

Momentum and Individual Investor Trades: Evidence from Singapore

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Abstract

This paper examines the role of retail investor trading activity on stock price momentum. We find that there is little evidence of momentum for stocks traded on the Singapore Exchange (SGX) unconditionally and momentum is concentrated in stocks with high market capitalization and high nominal prices. While these stocks are likely to be the trading habitat of institutional investors, they exhibit substantially greater price momentum when they are accompanied by heavy trading by retail investors. Moreover, contrarian trading by retail investors on momentum stocks increases stock price underreaction to information and generates momentum of above 2% per month.

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1. Introduction

Momentum in stock prices is a phenomenon that has been extensively documented in the literature, starting with the seminal work by Jegadeesh and Titman (1993). Momentum refers to the predictability in asset returns whereby assets that have outperformed (underperformed) in the recent past tend to continue to perform well (poorly) in the future. The momentum strategy involves buying past intermediate term (e.g. past 12 months) winner stocks and shorting past intermediate term loser stocks, and has been shown to be an economically profitable strategy. The strong evidence of price momentum in US and international stock markets, in industries and different asset classes, and the pervasiveness of the momentum effect challenges the fundamental notion of market efficiency.² The momentum effect is not easily explained by risk-based factors and has led to the development of behavioral theories of price formation in financial markets.³

More recent papers show that cross-sectional stock return predictability based on past returns is related to investor clienteles, with institutional investors enhancing momentum and retail investors contributing to short-term (e.g. past 1 month) price reversals. Using segmented investor clienteles in A (domestic retail investors) and B (foreign investors) share classes traded on Chinese stock markets, Chui, Subrahmanyam, and Titman (2022) find that retail investors contribute to short-term reversals in A shares while institutional investors strengthen momentum in B shares of the same underlying firm. Du et al. (2022) provides additional evidence by showing that institutional (retail) investors prefer high (low) price stocks and contribute to momentum (reversal) in these stocks.⁴

² There is widespread evidence of price momentum in different markets including international stock markets (Rowenhorst (1998), Chan, Hameed, and Tong (2000), Chui, Titman, and Wei (2003, 2010), Griffin, Ji, and Martin (2003)), across industries (Moskowitz and Grinblatt (1999)), and asset classes (Asness, Moskowitz, and Pedersen (2013)).

³ For example, Barbaris, Shleifer, and Vishny (1998) and Hong and Stein (1999) develop theoretical models of investor underreaction to information giving rise to price momentum. Daniel, Hirshleifer, and Subrahmanyam (1998) argue that momentum is due to investors' overconfidence and self-attribution bias.

⁴ The evidence that institutional investors (e.g. mutual funds) are momentum traders is also provided in other papers including Grinblatt, Titman, and Wermers (1995), Nofsinger, and Sias (1999), and Vayanos and Woolley (2013). Similarly, empirical evidence to support return reversals related to liquidity effects when the stocks are

In this paper, we build on these findings on clientele effects by examining if retail trading activities interact with price momentum. We start with the notion that retail investors are contrarian traders using short-term price signals and institutional investors are momentum traders over the intermediate term, and investigate if the intensity and direction of retail trading affects stock price adjustment process, and hence, momentum. We conjecture that the presence of heavy retail trades further slows down the price adjustment process as retail investors trade based on short-term price signals. For example, if intermediate-term momentum is driven by slow diffusion of information (e.g. Hong and Stein (1999)), heavy contrarian trading on short-term price signals further fuels the investor under-reaction to information. This produces our first hypothesis that momentum is enhanced when past intermediate term returns are accompanied by heavy retail trading. Additionally, the contrarian trades by retail investors suggest a new trading strategy that combines past returns with the direction of retail trades, based on whether retail investors as a group are net buyers or sellers in intermediate-term loser/winner stocks. This produces our second testable hypothesis: if retail investors are contrarian traders, momentum will be stronger when retail investors are net buyers (net sellers) in loser (winner) stocks.

Our empirical investigation utilises proprietary data of retail trades from one of the largest brokerage in Singapore. The data covers a significant portion of retail trades for stocks traded on the stock exchange of Singapore (Singapore Exchange or SGX thereafter) and is representative of retail trading in the market. For example, the retail trading data covers almost all stocks listed on the exchange and represents about 32% of the trading volume in SGX. When we split the sample into firms that are above and below the median market capitalization, the ratio of retail trades to the total trading volume reported by SGX is 28% for big firms and 37% for small firms. We observe similar trading ratios when we split the sample into high- and low-

dominated by noise traders are in Jegadeesh and Titman (1995), Kaniel, Saar, and Titman (2008), Nagel (2012), Cheng et al. (2017).

priced stocks.⁵ These observations are consistent with the recent evidence that retail investors make up a bigger proportion of all traders in small and low-priced stocks in China and other markets.

We start by documenting that price momentum is related to investor clienteles. We find that the momentum strategy using stocks traded on SGX over the period 2013 to 2022 do not yield significant profits, unconditionally. Building on the evidence on retail (institutional) investor preference for small (big) market capitalisation and low (high) priced stocks, we split the stocks into two sub-groups based on size or nominal stock price, using the median values as breakpoints. Consistent with clientele effects, we find strong evidence of momentum profits in the subset of big stocks as well as high-priced stocks on SGX. Specifically, the long-short momentum portfolios produce significant returns of over 1% per month for the big or high-priced stocks. These returns are robust to the adjustments for exposure to Fama-French 3 and 5 factors specific to Singapore (Jensen, Kelly, and Pedersen (2021)). On the other hand, there is no evidence of momentum in small or low-priced stocks.

Our main objective is to investigate if price momentum proliferates when intermediate-term momentum traders and short-term contrarian traders coexist. The setting for our analyses is the group of big or high-priced stocks, which are likely to attract institutional investors and, to a lesser extent, retail traders, and where price momentum concentrates. We measure retail participation in each stock by aggregating the retail trading volume from our data provider. Interestingly, we find new evidence that high retail investor participation over the formation period is positively related to momentum profits, within the subset of big or high-price stocks. For both these groups of stocks, momentum profits spike to above 2% per month when there is high retail trading volume. Momentum profits are weaker when the past returns are not

⁵ The retail volume is overstated relative to SGX volume as there are instances where the retail to retail trades in our brokerage firm is double counted but not in SGX volume. A lower bound on the ratio of retail to total trades covered by our data provider is 16%, which is a significant proportion of all trades.

accompanied by heavy retail trading. The incremental momentum profits in high retail participation (over low retail participation) are over 1% per month and is statistically and economically large. On the other hand, momentum is absent in small or low-priced stocks, regardless of the intensity of retail trading volume. To distinguish our findings from that due to the relation between momentum and trading volume (e.g. Lee and Swaminathan (2000)), we show that momentum in our big and high-priced sample is unrelated to total trading volume on the stock exchange. These findings support our first hypothesis that the retail investor trading amplifies momentum in stocks with an institutional clientele. Moreover, momentum profits in our setting lasts for several months and plateau thereafter, consistent with underreaction in stock prices generating momentum.

We employ an important change in the trading arrangement on SGX to provide more direct evidence of the impact of retail trading. In January 2015, SGX reduced the round lot trade size for all stocks from 1,000 shares to 100 shares. This substantial reduction in round lot size was intended to increase retail participation in the stock market and provides an exogenous shock that reduces the investment required for trading, especially for high-priced stocks. Hence, the 90% reduction in lot size attracts greater participation by retail investor who might be financially constrained and provides the channel for the amplification effect of contrarian retail trade on momentum profits. Indeed, this is what we find. The latter finding supports our second hypothesis on the interaction effects of retail investors on price momentum.

Finally, we examine if the direction of retail trading matters for price momentum. Consistent with the notion that retail investors are short-term contrarian traders, we find that retail investors are net buyers of intermediate term loser stocks, in each month of the momentum formation period. Similarly, retail investors are net sellers of winning stocks during the same period. The contrarian trades by retail investors provide one reason why stock prices may under-react to information and generate future price momentum. We devise a modified momentum strategy that combines the information in past returns as well as net-trading

direction of the retail investors. Specifically, momentum profits are amplified when the strategy is implemented in stocks with retail trades that are contrarian types. In other words, the profits are higher when buying past intermediate-term winners (losers) with net selling (net buying) by retail investors. While momentum profits continue to exist when retail investors are trading on the right side of momentum (net buyers of winners and net sellers of losers), the profits are substantially larger (at about 1.8% to 2.3% per month) when the strategy combines past intermediate-term returns with contrarian trades by retail investors.

