern of foreign investors' outperformance is also observed when compared with local institutions.

Comparative performance along the value-growth dimensions is reported in Panel B. The price ratio differentials show that retail investors pay less than both types of institutions and do so across all value-growth categories. Local institutions pay more than foreign investors when buying value and growth stocks, and pay less when buying the group of medium valuation. As shown in Panel C, the outperformance of retail investors over both local and foreign institutions continue to be observed along the momentum-contrarian spectrum. Despite the apparent outperformance of retail investors, there is no discernible pattern that the price differentials are larger when they buy past losers. Comparative performance becomes less obvious between foreign investors and local institutions. Although foreign investors pay less than local institutions when buying past losers, these two groups are on par when buying stocks in the other two categories.

On balance, the results reported in Table 3 indicate outperformance of retail investors over local as well as foreign institutions when buying stocks of characteristics that reflect common investment styles. The results also suggest that foreign investors tend to pay less than local institutions when buying local stocks, especially along the size and value-growth dimensions – the most common styles among institutional investors (Cronqvist et al., 2015). We next investigate whether these performance differentials, the outperformance of retail investors in particular, can be explained by conditions that are likely to put institutions at a price disadvantage independently of their technological resources and informedness. The results based on equation (1) are reported in Table 4.

Estimates for the size styles are reported in models (1) through (3). The hypothesis that investor type A pays less than investor type B when buying small-cap stocks predicts a negative model intercept (β_0). If type A also pays less than type B when buying medium-cap and large-cap stocks, the linear combinations of β_0 and β_1, and of β_0 and β_2, respectively, should be negative. Model (1), where the independent variable is the purchase price ratio differential between retail investors and local institutions, shows that β_0 is significantly negative (−0.474). The sums of β_0 and β_1 (−0.230) and of β_0 and β_2 (−0.181) are also significantly negative. In line with the results in Panel A of Table 3, these estimates confirm that retail investors pay less than local institutions when buying stock across size categories. With these estimates, the significantly positive β_1 (0.244) and β_2 (0.293) as well as β_2 being significantly more positive than β_1 together confirm that the outperformance of retail investors over local institutions is largest for small-cap stocks, becomes smaller for medium-cap stocks, and is smallest for large-cap stocks.

The estimates in model (2) also confirm that retail investors pay significantly less than foreign investors only when buying large-cap stocks ($\beta_0 + \beta_2 = -0.074$), but pay more when buying small-cap stocks ($\beta_0 = 0.098$) and medium-cap stocks ($\beta_0 + \beta_1 = 0.012$), although insignificantly so for the medium-cap stocks. As shown in model (3), foreign investors pay significantly less than local institutions when buying regardless of the stock size category. Interestingly, the estimates from models (2) and (3) suggest that foreign investors do better than local investors, whether they be retail or institutional, at buying smaller-cap stocks. To the extent that institutional purchases are based on private information (Keim and Madhavan, 1996) and that there is less information in the public domain for small stocks (e.g., Bhushan, 1989), this observed outperformance of foreign investors lend support to the view that they are better informed about local stocks than local investors.

The estimates in models (4) through (6) speak to the results in Panel B of Table 3. The sign and significance of β_0, $\beta_0 + \beta_1$, and $\beta_0 + \beta_2$ in model (4) confirm that retail investors pay significantly less than local institutions when buying stocks regardless of the stock's valuation category. However, the estimates in model (5) stand in sharp contrast with the pattern observed in Table 3. Specifically, once account is taken of non-information factors that are likely to affect the relative price advantage of investors, the results suggest that retail investors pay significantly more than foreign investors across all value-growth styles. Except for the medium-valuation category, the model (6) estimates confirm their univariate counterparts that foreign investors outperform local institutions when buying value as well as growth stocks. To the extent that high valuation reflects relatively high asymmetry, the outperformance of foreign investors across growth styles over both types of local investors gives another piece of evidence of international investors being better informed than local investors. Consistent with

the key results from models (1) through (3), nevertheless, retail investors outperform institutions domiciled in the same country.