We contribute to two main strands of literature. First, we contribute to the recent work on the role of investor clientele on cross sectional price momentum. Chui, Subrahmanyam, and Titman (2022) and Du et al. (2022) find that momentum is weaker in stocks dominated by retail investors, particularly low-priced stocks and the share class with domestic retail investors in China. We confirm their findings on the importance of investor clientele on price momentum using the Singapore stock market: momentum is stronger in stocks that are more attractive to institutional investors, i.e. bigger firms and higher-priced stocks. These findings add to the search for investors biases that may generate stock momentum. We find that the stock momentum in our subsample persists for several months but do not reverse, consistent with an underreaction to information (see e.g. Hong and Stein (1999), Grinblatt and Han (2005), Da, Gurun and Warachka (2014) and others). More interestingly, we add to the literature by showing that there are important interaction effects generated by heavy and directional retail trading in otherwise institutional stocks. In particular, we show that when there is more retail trading in the bigger firms' stocks and they appear to trade in the opposite direction than prescribed by intermediate term momentum, momentum is enhanced rather than diffused. The latter findings provide some clarity on the growing interest in the role of retail investors in price discovery. Retail investors have been viewed as noise traders whose trades are random (e.g. Barber et al. (2009)) or contrarian traders who provide liquidity (e.g. Kaniel, Saar and Titman

(2008)). Our findings are consistent with the latter view and suggests that retail investors are on average contrarian traders who contribute to stock price underreaction and momentum.

2. Data

We exploit a proprietary set of administrative data from one of the largest brokerage in Singapore that contains equity trades made by individual investors trading on the Singapore Exchange, SGX. Our sample period runs from October 2011 to September 2022. We match this dataset with data from Bloomberg to obtain other firm and market variables. These two datasets are merged through a link table from our data provider, consisting of unique identifiers (ISIN and security ticker) for each security. Our data on share of institutional and non-individual ownership is retrieved from Refinitiv and matched through the same procedure.

Our proprietary trading data contains trades by all individual account owners, with date stamp (year-month-day), price and quantity traded, along with the currency of trade and whether it was a buy or sell trade. Through the stock identifier, we retain all common stocks traded on SGX. We take the product of price and quantity to get a daily dollar volume and aggregate them at monthly intervals for each security. The security level data from Bloomberg also include monthly prices, returns, market capitalization and the daily total dollar trading volume reported by the stock exchange. Trades done in foreign currencies are rebased to Singapore Dollars (SGD) with the contemporaneous exchange rate data from Bloomberg.⁶ To reduce the data errors in stock returns, several filters are applied following the methods of Ince and Porter (2006), Lee (2011) and Amihud, Hameed, Kang, and Zhang (2015). Specifically, monthly returns are set as missing if they are above 500% or if $(1 + r_{i,t}) \times (1 + r_{i,t+1}) \leq 50\%$, where $r_{i,t}$ is the return of stock i on month t and at least either $r_{i,t}$ or $r_{i,t+1}$ is above

⁶ Some stocks are traded in dual currencies, such as in both SGD and USD. For more information, refer to: <https://www.sgx.com/securities/trading#Dual%20Currency%20Trading>. The USD/SGD exchange rate is relatively stable during our sample period. For instance, the average USD/SGD exchange rate is 1.35, with an interquartile range between 1.33 and 1.38 per US\$ dollar.

300%. We also check to ensure that the securities' daily traded price (in nominal terms) falls within the high and low for the day. Our final dataset consists of 810 unique firms actively traded by 232,328 individual account holders. Every month, we have on average 524 firms.

We report the mean values, along with the standard deviation, and distribution of select market variables and dollar trading volume of all stocks in Table 1. For each security, we scale the retail trading volume by the total trading volume reported by SGX. Thereafter, we take the mean across all securities and report the values as a measure of the market share our data provider commands. As shown in Table 1, our retail data accounts for approximately 32% of all trading volume in SGX. The retail trading volume may be double counted (relative to SGX volume) if both parties to the transaction are retail investors from our data provider. In the extreme case where all retail trades are crossed within our data provider, we obtain a lower bound of 16%, which remains a significant portion of total trading volume in SGX.

[insert Table 1 here]

[insert Figure 1 here]

As our analysis focuses on market capitalization and nominal stock price, we also report additional descriptive statistics on four subsamples of firms. The first two comprises of stocks with a cut-off at their median market capitalization into big and small market capitalization, with the cut-off updated each month. The next two groups of stocks are formed based on the nominal prices into high and low prices based on the median monthly price as the breakpoint. The retail volume as a percentage of total SGX trading volume ranges from around 27% (for big and high-priced stocks) to 37% (for small and low-priced stocks), implying that a large proportion of the retail investor trades are in small stocks or low-priced stocks. The mean market capitalization of the big and small firms are SGD 1,258 and SGD 32 million respectively, similar to market size of high- and low-priced stocks. Not surprisingly, firm size

and nominal price are highly correlated, with a Spearman's cross-sectional correlation coefficient of 60%.

We plot the dynamic distribution of market capitalization and nominal price over time in Figure 1. Both firm size and nominal prices are highly stable over time. The majority of firms on SGX are small, with market cap of SGD 304 (USD 225) million at the 75th percentile. In Panel B of Figure 1, the median price of the stocks in the sample is SGD 0.26 (or USD 0.19). The majority of the stocks on SGX also have low nominal prices of around SGD 0.78 (USD 0.58) at the 75th percentile.⁷

The retail dollar trading volume in our sample makes up a bigger proportion of market capitalization of small and low-priced stocks, reflecting the trading preference of retail investors. Nevertheless, we also find significant retail trading in the big and high-priced firms. For example, the magnitude of dollar trades by retail investors is sizeable in high-priced firms at 0.6% of market capitalization, compared to 4% in terms of overall trading volume in the stock exchange. The mean monthly return is 0.62% for all stocks, with higher mean returns for small firms. Our analyses of momentum profits in subsequent section examines both size and nominal price based sub-samples.

Table 1 also provides the distribution of ownership of the stocks. In contrast to the retail investor preference for low-priced, small firms, institutional investors hold a bigger proportion of high-priced, big firms. Institutional investor ownership is larger for high-priced and big firms. For example, big firms have higher institutional ownership of 11.5% compared to 5.3% for small firms. Non-individual ownership, broadly defined to be shares held by strategic entities such as corporations, holding companies, government agencies, private equity funds,

⁷ Note that the minimum lot size per trade for common shares is 1,000 shares prior to 19th January 2015, and 100 shares thereafter. We examine the change in round lot size in a later sub-section. Refer to <https://www.sgx.com/securities/trading> and <https://www.straitstimes.com/business/companies-markets/sgx-prepares-market-for-smaller-lot-size>.

and other insider investors, is also larger at above 40% for big and high-priced firms (42.3% and 40.9%) compared to about 30.5% to 32.2% for small and low-priced firms.

3. Cross-Sectional Momentum

To begin our analysis, we create unconditional momentum portfolios by dividing stocks into quintiles based on their returns over the past 12-months ($t - 12$ to $t - 1$), exclude the most recent month ($t = 0$), and we report the one month equally-weighted holding period return in the next month ($t + 1$) in Panel A of Table 2. We then construct double-sorted portfolios, first based on market capitalization (or nominal price) at the end of the month t and then the past 12-months' returns. We show the returns of these double-sorted portfolios in Panels B (size-momentum) and C (nominal price-momentum) respectively. To obtain risk-adjusted returns, we report portfolio returns after controlling for the exposure to Fama-French 5-factor model where the relevant Singapore market-based factors are extracted for the database made available by Jensen, Kelly, and Pedersen (2021).⁸ Specifically, we estimate the following regression in Equation (1) to generate the portfolio alphas (α):

$$Return_{p,t} - RF_t = \alpha + \beta_1(Mkt_t - RF_t) + \beta_2SMB_t + \beta_3HML_t + \beta_4RMW_t + \beta_5CMA_t + \varepsilon_{p,t} \quad (1)$$

$Return_{p,t}$ refers to the monthly return of our sorted portfolio p at month t . RF_t refers to the 1-year Singapore treasury bills. α denotes the alpha after controlling for the Singapore-version of Fama-French 5 factors: excess returns on the market ($Mkt - RF$), size (SMB), value (HML), operating profitability (RMW) and investments (CMA). We also report portfolio returns adjusted for exposure to Fama-French 3 factors, where we omit RMW and CMA from the regression. All t-statistics presented are Newey-West adjusted t-statistics.