In models (7) through (9), the estimates indicate comparative performance across contrarian-momentum styles. The estimates in model (7) show that retail investors pay a significantly lower purchase price than local institutions whether the stock is a past winner or loser. Though typically known as contrarian, retail investors buy past winners at better prices than local institutions, who are known to have an appetite for long-positions in past winners. Notably, this finding not only confirms their univariate counterpart in Table 3, but also adds to the outperformance of retail investors over local institutions observed across the size and value-growth styles. Model (8) yields a different picture. In the presence of control variables, across all past return categories, retail investors pay significantly more than international institutions. As indicated by the estimates in model (9), international investors also outperform local institutions persistently across the past return styles.

Turning the control variables, the vast majority of them have significant coefficients across models. By and large, the coefficient signs are also in line with expectation. For example, the negative coefficients of the average volatility and average bid-ask spread, and the positive coefficient of contemporaneous market return in model (1) consistently suggest that as liquidity dries up (i.e., as volatility and bid-ask spread increase, and during market declines), retail investors are put at a price advantage compared to local institutions. Although insignificant, average trading volume has a positive coefficient, consistent with the liquidity effect. For parsimony, we abstain from devoting a full discussion to the results for the control variables in Tables 4 and 6.

In several cases, the regression results deviate from their univariate counterparts. Together with the persistently significant results for the control variables,

such deviation confirms the importance of accounting for factors that can put one investor type at a price advantage/disadvantage relative to another type. Notwithstanding the significant roles of the control variables, one set of comparative performance results remains intact: retail investors pay less than local institutions even when buying stocks in the styles known be preferred by institutions. The results are also consistent with retail investors having a comparative advantage over local institutions in buying small-cap stocks.

4.2 Comparative sale price performance across styles

In addition to the persistent outperformance of retail investors over local institutions, the results reported above also reveal superior performance of institutions that invest internationally. The asymmetry of informativeness of institutional trades implies that the comparative performance of institutions, whether they be local or international, should become weaker when selling. Thus, an important empirical issue becomes whether the comparative advantage of institutions in their preferred styles remains when selling stocks. Table 5 reports sale price ratios for each investor type and the ratio differentials.

With one a minor exception, Panel A of Table 5 shows that, when selling, retail investors persistently receive more than not only local institutions, but also foreign investors across size categories. This sale outperformance of retail investors over foreign investors stands in sharp contrast to their comparative purchase performance, and notably, appears by far largest for small-cap stocks (by 15.6 bps). Local institutions also outperform foreign investors, and do so by the largest margin for small-cap stocks (by 13.6 bps). As observed in Panel B, retail investors receive more than local

institutions as well as foreign investors when selling stocks across value-growth styles. Similarly, local institutions, too, outperform foreign investors across these categories.

Given that institutions are typically momentum traders, the comparative advantage hypothesis implies that they should outperform retail investors when selling past losers, and retail investors should exhibit superior performance when selling past winners. Panel C reveals that, across all past return categories, retail investors outperform not only local institutions, but also foreign investors. Interestingly, their outperformance also appears largest (by a small margin) when selling past losers, not past winners. Similar to the results for the size and value-growth dimensions, local institutions receive more than foreign investors when selling regardless of the stock's past return category. Taken together, Table 5 reveals uniform patterns of comparative performance of retail investors: they appear to outperform both local and foreign institutions when selling. As with the analysis of purchase price performance, we also investigate whether the sale price ratio differentials observed in Table 5 stand up to a panel of control variables. Table 6 report the results based on equation (1).

Models (1) through (3) shows the estimates for the size categories. As shown in model (1), β_0, $(\beta_0 + \beta_1)$, and $(\beta_0 + \beta_2)$ are all positive and significant, confirming that retail investors receive more than local institutions when selling regardless of the size styles. The estimates in model (2) reaffirm retail investors' outperformance over foreign investors across all size styles, which is largest for small-cap stocks. At variance with their Table 5 counterparts, the model (3) estimates indicate that local institutions significantly outperform foreign investors only when selling small-cap stocks ($\beta_0 = 0.085$), but receive significantly less when selling medium-cap ($\beta_0 + \beta_1 = -0.053$) and large-cap ($\beta_0 + \beta_2 = -0.072$) stocks. For the sale price ratio differentials across the value-growth styles, the estimates in models (4) and (5) suggest that retail

investors' persistent sale outperformance over local institutions and foreign investors stands up to the presence of the control variables. However, model (6) reveals that, once the influence of the control variables is accounted for, local institutions receive significantly less than foreign investors when selling medium-valuation and growth stocks.