⁸ Refer to https://jkpfactors.com/?country=all_countries&factor=all_factors for the data. We downloaded the five variables specific to Singapore, including “mktrf”, “market_equity”, “be_me”, “ope_be”, and “at_gr1”. They correspond to the five factors included in Fama-French 5-factor model, namely market, size, value, investment, and profitability.

[insert Table 2 here]

Panel A of Table 2 shows that unconditional momentum is weak for stocks listed in SGX. The momentum portfolio that takes a long position in winner quintile stocks and short position in the loser quintile stocks delivers an insignificant monthly return of 0.43% ($t = 1.37$). The average monthly momentum portfolio alphas are 0.63% ($t = 1.80$) and 0.55% ($t = 1.65$) for the Fama-French 3- and 5-factor models respectively. Although there is an increase in factor adjusted momentum returns, the evidence for momentum in Singapore market is weak, unconditionally.

Next, we focus on momentum portfolios sorted on size and nominal price. The first (last) three columns of Panel B report the returns on the momentum portfolio constructed within the set of big (small) firms. The returns of the big-momentum portfolios increase linearly, from -0.57% to 0.45%, as we move from the loser to winner portfolios. The Fama-French 5-factor alpha is negative and significant for the loser portfolio at -0.78% ($t = -2.17$), monotonically increasing to 0.40% ($t = 1.34$) for the winner portfolio. The long-short winner minus loser portfolio produces a positive and significant raw monthly return of 1.02% ($t = 3.75$). This momentum profit in big firms is also robust after controlling for the exposure to Fama-French 3- and 5-factor model, with alpha of 1.23% ($t = 4.12$) and 1.18% ($t = 4.23$) respectively. On the contrary, the momentum portfolio constructed using small firms do not display momentum, with average returns close to zero and is unaffected if we adjust for factor risks.

We obtain very similar results when stocks are sorted by their nominal price. In Panel C of Table 2, price momentum in SGX concentrates in the high-priced stocks. As shown in the first three columns of the panel, the raw returns and Fama-French 5-factor alphas for the high-priced-momentum portfolios increases linearly, when we move from the loser to winner quintiles. The long-short winner minus loser portfolio produces significantly positive raw

monthly return of 1.03% ($t = 4.15$) that is robust to adjustment for factor exposures. Similar to the small-size-momentum sorted portfolios, the return on the low-priced-momentum long-short portfolio is not significantly different from zero, with a 5-factor alpha of 0.25% ($t = 0.54$). We obtain qualitatively similar results in value-weighted momentum portfolio returns reported in Appendix Table A1, Panel A.⁹

Overall, we find that momentum concentrates in the subset of firms that belong to the top half of the stocks in terms of size or nominal price. There is no evidence of price momentum among the small or low-priced stocks. The concentration of price momentum in larger size or higher nominal price accords well with the clientele effects documented in Chui et al. (2022) and Du et al. (2022). In a sense, this is similar to findings in the U.S. where momentum returns increase when one excludes microcaps or look at risk-adjusted returns. The absence of momentum in small, or low-priced stocks is also consistent with these stocks being primarily traded by retail investor, who are more likely to be contrarian traders.

4. Momentum and Retail Trading

4.1. Are Retail Investors Contrarian Traders?

In this sub-section, we investigate if retail investors are indeed contrarian traders. We exploit our proprietary trading dataset that provides the direction of each trade in all individual investor accounts. We construct a trading volume measure that considers the direction of trade by retail investors as a group. The *SignedRetailTrading* variable is defined as follows:

$$SignedRetailTrading_{i,t} = \frac{DollarVolume_{i,t}^{buy}}{DollarVolume_{i,t}^{buy} + DollarVolume_{i,t}^{sell}} \quad (2)$$

⁹ We argue that focusing on equally-weighted portfolio returns doesn't undermine the economic significance of our results. Firstly, we focus on high priced or big firms since these are the group of the stocks where momentum effects are robust. Second, value-weighting tend to overweight the few mega-sized firms in the market. Third, we confirm that our results remain qualitatively similar for value-weighted portfolio returns if we truncate the effect of mega firms. All our main results based on value-weighted portfolios (where we truncate the top 10% of the firms) are presented in Appendix Table A1.

$SignedRetailTrading_{i,t}$ is a scaled measure of the signed retail dollar volume for security i at month t . The superscript attached to $DollarVolume$ refers to the subset of trades that are flagged to be either buy or sell trades. $SignedRetailTrading_{i,t}$ is confined to be within the values of 0 and 1, where 0 (1) means that all trades for stock i in the month t are sell (buy) trades.

To examine if retail investors are contrarian traders in aggregate, we regress $SignedRetailTrading_{i,t}$ on the stocks' cumulative returns during momentum's 12-months formation period. Specifically, we have:

$$SignedRetailTrading_{i,t} = \alpha + \beta_i PastReturns_{i,t} + \delta_i + \gamma_t + \varepsilon_t \quad (3)$$

where $PastReturns_{i,t}$ refers to the 12-months cumulative return during momentum's formation period from $t - 12$ to $t - 1$ for each stock i . δ and γ refers to firm and month-by-year fixed effects respectively. We run our regression on the full sample of firms and two further subsamples consisting of only high- and low-priced firms as a proxy for high and low retail investor trading in these stocks.

[insert Table 3 here]

Table 3 shows that retail investors are contrarian traders on average. The regression coefficient β_i is significantly negative for all stocks and for the subset of low-priced and high-priced stocks, suggesting that retail traders are net sellers in stocks that performed well during the formation period, and net buyers in stocks that underperformed in the past. On average, retail investors sell 0.9% (0.7%) more for low-priced stocks (high-priced stocks) when the past 12-months cumulative return increases by 1%. This corresponds well with the contrarian nature of retail investors along with their higher interest in low-priced stocks.

4.2. Retail Trading, Firm Size (or Nominal Price) and Momentum Returns

Here, we examine the relation between price momentum and retail participation. For each security, we aggregate the daily trades to obtain monthly dollar trading volume by retail investors. To normalize the trading volume across different stocks, we first scale the dollar trading volume for stock i in month t by the market capitalization of the same stock i at time t .¹⁰ Specifically,

$$RetailTrading_{i,t} = \frac{RetailDollarVolume_{i,t}}{Market\ Capitalization_{i,t}} \quad (4)$$

A high (low) $RetailTrading_{i,t}$ indicates a high level of retail participation in trading the stock, relative to other stocks in the same month.

We condition our analysis of momentum returns on SGX on the degree of retail investor participation in the stock. We do this by triple sorting the set of stocks on three variables each month. First, we independently sort stocks into 2 by 3 groupings based on their firm size (2 groups split at the median cut off) and $RetailTrading_{i,t}$ (3 groups) in month t . Then, we further sort stocks in each of the 6 groups into quintiles based on their past 12-months returns ($t - 12$ to $t - 1$). We report the equal-weighted holding period return for the extreme loser and winner deciles in month $t + 1$, skipping month t . We also report the return on the winner minus loser momentum portfolio in the holding month $t + 1$. We repeat the analysis for sub-group of firms split into high- and low-price, based on the median cut off each month. The results are presented in Table 4.

Panel A of Table 4 reports the holding period returns and the risk-adjusted returns for the momentum portfolios with high and low retail trading volume for all firms and the sub-groups of big and small firms. The first three columns of Panel A represent the portfolio sorts

¹⁰ Dollar volume in the numerator and market capitalization in the denominator both accounts for variation in volume due to corporate adjustments such as splits, reverse-splits, etc. Also, we also compare dollar volume and market capitalization in the same nominal terms and currency (where applicable) to ensure that the values are comparable.

for all firms, the next three columns for big firms, and the last three columns for small firms. Despite the retail trading volume sort, we find our results to be generally amenable with our earlier results that unconditional momentum is weak in the sample of SGX stocks. The raw returns of the low, high, and high minus low momentums portfolios in each of the retail trading volume sorts are statistically indistinguishable from zero. The Fama-French 5-factor alpha for our high retail trading volume-momentum portfolio is a weakly significant 1.05% ($t = 1.88$). This finding, in part, is suggestive that retail trading volume may play some role in driving momentum. Next, we direct our analyses to the interaction effects of retail trading and firm size (and nominal price), given the prominence of momentum in the larger and higher-priced stocks.