The estimates in models (7) and (8) confirm that retail investors receive significantly higher sale prices than both local and foreign institutions across past-return categories. Combined with their purchase outperformance over local institutions across past-return categories observed in section 4.1, this persistently superior sale performance of retail investors does not appear supportive of the idea that their contrarian behavior reflects their uninformed liquidity provision to institutional trades. Model (9) shows that, in the presence of control variables, local institutions persistently underperform foreign investors across all past-return categories, though significantly so only for past losers.

Overall, the results in Table 6 confirm the persistent outperformance of retail investors in selling, over both local institutions and institutions that are international investors. Such superior sale performance of retail investors deviates from the findings in section 4.1 that they perform worse than international investors when buying. This variation in comparative performance of retail investors is consistent with institutional sales containing less information than institutional purchases. Alternatively, the superior sale performance of retail investors implies that they rationally utilize their greater trading flexibility and the information available to them. The findings that retail investors trade at significantly better prices than local institutions both when buying and when selling lends support to this alternative possibility. Together with their purchase outperformance over local institutions, retail investors' persistently superior

sale performance rejects the label of noise traders regularly attached to them. Also importantly, the findings provide evidence that retail investors trade systematically at better prices than institutions, especially those that do not appear to be international investors.

5. Conclusion

Despite voluminous research on performance of retail and institutional investors, the fundamental question of which group performs better, to our knowledge, remains far from clear. One plausible reason for such paucity might lie in the difficulty in making generalizations from a sample of trades by clients of a single brokerage house. Based on trades by *all* investors in a stock market, our analysis reveals that retail investors trade systematically at better prices than institutions, especially domestic institutions. By taking account of the known investment styles, we also find evidence consistent with retail investors having a comparative advantage in trading small stocks, which provides a plausible rationale for their known preference for small stocks.

Our work corroborates the recent literature that challenges the noise-trader label traditionally attached to retail investors. To the extent that institutional trades demand immediacy, the superior comparative trading performance of retail investors we document is consistent with these investors rationally utilizing their trading flexibility and choosing to be on the correct side of trades to gain from supplying liquidity. Moreover, brokerage houses in Thailand are by law full-service houses. The evidence in our study therefore indicates that retail investors with ready access to research services can behave differently from those studied in several prior studies, i.e., those who are clients of a discount broker and do not have ready access to such information.

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Table 1
Descriptive statistics

The number of stock-session observations and proportions of trading volume by local retail investors, local institutions, and foreign institutions across various style portfolios are reported. Panel A reports statistics for the full sample. Panels B, C, and D report statistics for style portfolios in the size, value-growth, and contrarian-momentum dimensions, respectively. The small-cap, medium-cap, and large-cap portfolios contain stocks in the 30% smallest, 40% medium and 30% largest market-cap categories. The value, medium, and growth portfolios contain stocks in the 30% lowest, 40% medium and 30% highest PE-ratio categories. The past-losers, medium, and past-winners portfolios contain stocks in the 30% lowest, 40% medium and 30% highest past-return categories.

			Proportions of trading volume (%)		
		N. of obs	Retail	Local institution	Foreign
Panel A: Full sample					
All	Purchases	333,720	56.43	18.98	24.59
	Sales	333,541	55.74	19.44	24.83
Panel B: Size styles					
Small-cap	Purchases	9,221	76.87	10.95	12.19
	Sales	9,357	75.19	11.69	13.11
Medium-cap	Purchases	35,229	80.40	9.93	9.67
	Sales	34,811	78.95	10.80	10.25
Large-cap	Purchases	278,778	52.20	20.61	27.19
	Sales	279,038	51.65	21.02	27.34
Panel C: Value-growth styles					
Value	Purchases	73,273	61.88	16.24	21.88
	Sales	73,256	61.29	16.65	22.06
Medium	Purchases	140,935	50.28	21.89	27.83
	Sales	141,429	49.71	22.48	27.81
Growth	Purchases	93,317	57.96	18.38	23.66
	Sales	93,015	56.85	18.90	24.25
Panel D: Contrarian-momentum styles					
Past losers	Purchases	67,114	65.15	14.57	20.28
	Sales	67,482	64.28	15.39	20.33
Medium	Purchases	137,868	52.72	20.90	26.38
	Sales	137,802	52.58	21.03	26.39
Past winners	Purchases	110,180	53.74	20.05	26.20
	Sales	109,845	52.25	20.82	26.93

Table 2
Trade price ratios across investor types

Trade price ratios, as defined in section 3.3, are reported for purchases and sales by local retail investors, local institutions, and foreign institutions in the full sample. In parentheses *p*-values are reported. In columns (1) through (3), *p*-values are reported for the null hypothesis of the trade price ratio being equal to 100. In the next three columns, *p*-values allowing for unequal variance are reported for the null hypothesis of the trade price ratio being equal between two investor types.