[insert Table 4 here]

To examine the interaction of retail trading and firm size, we differentiate the stocks via their median size cut-off in a similar fashion to Table 2. Among the big firms (third to sixth column in Table 4, Panel A), momentum portfolio (i.e. winner minus loser big stocks with high retail participation) generates significant and economically large profits of 2.15% ($t = 2.86$) per month, with a Fama-French 5-factor alpha of 2.38% ($t = 3.41$). Conversely, the lack of retail investor trading in the big firms attenuates momentum effect. We find that the winner-minus-loser momentum portfolio based on big firms with low retail trading lowers the raw momentum returns to 0.62% ($t = 1.58$) and 5-factor alpha to 0.67% ($t = 1.63$). The panel also reports the difference in the momentum profits between the high and low retail participation in big stocks to capture the marginal contribution of retail participation in generating the additional momentum effects. We find that the incremental momentum profits in big firms for the subset with high retail volume is significant at 1.54% ($t = 1.88$) for raw returns and 1.71% ($t = 2.33$) in terms of 5-factor alpha. On the other hand, retail trading volume does not play a significant role in affecting the (lack of) price momentum in small stocks. As shown in last three columns of Panel A, Table 4, there is no evidence on price momentum in small stocks and the intensity

of retail investor trading in these stocks do not make a difference. Similar to the results on small stocks in Table 2, adding information on retail trading does not change the main finding that it is no momentum in small stocks.

We obtain similar results when we examine the interaction effect of retail trading activities within the subset of stocks grouped by nominal stock prices. The results for the high- and low-priced stocks are presented in Table 4 Panel B. The first and last three columns show the holding period returns on the subset of stocks with above (high) and below (low) median nominal prices respectively. Similar to the results based on big and small stocks, momentum is stronger in high-priced stocks, especially when accompanied by high retail trading volume. The high retail trading volume group generates a raw monthly returns and alpha of 2.05% ($t = 2.74$) and 2.46% ($t = 3.36$). The returns are lower in magnitude at 1.02% ($t = 2.8$) to 1.3% ($t = 3.91$) when accompanied by low retail trading volume. Hence, the presence of active retail trading in high-priced stocks amplifies the momentum effect.

Overall, we find evidence that momentum is prevalent in bigger and high-priced stocks traded on SGX, and high retail trading volume amplifies the effect. Similar to findings in other papers, the significant alphas shows that the returns are not explained by exposures to the Fama-French factors. Hence, these results are suggestive of retail participation amplifying the price momentum among stocks with institutional interests. This could be an avenue for future investigation with a broader sample.

4.2.1. Robustness Checks

Given our results in Table 4, one may be concerned that the positive relation between momentum and retail trading volume may be confounded by potential effects of total trading volume (e.g. Lee and Swaminathan (2000)). We alleviate this concern by providing two robustness checks. First, we construct *TotalTradingVolume*, defined as the trading volume by all market participants divided the market capitalization, as an alternative measure of trading

activity in the stock. We replicate the results in Table 4 Panel A and B for big firms and high-priced firms, except for replacing *RetailTrading* with *TotalTradingVolume* and present the results in Panel C.¹¹

Among the big stocks, we observe significant momentum profits in both groups of stocks with high and low *TotalTradingVolume*. Unlike the results based on high and low retail trading volume, big stocks segregated into high total trading volume do not display significantly larger momentum profits than the low volume stocks. The difference in 5-factor alphas of 0.68% for the groups of high and low total volume stocks is not significant with $t = 1.38$. Similarly, the momentum alpha for high-priced stocks with high total trading volume (at 1.26%) is not different from the alpha when total trading volume is low (1.03%). Hence, we disentangle the effects of retail trading volume from total trading volume and attribute the strengthening of momentum profits in big and high-priced stocks in Panel A and B of Table 4 to higher retail trading volume.

Additionally, we perform two Fama-Macbeth cross-sectional regressions as alternative empirical estimations. We consider two specifications, where we regress returns on stock i in month $t + 1$:

$$Return_{i,t+1} = \alpha + b_1 \times D_{i,t} \times PastReturns_{i,t} + b_2 \times D_{i,t} + b_3 \times PastReturns_{i,t} + Controls_{i,t} \quad (5)$$

and

$$Return_{i,t+1} = \alpha + c_1 \times RetailParticipation_{i,t} \times PastReturns_{i,t} + c_2 \times RetailParticipation_{i,t} + c_3 \times PastReturns_{i,t} + Controls \quad (6)$$

where *PastReturns* is the cumulative return of the past 12-months ($t - 12$ to $t - 1$). In Equation (5), the regression is estimated using all firms and D is a dummy variable set to 1 for big (or high-priced) firms, and 0 otherwise. In Equation (6), we estimate the regression for the

¹¹ We examined an alternative specification by averaging *RetailDollarVolume* over a period of 12-months (from $t - 12$ to $t - 1$) and scaling it by *TotalTradingVolume* and obtained similar qualitative results.

subset of high-priced stocks or big stocks only. *RetailParticipation* is a categorical variable, set as 3 if *RetailTrading* is in the top tercile, 2 if *RetailTrading* is in the middle tercile, and 1 otherwise. The control variables for both Equations (5) and (6) are: $Return_t$ for return in current period at time t (to account for short term reversals), *TotalTradingVolume* representing the total dollar volume traded on SGX (controlling for total volume effects) and *MarketCap* (firm size). The coefficients of interest are b_1 and c_1 for the interaction terms $D \times PastReturns$ and $RetailParticipation \times PastReturns$. Effectively, Equation (5) examines if the interaction between big or high-priced stocks and past returns is a significant predictor of future returns, and therefore momentum. Equation (6) examines if retail trading volume, proxied via *RetailParticipation*, augment momentum returns.

[insert Table 5 here]

The results are presented in Table 5. The first two columns of Table 5 report the interaction effect between big or high-priced dummy on the past cumulative returns during momentum's formation period. The b_1 coefficient in Equation (5) is significantly positive, confirming the concentration of momentum among big and high-priced stocks. The estimate of Equation (6) on the interaction effect between *RetailParticipation* and *PastReturns* in predicting future returns is presented in columns 3 and 4 of Table 5. Indeed, we find a positively significant relationship, confirming our results presented in Table 4 that retail trading volume enhances momentum profits among the subset of big and high-priced stocks.

4.3. Experimental Setting with Changes in Round Lot Size

One of the main messages in our paper is that intermediate-term momentum is strengthened by retail participation. Indeed, the results in Table 4 confirm our hypothesis and rule out the alternative explanation that the returns are driven by total trading volume in SGX. However, other possible confounding factors remain. For instance, retail trading may be correlated with trading costs, which may in turn affect price momentum. We exploit an

institutional change in SGX that lowers the round lot size to help us better identify the effects of retail participation on momentum profits. SGX reduced the round lot size of securities traded on the exchange from 1,000 to 100 shares per lot, effective from 19 January 2015.¹² This exogenous change in trade size should benefit retail investors more than institutional investors because retail investors, who are likely to be capital constrained, can better access a wider range of high-priced stocks. Therefore, we expect momentum strategy among high-priced stocks with heavy retail trading to be more profitable as an increased number of previously constrained retail players enter the market. More importantly, the lower minimum lot size should amplify the momentum profits by inducing an increase in retail trading without altering other firm level characteristics related to momentum profits.¹³

We sort portfolios to check how the profitability of momentum strategy responds to the change in minimum lot size, especially for high-priced stocks with heavy retail trading. In particular, we decompose the high-priced portfolios in Table 2 and Table 4 into two separate time-periods – before and after January 2015 (corresponding to minimum lot size of 1,000 and 100 respectively). The results are reported in Table 6. Panel A shows that the winner-minus-loser momentum strategy applied to high-priced portfolios generates positively significant raw returns and 5-factor alphas of 1.29% ($t = 2.73$) and 1.46% ($t = 2.87$) before the policy, and 0.96% ($t = 3.27$) and 1.1% ($t = 3.94$) after the policy. This suggests that momentum among the high-priced stocks do not seem to be affected by the policy change.

[insert Table 6 here]

Panel B of Table 6 divides the high-priced portfolios by sorting on *RetailTrading* and past 12-months returns. Momentum profits coupled with *RetailTrading* appear to be

¹² According to Magnus Bocker, CEO of the SGX, one purpose of the policy is to “make it easier to invest blue chips and index component stocks which tend to be higher-priced”. We expect securities in SGX, especially those high-priced stocks, become more attractive to retail investors since the reduction in minimum lot size relaxes their capital constraints.

¹³ In unreported results, we find that common firm-level characteristics (e.g. firm size, price, total trading volume) are not significantly affected by the change in round lot size.

significantly more pronounced after the policy. In the periods before the policy change, we find raw momentum profits among stocks with high retail trading volume to be 1.51% ($t = 1.26$) with a weakly significant Fama-French 5-factor alpha of 2% ($t = 1.72$). Post-policy, we find the same sorted group of stocks returning higher raw returns of 2.48% ($t = 2.82$), with a Fama-French 5-factor alpha of 2.95% ($t = 3.4$). Furthermore, we find that the difference in the momentum profits between the high and low *RetailTrading* in high-priced stocks to be 0.56% ($t = 0.39$) and 1.63% ($t = 1.79$) in terms of 5-factor alpha, before and after the policy change in minimum lot size. Overall, there is some evidence that reducing the round lot size amplifies the momentum profits in high-priced stocks accompanied by heavy retail trading since relaxed minimum investment sum is likely to add to retail investors' interests in high-priced stocks. This supports our conjecture that the ease of trading provided by the small lot size alleviates retail traders' capital constraints and increases price momentum in high-priced stocks.

4.4. Retail Trading during the Formation of Momentum

Our results so far focus on the post-formation returns across different dimensions of portfolio sorts to examine the ex-post effect in month ($t + 1$) of retail trading on momentum. In this sub-section, we focus our attention on the retail trading activity during the formation period ($t - 12$ to $t - 1$) to better understand the behavior of retail investors in affecting momentum. At each formation month t , we identify ex-post the stocks that would have been sorted into each of the portfolios according to market capitalization (or nominal price) and prior 12-months returns. We track the stocks' *SignedRetailTrading* measure over a period of 25-months from $t - 12$ to $t + 12$ (including $t = 0$) and repeat the exercise, "rebalancing" the portfolio after the one month holding period. Thereafter, we average the *SignedRetailTrading* measure across all securities within each month t and plot them across time in Figure 2 with the relative month t on the horizontal axis. Essentially, this depicts the

aggregated sign of retail buying (or selling) volume through each period relative to portfolio formation month.

[insert Figure 2 here]

We present the graph for four groups based on market capitalization and nominal price of the stocks. Panels A and B of Figure 2 corresponds to the portfolio of stocks with large and small market capitalization, while Panels C and D refers to the sub-groups of stocks based on high and low nominal prices. Within each of these panels, the solid red line represents the *SignedRetailTrading* for the loser stocks and dotted blue line for the winning stocks. These lines represent point-in-time plots at their respective horizontal-axis intervals. The vertical bars represent confidence intervals at the 95% level and the solid black line plotted horizontally represents 0.5, where the buying and selling volume are exactly equal.

On average, the figures show that retail investors tend to be contrarians in nature. Focusing on Panel A and C of Figure 2, representing the big and high nominal price stocks, we observe the solid red lines (for loser stocks) tend to be upward sloping from $t - 12$ to $t - 1$. This suggest that the retail investors are trading against the price momentum in each month (being net buyers of loser stocks) and increasing their buying activity in loser stocks during its formation month. The converse holds for winner stocks: retail investors tend to be net sellers of winning stocks (dotted blue line) during the same period. Post formation, we continue to observe contrarian trades on both panels in the periods immediately following $t = 0$, suggesting that retail investors continue to be contrarians on average. However, the values start tending towards 0.5 and loses its statistical significance after a few months post formation. These observations are similar when we look at high-priced stocks: retail investors as a group are net buyers of losers and net sellers of winners in the formation period of the momentum strategy.

In contrast, retail investors' trading preference among the small or low-priced stocks does not seem to be related to momentum. We see in Panel B that retail investors are net selling winners regardless of momentum throughout the 25-months period and suggest that retail investors are generally contrarians on small sized firms. These same investors are indifferent on the losers as the value of *SignedRetailTrading* is not statistically different from 0.5. Our interpretation of Panel D on the low-priced stocks remains largely similar.

The findings based on *SignedRetailTrading* suggests that retail investors are contrarian traders in aggregate, including in big stocks and high-priced stocks. Among the subset of stocks that do display momentum (big or high-priced), we find retail investors preferring to buy losing stocks and sell winning stocks. After the formation period, we note a stark decrease in the contrarian trades and tend towards expected values in the period that follows. The trading pattern is less stark among stocks that do not display momentum (low market capitalization or low nominal price).

4.5. Momentum Returns in the Longer-Term

A natural follow up on the retail investors' trading behavior relates to momentum profits in the longer term. We examine the performance of the momentum portfolios in the longer term by extending the returns over the next 24-months holding period. We adjust these returns for the Fama-French 5 factors and plot the cumulative alphas over time. The relevant market capitalization and nominal price portfolio sorts, along the specifications of our variables and high dimension sorts with have been described in the preceding sections. For brevity, we limit our results to the high market capitalization and high nominal price portfolios where momentum is present.

[insert Figure 3 here]

Panel A and B of Figure 3 displays the cumulative alpha of the momentum portfolio within the large market capitalization and high-priced stocks respectively. We find the alpha

for the stocks with large market capitalization to be increasing over the short term. The Fama-French 5-factor alpha is positive and increases over the first 6-month holding period and levels off in the longer horizon. The first 6 months produced approximately 4% alpha, or 8% per annum, which is economically significant. Similarly, the cumulative alpha for the high-priced stocks increases up to approximately 4% in the first six months, and plateaus thereafter. The momentum profits we report for big stocks and high-priced stocks lasts for about 6 months, and we do not observe subsequent reversals. These findings are suggestive of underreaction in stock prices as a source of momentum on SGX.

4.6. Retail Investors as Contrarian Traders

Our results so far shows that price momentum exist and is indeed profitable among stocks with high market capitalization or high nominal price. We also find that heavy retail trading in these stocks enhances momentum. The existing literature shows that institutional investors are more likely to be momentum traders (e.g. Grinblatt, Titman, and Wermers (1995), Nofsinger and Sias (1999), and Vayanos and Woolley (2013)), while retail investors are likely to be contrarian traders (e.g. Kaniel, Saar, and Titman (2008)). Our conjecture is that retail investors are contrarian trader providing liquidity to their counterparties, and in doing so, increase stock price underreaction and amplify momentum effects. As such, their trading participation increases price momentum. This conjecture is also consistent with our results in Figure 2 and Table 3 which shows that retail investors tend to trade against momentum.

We set out to test our hypothesis that a winner minus loser momentum strategy is indeed more profitable when contrarian retail traders are present. To identify contrarian trading, we use the measure of *SignedRetailTrading* in Equation (2). We pair this measure with the one-year return of stock i . We construct triple sorted portfolios, first independently sorting stocks into 2 by 2 groups based on firm size (big or small firms) or nominal price (high or low) and *SignedRetailTrading* (NetBuy or NetSell) in month t . NetBuy (NetSell) refers to the stocks

where retail investors are net buyers (sellers) of the stock, i.e. *SignedRetailTrading* is above (below) 0.5. Within each of these groups, we sort the groups into quintiles based on their past 12-months returns ($t - 12$ to $t - 1$). The group of stocks for which retail investors are net buyers ($SignedRetailTrading > 0.5$) of loser quintile stocks and net sellers ($SignedRetailTrading < 0.5$) of winner stocks, identifies stocks with high contrarian retail investors and we refer to these as stocks with *ContrarianTrading* stocks. In other words, the winner minus loser momentum returns of the *ContrarianTrading* portfolios are the difference between portfolios with *SignedRetailTrading* below 0.5 for winner stocks and portfolios with *SignedRetailTrading* above 0.5 for loser stocks. Likewise, the groups of stocks for which retail investors are net seller of loser stocks and net buyers of winner stocks, we label the stocks as *MomentumChasing* stocks and construct momentum portfolio returns for these stocks. As before, we skip the month t and report the equally-weighted holding period return for the month $t + 1$. The returns of our portfolios are presented in Table 7.

[insert Table 7 here]

Panel A of Table 7 focuses on the portfolios sorted via median market capitalization cut offs. The first three columns show the returns of the portfolios consisting of stocks above median market capitalization, and the last three columns below median market capitalization. Among the big market capitalization momentum trading portfolio sort, the monthly momentum profits for the *ContrarianTrading* portfolios are significantly positive at 1.68% ($t = 4.06$) for raw returns and 1.84% ($t = 4.27$) in terms of 5-factor alpha. On the other hand, the returns of the *MomentumChasing* portfolios are significantly lower both in magnitude and statistical significance at 0.74% ($t = 1.44$) in raw returns and a 5-factor alpha of 0.88% ($t = 1.62$). The difference in momentum returns between the *ContrarianTrading* and *MomentumChasing* portfolios are also significant. Together, they show that momentum profits are higher with the presence of contrarian traders and supports our hypothesis. Our interpretations of the results in

Panel B, consisting of nominal price sorted portfolios, are similar. Again, reinforcing our previous results, there is no momentum in small and low-priced stocks, independent of retail trading behavior.¹⁴

Overall, the results support our hypothesis that momentum profits are higher in the presence of contrarian retail traders. Tying our results of our earlier sections, heavy retail trading, in particular their contrarian trades, slows down further the adjustment of prices to information and hence contribute to momentum in stock prices as the prices eventually reflect all information in the intermediate term.