	Retail	Local Institution	Foreign	Differentials		
	(1)	(2)	(3)	(1) vs. (2)	(1) vs. (3)	(2) vs. (3)
Purchases	99.960	100.022	100.012	−0.062	−0.052	0.010
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	100.032	99.992	99.947	0.040	0.085	0.044
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 3
Purchase price ratios across investor types sorted by styles

Trade price ratios, as defined in section 3.3, are reported for purchases by local retail investors, local institutions, and foreign institutions. Panels A, B, and C report trade price ratios across style portfolios in, respectively, the size, value-growth, and contrarian-momentum dimensions. For each dimension, stocks are sorted into the style portfolios as in Table 1. In parentheses *p*-values are reported. In columns (1) through (3), *p*-values are reported for the null hypothesis of the trade price ratio being equal to 100. In the next three columns, *p*-values allowing for unequal variances are reported for the null hypothesis of the trade price ratio being equal between two investor types.

	Retail	Local Institution	Foreign	Differentials		
	(1)	(2)	(3)	(1) vs. (2)	(1) vs. (3)	(2) vs. (3)
Panel A: Size styles						
Small-cap	99.969	100.207	99.883	−0.237	0.086	0.324
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Medium-cap	99.981	100.109	99.916	−0.128	0.065	0.193
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Large-cap	99.956	100.004	100.030	−0.048	−0.074	−0.026
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Value-growth styles						
Value	99.965	100.027	100.006	−0.062	−0.041	0.021
	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)
Medium	99.956	100.011	100.022	−0.055	−0.065	−0.010
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Growth	99.957	100.029	100.009	−0.072	−0.051	0.020
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel C: Contrarian-momentum styles						
Past losers	99.971	100.038	99.999	−0.067	−0.028	0.039
	(0.000)	(0.000)	(0.795)	(0.000)	(0.000)	(0.000)
Medium	99.955	100.019	100.018	−0.064	−0.063	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.916)
Past winners	99.957	100.014	100.017	−0.057	−0.061	−0.003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.225)

Table 4
SUR analysis of purchase price ratio differentials between different investor types

SUR estimates based on equation (1) are reported. Estimates for the size styles are reported in models (1) through (3), the value-growth styles in models (4) through (6), and the contrarian-momentum styles in models (7) through (9). In all models, the dependent variable is the purchase price ratio differential between two investor types for stock *i* during session *t*. In models (1), (4), and (7), the price ratio differential is between local retail investors and local institutions. In models (2), (5), and (8), the price ratio differential is between local retail investors and foreign institutions. In models (3), (6), and (9), the price ratio differential is between local institutions and foreign institutions. For the size styles, the dummy variables $D_{i,t,1}$ and $D_{i,t,2}$ equal 1(0) if stocks are in the medium-cap and large-cap categories, respectively (otherwise). For the value-growth styles, $D_{i,t,1}$ and $D_{i,t,2}$ equal 1(0) if stocks are in the medium and growth categories, respectively (otherwise). For the contrarian-momentum styles, $D_{i,t,1}$ and $D_{i,t,2}$ equal 1(0) if stocks are in the medium and past-winner categories, respectively (otherwise). Average price volatility, average turnover and average bid-ask spread for stock *i* are measured in percent as an average during the preceding 40-session period. Contemporaneous market return is percentage return on the SET value-weighted index for the day on which session *t* falls. Trade value difference is measured as a percentage difference in trade value for stock *i* during session *t* between two investor types. Price run-up is measured as percentage buy-and-hold return on stock *i* over the preceding 10-session period. PE ratio is the price-earnings ratio for stock *i* on the previous trading day. Market cap is the natural logarithm of market capitalization of stock *i* on the previous trading day. In parentheses *p*-values are reported.