5. Conclusion

Retail investors play an increasingly important role in the market dynamics in the light of the recent rise of financial technologies. This raises the question on how they interact and affect market anomalies, particularly momentum, which have been found to be robust across time, markets, and asset classes. Using stocks traded on Singapore Exchange, we find momentum to concentrate among stocks with higher market capitalization and higher nominal stock price. We go on to show that heavy trading by retail investors in these stocks, adds significantly to price momentum. In contrast, there is no evidence of price momentum in small stocks or low-priced stocks, which are the trading habitat of retail investors. These findings emphasize the interaction effect of retail trading with other traders in the market, presumably institutional investors who are more active in the big and high-priced stocks. This gels well with the evidence in the literature that institutional investors stay away from small, low-priced stocks given their investment mandate.

Our findings are robust to control for exposure to common risk factors, and we argue is consistent with behavioral factors and clientele effects as main drivers of momentum. We provide additional evidence to support the idea that the interaction of retail and other investors.

¹⁴ We obtain similar results in value-weighted momentum portfolios reported in Panel C of Appendix Table A1.

We find that retail investors are contrarian traders, on average, as they are buying losers and selling winners in the momentum strategy. The amplification of momentum effects in the presence of (contrarian) retail investors suggests that heavy retail trading in some stocks increases underreaction in prices to information and fuels continued momentum. Whether the differences in trading strategy across investor types stem from investor disagreement, differential information or behavioral biases is left for future research.

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Table 1: Summary Statistics

This table reports summary statistics of variables appearing in the following analysis from October 2011 to September 2022. We report the mean value of each variable for the full sample and equal subsamples based on market cap (big and small firms) or price (high-priced and low-priced firms) split at the median each month. Price is the monthly raw stock price at the end of each month. Return is the monthly stock return in percentage. Market cap (or mkt cap) is the market capitalization in millions. Total trading volume is the total dollar trading volume in SGX in millions. Retail trading volume is the total dollar trading volume by retail investors in millions. Institutional ownership is the percentage of shares held by institutions. Non-individual ownership is the percentage of shares held by strategic entities (e.g. corporations, holding companies, government agencies, private equity funds, and other insider investors) excluding individual investors. Variables are in monthly frequency.

Variable	Mean					Std Dev	10%	25%	Median	75%	90%
	All Firms	Big Firms	Small Firms	High-Priced Firms	Low-Priced Firms						
Market Cap	644.22	1,258.45	31.64	1,243.81	63.89	2078.11	10.02	25.98	83.37	304.25	1128.93
Price	0.79	1.41	0.18	1.49	0.10	1.71	0.03	0.09	0.25	0.65	1.75
Return (%)	0.62	0.15	1.12	0.80	0.43	14.80	-8.70	-1.47	0.00	0.42	8.33
Retail Trading Volume/Total Trading Volume (%)	31.96	27.74	36.55	27.30	36.54	22.37	6.27	14.45	27.63	44.98	64.42
Retail Trading Volume/Mkt Cap (%)	1.22	0.80	1.65	0.59	1.83	5.07	0.01	0.03	0.13	0.49	2.18
Total Trading Volume/Mkt Cap (%)	6.61	4.70	8.56	4.03	9.16	28.28	0.04	0.15	0.62	3.07	12.12
Institutional Ownership (%)	9.73	11.48	5.32	12.39	5.49	17.09	0.01	0.34	2.19	11.13	28.63
Non-Individual Ownership (%)	36.72	42.29	30.50	40.90	32.23	27.42	1.15	9.06	37.07	60.26	74.71

Table 2: Momentum Profits

This table reports the profitability of momentum strategy for the full sample and sub-samples split based on market cap or price. In particular, SGX stocks are sorted each month t into quintiles based on their cumulative returns in the past 12-months ($t-12$ to $t-1$) in Panel A. We report the average holding-period returns in month $t + 1$ for the period October 2011 to September 2022 and corresponding factor-adjusted alphas. The “W – L” group provides the mean returns of the strategy that buys the winner quintile and sells the loser quintile. The FF3 alpha is based on the SGX version of market, size, and value factors and the FF5 alpha further includes investment and profitability factors in SGX. The data on factors is obtained from the Global Factor Data website (Jensen, Kelly, and Pedersen (2021)). In Panel B & C, we first sort stocks evenly into two groups based on market cap or price in month t and then further sort each group into quintiles based on previous 12-months returns ($t - 12$ to $t - 1$). The “W – L” group provides the mean returns of the strategy that buys the winner quintile and sells the loser quintile within each size or price group. Newey-West adjusted t-statistics are shown in the parenthesis and returns are equally-weighted.

Panel A: All stocks						
Mom	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Loser (L)	0.36 (0.72)	0.12 (0.24)	0.19 (0.36)			
2	-0.12 (-0.55)	-0.21 (-1.17)	-0.19 (-1)			
3	0.06 (1.27)	0.06 (1.13)	0.05 (0.97)			
4	0.25* (1.95)	0.24* (1.95)	0.24* (1.95)			
Winner (W)	0.78** (2.16)	0.75** (2.03)	0.74** (2)			
W – L	0.43 (1.37)	0.63* (1.8)	0.55* (1.65)			

Panel B: Big and Small Stocks						
Mom	Big			Small		
	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Loser (L)	-0.57 (-1.34)	-0.79** (-2.27)	-0.78** (-2.17)	1.21** (2.01)	0.97 (1.61)	1.09* (1.71)
2	-0.08 (-0.53)	-0.11 (-0.86)	-0.12 (-0.9)	0.15 (0.4)	-0.01 (-0.02)	0.02 (0.06)
3	-0.01 (-0.29)	-0.02 (-0.47)	-0.03 (-0.75)	0.06 (0.52)	0.04 (0.36)	0.06 (0.54)
4	0.08 (0.57)	0.04 (0.29)	0.02 (0.13)	0.39*** (2.79)	0.39*** (2.77)	0.4*** (2.65)
Winner (W)	0.45 (1.42)	0.43 (1.41)	0.4 (1.34)	1.31*** (2.79)	1.28*** (2.72)	1.3*** (2.67)
W – L	1.02*** (3.75)	1.23*** (4.12)	1.18*** (4.23)	0.1 (0.24)	0.3 (0.69)	0.21 (0.47)

Panel C: High- and Low-Priced Stocks						
Mom	High-Priced			Low-Priced		
	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Loser (L)	-0.35 (-0.95)	-0.54 (-1.76)	-0.55 (-1.8)	0.84 (1.3)	0.56 (0.89)	0.71 (1.05)
2	-0.01 (-0.05)	-0.03 (-0.28)	-0.05 (-0.47)	0.17 (0.45)	0.03 (0.07)	0.06 (0.16)
3	0.01 (0.31)	0.01 (0.23)	0 (-0.09)	-0.02 (-0.12)	-0.05 (-0.43)	-0.02 (-0.16)
4	0.19 (1.14)	0.16 (0.98)	0.15 (0.97)	0.2 (1.58)	0.19 (1.49)	0.2 (1.42)
Winner (W)	0.68** (2.13)	0.7** (2.19)	0.68** (2.26)	1.03** (2.16)	0.95** (2.02)	0.96* (1.95)
W – L	1.03*** (4.15)	1.24*** (5.11)	1.24*** (5.54)	0.19 (0.44)	0.39 (0.9)	0.25 (0.54)

Table 3: Retail Investors as Contrarian Traders

This table reports regressions relating $SignedRetailTrading_{i,t}$ to the 12-months ($t - 12$ to $t - 1$) cumulative returns during momentum's formation period. The dependent variable is the $SignedRetailTrading_{i,t}$ is defined as the retail buy trading volume scaled the sum of retail buy and sell dollar volume for stock i in month t . It is confined to the values between 0 to 1. $PastReturns_{i,t}$ is the past 12-months cumulative return ($t - 12$ to $t - 1$). High- and low-priced sub-samples refers to stocks above and below the median nominal price each month. We include firm and month-by-year fixed effects. Standard errors are double-clustered by firm and month-by-year and we report the corresponding t-values in parentheses.

Dependent Var	$SignedRetailTrading_{i,t}$		
	Full Sample	High-Priced	Low-Priced
Sample	(1)	(2)	(3)
$PastReturns_{i,t}$	-0.006** (-2.28)	-0.007** (-1.97)	-0.009*** (-3.37)
Firm FE	Yes	Yes	Yes
Month-By-Year FE	Yes	Yes	Yes
Observations	39,567	19,880	19,686
R2	0.08	0.10	0.10

Table 4: Retail Trading and Momentum

This table reports the profitability of momentum strategy related to retail trading and total trading in SGX. In Panel A, we first independently sort stocks into a 2 by 3 metric based on market cap (Big and Small firms) and retail trading (Low and High) in month t and then further sort each group into quintiles based on previous 12-months returns ($t - 12$ to $t - 1$). In Panel B, we conduct the same analysis while replacing market cap with stock price (High-Priced and Low-Priced). The FF3 alpha is based on the SGX version of market, size, and value factors and the FF5 alpha further includes investment and profitability factors in SGX. The data on factors is obtained from the Global Factor Data website (Jensen, Kelly, and Pedersen (2021)). In Panel C, we conduct the same analysis for big or high-priced stocks while replacing retail trading with total trading volume on SGX. In particular, we first independently sort stocks into a 2 by 3 metric based on market cap or price and total trading volume in SGX and then further sort each group into quintiles based on previous annual returns ($t - 12$ to $t - 1$). For all three panels, we report the average holding-period returns in month $t + 1$ for the period October 2011 to September 2022 and corresponding factor-adjusted alphas. The “W – L” group provides the mean returns of the strategy that buys the winner quintile and sells the loser quintile within each market cap (price)-retail trading (total trading) group. Retail trading is defined as the sum of retail buy and sell dollar volume divided by the market cap. Total trading is defined as the total trading volume in SGX (including retail trading volume) divided by market cap. Newey-West adjusted t-statistics are shown in the parenthesis and returns are equally-weighted.

Panel A: Market Cap, Retail Trading, and the Profitability of Momentum Strategy										
Retail Trading	Mom	All Firms			Big			Small		
		Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Low (L)	Loser (L)	1.05* (1.9)	0.84 (1.5)	0.89 (1.6)	-0.29 (-0.64)	-0.42 (-1)	-0.52 (-1.2)	1.37* (1.71)	1.11 (1.32)	1.28 (1.49)
	Winner (W)	1.19*** (2.7)	1.23*** (2.95)	1.17*** (2.75)	0.32 (0.83)	0.28 (0.75)	0.15 (0.41)	2*** (3.26)	2.12*** (3.37)	2.18*** (3.34)
	W – L	0.14 (0.26)	0.4 (0.68)	0.28 (0.49)	0.62 (1.58)	0.71* (1.71)	0.67 (1.63)	0.63 (0.64)	1.01 (0.99)	0.9 (0.86)
High (H)	Loser (L)	-0.24 (-0.28)	-0.31 (-0.36)	-0.25 (-0.26)	-1.16 (-1.45)	-1.27* (-1.72)	-1.19 (-1.57)	0.82 (0.74)	0.8 (0.7)	0.86 (0.71)
	Winner (W)	0.56 (0.79)	0.73 (0.95)	0.8 (1)	0.99 (1.28)	1.2 (1.51)	1.19 (1.48)	0.55 (0.57)	0.64 (0.6)	0.83 (0.74)
	W – L	0.8 (1.39)	1.04* (1.79)	1.05* (1.88)	2.15*** (2.86)	2.47*** (3.32)	2.38*** (3.41)	-0.27 (-0.35)	-0.16 (-0.21)	-0.03 (-0.04)
H – L	Loser (L)	-1.28* (-1.74)	-1.14 (-1.5)	-1.14 (-1.44)	-0.87 (-1.35)	-0.85 (-1.32)	-0.68 (-0.97)	-0.55 (-0.56)	-0.31 (-0.31)	-0.41 (-0.4)
	Winner (W)	-0.63 (-1.22)	-0.5 (-0.89)	-0.37 (-0.62)	0.67 (0.92)	0.92 (1.23)	1.04 (1.42)	-1.46* (-1.7)	-1.48 (-1.5)	-1.35 (-1.31)
	W – L	0.66 (0.94)	0.64 (0.86)	0.77 (1.09)	1.54* (1.88)	1.77** (2.19)	1.71*** (2.33)	-0.9 (-0.82)	-1.16 (-0.99)	-0.94 (-0.81)

Panel B: Stock Price, Retail Trading, and the Profitability of Momentum Strategy

Retail Trading Mom		High-Priced			Low-Priced		
		Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Low (L)	Loser (L)	-0.56 (-1.28)	-0.77** (-1.97)	-0.85** (-2.16)	1.44 (1.62)	1.21 (1.33)	1.45 (1.54)
	Winner (W)	0.47 (1.35)	0.51 (1.54)	0.45 (1.38)	2.12*** (3.05)	2.12*** (3.1)	2.04*** (2.94)
	W - L	1.02*** (2.8)	1.29*** (3.84)	1.3*** (3.91)	0.68 (0.7)	0.91 (0.88)	0.58 (0.55)
High (H)	Loser (L)	-0.51 (-0.88)	-0.55 (-0.99)	-0.58 (-1.09)	0.47 (0.42)	0.43 (0.38)	0.59 (0.47)
	Winner (W)	1.54* (1.83)	1.81** (2.06)	1.88** (2.16)	0.24 (0.27)	0.26 (0.26)	0.33 (0.33)
	W - L	2.05*** (2.74)	2.35*** (3.09)	2.46*** (3.36)	-0.23 (-0.29)	-0.18 (-0.24)	-0.26 (-0.32)
H - L	Loser (L)	0.05 (0.1)	0.22 (0.47)	0.27 (0.57)	-0.96 (-0.93)	-0.78 (-0.74)	-0.86 (-0.77)
	Winner (W)	1.08 (1.61)	1.29* (1.83)	1.43** (2.07)	-1.88** (-2.15)	-1.87** (-1.98)	-1.71* (-1.78)
	W - L	1.03 (1.51)	1.07 (1.46)	1.16 (1.59)	-0.91 (-0.78)	-1.09 (-0.88)	-0.84 (-0.69)

Panel C: Total Trading, and the Profitability of Momentum Strategy

Total Trading Mom		Big			High-Priced		
		Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Low (L)	Winner (W)	0.27 (1)	0.18 (0.73)	0.12 (0.54)	0.31 (1.24)	0.24 (0.99)	0.21 (0.94)
	Loser (L)	-0.4 (-1.12)	-0.54* (-1.68)	-0.57* (-1.73)	-0.64* (-1.83)	-0.8*** (-2.78)	-0.82*** (-2.7)
	W - L	0.67*** (2.74)	0.72*** (3.04)	0.69*** (2.79)	0.95*** (4.62)	1.04*** (5)	1.03*** (5.03)
High (H)	Winner (W)	0.3 (0.67)	0.4 (0.88)	0.39 (0.8)	0.58 (1.17)	0.73 (1.42)	0.76 (1.48)
	Loser (L)	-0.76 (-1.44)	-1.08** (-2.23)	-0.99* (-1.95)	-0.31 (-0.84)	-0.51 (-1.48)	-0.5 (-1.5)
	W - L	1.06** (2.31)	1.49*** (3.02)	1.38*** (2.88)	0.88** (1.98)	1.24*** (2.65)	1.26*** (2.77)
H - L	Winner (W)	0.03 (0.08)	0.22 (0.58)	0.27 (0.67)	0.27 (0.73)	0.49 (1.25)	0.55 (1.39)
	Loser (L)	-0.36 (-0.98)	-0.55 (-1.37)	-0.41 (-0.99)	0.33 (1.22)	0.29 (0.94)	0.32 (1.07)
	W - L	0.39 (0.82)	0.77 (1.52)	0.68 (1.38)	-0.06 (-0.13)	0.2 (0.37)	0.23 (0.42)

Table 5: Fama-Macbeth Regressions

This table reports Fama-Macbeth regressions relating to momentum performance. The dependent variable $Return_{t+1}$ is the future stock return in month $t + 1$. $PastReturns$ is the cumulative return of the past 12-months ($t - 12$ to $t - 1$). $RetailParticipation$ is a categorical variable based on $RetailTrading$, set as 3 for high volume, 2 for median volume, and 1 for low volume. $RetailTrading$ variable is defined as the average ratios of the $RetailDollarVolume$ divided by $MarketCap$ of the same stock in past 12 months ($t - 12$ to $t - 1$). D is a dummy variable set to 1 for big firms in column 1 (high-priced firms in column 2) or 0 otherwise. We use all firms in the sample for columns 1 and 2, a subsample of big firms in column 3, and subsample of high-priced firms in column 4. We include a set of control variables, namely $Return_t$, $TotalTradingVolume$, and $MarketCap$. We report the Newey-West adjusted t-values in the parentheses.