	Size styles			Value-growth styles			Contrarian-momentum styles		
	Retail minus Institution	Retail minus Foreign	Institution minus Foreign	Retail minus Institution	Retail minus Foreign	Institution minus Foreign	Retail minus Institution	Retail minus Foreign	Institution minus Foreign
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Explanatory variables									
Intercept (β_0)	−0.474	0.098	0.572	−0.282	0.045	0.327	−0.281	0.046	0.327
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$D_{i,t,1}$ (β_1)	0.244	−0.086	−0.329	−0.005	0.005	0.010	−0.012	−0.005	0.007
	(0.000)	(0.000)	(0.000)	(0.098)	(0.158)	(0.026)	(0.002)	(0.200)	(0.116)
$D_{i,t,2}$ (β_2)	0.293	−0.172	−0.465	−0.009	−0.003	0.007	−0.004	−0.004	0.000
	(0.000)	(0.000)	(0.000)	(0.014)	(0.411)	(0.165)	(0.277)	(0.296)	(0.917)
Average price volatility	−4.385	2.350	6.734	−4.191	2.538	6.728	−4.270	2.435	6.706
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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Table 4 – *continued*

Average turnover	0.108	0.206	0.098	−0.474	0.629	1.103	−0.481	0.631	1.112
	(0.289)	(0.028)	(0.423)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average bid−ask spread	−0.162	−0.048	0.114	−0.172	−0.045	0.127	−0.172	−0.044	0.127
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Contemporaneous market return	1.031	1.648	0.617	1.054	1.636	0.582	1.055	1.636	0.581
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade value difference	0.819	0.819	0.819	0.833	0.833	0.833	0.828	0.828	0.828
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Price run-up	0.293	0.539	2.457	0.229	0.587	0.359	0.227	0.585	0.358
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PE ratio	0.119	0.234	0.115	0.050	0.308	0.259	0.034	0.297	0.263
	(0.086)	(0.000)	(0.165)	(0.520)	(0.000)	(0.002)	(0.622)	(0.000)	(0.001)
Market cap	0.016	−0.003	−0.019	0.026	−0.014	−0.040	0.026	−0.014	−0.040
	(0.000)	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted R^2 (%)	0.92	1.06	1.51	0.77	0.94	1.19	0.77	0.94	1.19
N. of observations	299,661	299,661	299,661	299,661	299,661	299,661	299,661	299,661	299,661
Panel B: Linear combinations									
$\beta_0 + \beta_1$	−0.230	0.012	0.242	−0.287	0.049	0.337	−0.293	0.041	0.334
	(0.000)	(0.301)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$\beta_0 + \beta_2$	−0.181	−0.074	0.107	−0.292	0.042	0.333	−0.285	0.042	0.328
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 5
Sale price ratios across investor types sorted by styles

Trade price ratios, as defined in section 3.3, are reported for sales by local retail investors, local institutions, and foreign institutions. Panels A, B, and C report trade price ratios across style portfolios in, respectively, the size, value-growth, and contrarian-momentum dimensions. For each dimension, stocks are sorted into the style portfolios as in Table 1. In parentheses *p*-values are reported. In columns (1) through (3), *p*-values are reported for the null hypothesis of the trade price ratio being equal to 100. In the next three columns, *p*-values allowing for unequal variances are reported for the null hypothesis of the trade price ratio being equal between two investor types.

	Retail	Local Institution	Foreign	Differentials		
	(1)	(2)	(3)	(1) vs. (2)	(1) vs. (3)	(2) vs. (3)
Panel A: Size styles						
Small-cap	100.024	100.003	99.867	0.021	0.156	0.136
	(0.000)	(0.882)	(0.000)	(0.273)	(0.000)	(0.000)
Medium-cap	100.018	99.982	99.938	0.036	0.080	0.044
	(0.000)	(0.021)	(0.000)	(0.000)	(0.000)	(0.000)
Large-cap	100.035	99.993	99.951	0.042	0.083	0.042
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel B: Value–growth styles						
Value	100.026	100.001	99.938	0.025	0.088	0.063
	(0.000)	(0.707)	(0.000)	(0.000)	(0.000)	(0.000)
Medium	100.036	99.996	99.952	0.040	0.084	0.044
	(0.000)	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)
Growth	100.034	99.984	99.949	0.051	0.085	0.035
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Panel C: Contrarian–momentum styles						
Past losers	100.025	99.980	99.937	0.045	0.089	0.044
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Medium	100.036	99.997	99.951	0.039	0.085	0.046
	(0.000)	(0.133)	(0.000)	(0.000)	(0.000)	(0.000)
Past winners	100.033	99.997	99.948	0.036	0.085	0.049
	(0.000)	(0.231)	(0.000)	(0.000)	(0.000)	(0.000)

Table 6
SUR analysis of sale price ratio differentials between different investor types

SUR estimates based on equation (1) are reported. Estimates for the size styles are reported in models (1) through (3), the value-growth styles in models (4) through (6), and the contrarian-momentum styles in models (7) through (9). In all models, the dependent variable is the sale price ratio differential between two investor types for stock *i* during session *t*. In models (1), (4), and (7), the price ratio differential is between local retail investors and local institutions. In models (2), (5), and (8), the price ratio differential is between local retail investors and foreign institutions. In models (3), (6), and (9), the price ratio differential is between local institutions and foreign institutions. For the size styles, the dummy variables $D_{i,t,1}$ and $D_{i,t,2}$ equal 1(0) if stocks are in the medium-cap and large-cap categories, respectively (otherwise). For the value-growth styles, $D_{i,t,1}$ and $D_{i,t,2}$ equal 1(0) if stocks are in the medium and growth categories, respectively (otherwise). For the contrarian-momentum styles, $D_{i,t,1}$ and $D_{i,t,2}$ equal 1(0) if stocks are in the medium and past-winner categories, respectively (otherwise). All other explanatory variables are defined as in Table 4. In parentheses *p*-values are reported.

	Size styles			Value-growth styles			Contrarian-momentum styles		
	Retail minus Institution	Retail minus Foreign	Institution minus Foreign	Retail minus Institution	Retail minus Foreign	Institution minus Foreign	Retail minus Institution	Retail minus Foreign	Institution minus Foreign
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Explanatory variables									
Intercept (β_0)	0.115	0.200	0.085	0.101	0.086	−0.015	0.113	0.084	−0.029
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.352)	(0.000)	(0.000)	(0.067)
$D_{i,t,1}$ (β_1)	0.001	−0.137	−0.138	0.017	−0.002	−0.020	−0.005	0.000	0.006
	(0.941)	(0.000)	(0.000)	(0.000)	(0.487)	(0.000)	(0.186)	(0.958)	(0.253)
$D_{i,t,2}$ (β_2)	0.031	−0.126	−0.157	0.026	−0.007	−0.033	−0.007	0.001	0.008
	(0.032)	(0.000)	(0.000)	(0.000)	(0.076)	(0.000)	(0.091)	(0.874)	(0.127)
Average price volatility	1.959	6.533	4.575	1.764	6.412	4.680	1.878	6.369	4.492
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average turnover	−1.397	−0.695	0.702	−14.888	−0.499	0.990	−1.495	−0.496	0.999
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

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Table 6 – *continued*

Average bid–ask spread	0.190	0.011	−0.178	0.191	0.020	−0.171	0.188	0.020	−0.168
	(0.000)	(0.262)	(0.000)	(0.000)	(0.046)	(0.000)	(0.000)	(0.041)	(0.000)
Contemporaneous market return	1.025	1.503	0.478	1.028	1.491	0.463	1.022	1.493	0.471
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trade value difference	−0.289	−0.289	−0.288	−0.291	−0.291	−0.291	−0.296	−0.296	−0.296
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Price run–up	−0.720	0.227	0.947	−7.316	0.248	0.980	−0.729	0.248	0.977
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PE ratio	0.261	−0.079	−0.340	0.205	−0.048	−0.253	0.239	−0.058	−0.297
	(0.001)	(0.262)	(0.000)	(0.012)	(0.500)	(0.010)	(0.003)	(0.408)	(0.002)
Market cap	−0.013	−0.003	0.010	−0.010	−0.004	0.006	−0.009	−0.004	0.005
	(0.000)	(0.012)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted R^2 (%)	0.34	0.24	0.18	0.35	0.20	0.17	0.33	0.20	0.16
N. of observations	299,795	299,795	299,795	299,795	299,795	299,795	299,795	299,795	299,795
Panel B: Linear combinations									
$\beta_0 + \beta_1$	0.116	0.063	−0.053	0.118	0.084	−0.034	0.108	0.085	−0.023
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.033)	(0.000)	(0.000)	(0.147)
$\beta_0 + \beta_2$	0.146	0.074	−0.072	0.127	0.080	−0.048	0.106	0.085	−0.021
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.193)