Dependent Variable	$Return_{t+1}$				
	Sample	Full Sample D=Big Firms	Full Sample D=High-Priced Firms	Sub-Sample of Big Firms Only	Sub-Sample of High-Priced Firms Only
	(1)	(2)	(3)	(4)	
$D \times PastReturns$	0.012*** (3.01)	0.016*** (3.24)			
D	-0.58*** (-3.58)	-0.08 (-0.43)			
$RetailParticipation \times PastReturns$			0.007* (1.76)	0.011* (1.90)	
$RetailParticipation$			0.11 (0.76)	-0.15 (-0.74)	
$PastReturns$	-0.53 (-1.40)	-0.80* (-1.76)	-0.88 (-0.91)	-2.33 (-1.37)	
$Return_t$	-0.12*** (-8.31)	-0.12*** (-8.50)	0.01 (0.46)	0.01 (0.55)	
$MarketCap$	0.00 (0.73)	-0.00 (-0.20)	-0.00 (-0.19)	0.00 (0.28)	
$TotalTradingVolume$	-0.00 (-0.64)	-0.00 (-1.02)	-0.00 (-0.48)	-0.00 (-0.56)	
$Constant$	0.45* (1.80)	0.17 (0.67)	-0.15 (-1.05)	0.15 (0.42)	
Observations	103,696	103,697	53,912	30,293	
R2	0.077	0.079	0.173	0.201	

Table 6: Changes in Minimum Trading Lot Size and Retail Volume

This table examines the profitability of momentum strategies in response to changes in minimum trading lot size. We divide our sample into two parts August 2011 to January 2015 (minimum lot size = 1,000) and February 2015 to September 2022 (minimum lot size = 100). In Panel A, we sort high-priced stocks into quintiles based on previous annual returns ($t - 12$ to $t - 1$). The “W-L” group provides the mean returns of the strategy that buys the winner quintile and sells the corresponding loser quintile. In Panel B, we first independently sort stocks into a 2 by 3 metric based on price and retail trading in month t and then further sort each group into quintiles based on previous annual returns ($t - 12$ to $t - 1$). We only report results for high-priced stocks. In both panels, we report the average holding-period returns in month $t + 1$ and corresponding factor-adjusted alphas for the two periods, October 2011 to January 2015 and February 2015 to September 2022 respectively. The FF3 alpha is based on the SGX version of market, size, and value factors and the FF5 alpha further includes investment and profitability factors in SGX. The data on factors is obtained from the Global Factor Data website (Jensen, Kelly, and Pedersen (2021)). Retail trading is defined as the sum of retail buy and sell dollar volume divided by the market cap. Stocks are considered to be high-priced if their price is above the median value of each cross-section. Newey-West adjusted t-statistics are shown in the parenthesis and returns are equally-weighted.

Panel A: Momentum Strategies in High-Priced Stocks							
Mom	Minimum Lot Size = 1,000			Minimum Lot Size = 100			
	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha	
Loser (L)	-0.37 (-0.75)	-0.73** (-2.22)	-0.65* (-1.7)	-0.34 (-0.76)	-0.39 (-1.02)	-0.38 (-0.97)	
2	0.07 (0.62)	0.05 (0.6)	0.11 (1.04)	-0.03 (-0.19)	-0.03 (-0.22)	-0.04 (-0.36)	
3	0.19 (1.51)	-0.05 (-0.39)	-0.08 (-0.49)	-0.04 (-1.02)	-0.03 (-0.77)	-0.03 (-0.77)	
4	0.78** (2.31)	0.34* (1.68)	0.18 (0.84)	0.02 (0.09)	0.02 (0.12)	0.04 (0.21)	
Winner (W)	0.91* (1.86)	0.69* (1.9)	0.81** (2.29)	0.62 (1.56)	0.72* (1.75)	0.72* (1.79)	
W - L	1.29*** (2.73)	1.41*** (3.2)	1.46*** (2.87)	0.96*** (3.27)	1.11*** (3.71)	1.1*** (3.94)	

Panel B: Momentum Strategies in High-Priced Stocks Sorted by Retail Trading Volume							
Retail Trading Mom	Minimum Lot Size = 1,000			Minimum Lot Size = 100			
	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha	
Low (L)	Loser (L)	-0.6 (-1.05)	-0.67 (-1.46)	-0.57* (-1.75)	-0.56 (-0.96)	-0.84 (-1.63)	-0.88* (-1.7)
	Winner (W)	1.55*** (4.53)	1.38*** (3.93)	0.87** (1.96)	0.44 (0.91)	0.46 (1.07)	0.44 (1.08)
	W - L	2.15*** (3.18)	2.05*** (2.36)	1.44*** (2.6)	1*** (2.35)	1.3*** (3.39)	1.32*** (3.37)
High (H)	Loser (L)	-1.66 (-1.39)	-1.46* (-1.81)	-1.02 (-1.02)	-0.34 (-0.5)	-0.24 (-0.35)	-0.24 (-0.37)
	Winner (W)	-0.14 (-0.13)	0.32 (0.43)	0.99 (1.85)	2.15** (2.03)	2.64*** (2.45)	2.71*** (2.52)
	W - L	1.51 (1.26)	1.77* (1.66)	2* (1.72)	2.48*** (2.82)	2.87*** (3.11)	2.95*** (3.4)
H - L	Loser (L)	-1.05 (-0.9)	-0.78 (-0.87)	-0.44 (-0.48)	0.23 (0.4)	0.6 (1.01)	0.63 (1.08)
	Winner (W)	-1.69* (-1.7)	-1.07** (-1.98)	0.12 (0.19)	1.71** (2.19)	2.18*** (2.59)	2.27*** (2.75)
	W - L	-0.64 (-0.59)	-0.28 (-0.26)	0.56 (0.39)	1.48* (1.86)	1.58* (1.71)	1.63* (1.79)

Table 7: Signed Retail Trading and Momentum

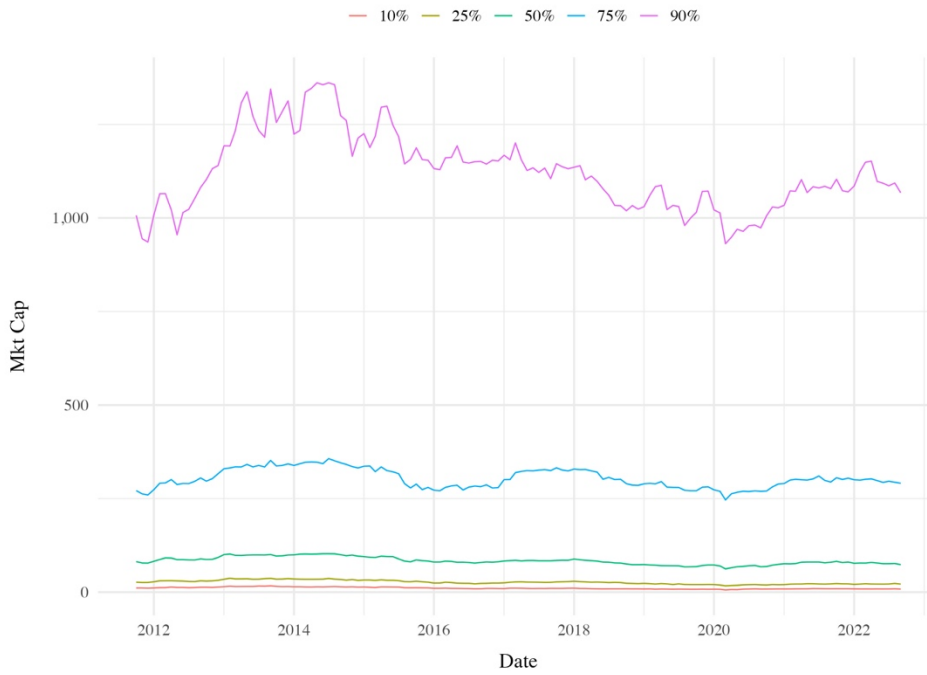
This table reports the profitability of momentum strategy related to signed retail trading. In Panel A, we first independently sort stocks into a 2 by 2 metric based on market cap (Big and Small firms) and signed retail trading (Net Buy and Net Sell) in month t and then further sort each group into quintiles based on previous annual returns ($t - 12$ to $t - 1$). In Panel B, we conduct the same analyses, replacing market cap with stock price (High- and Low-Priced firms). For both panels, we report the average holding-period returns in month $t + 1$ for the period October 2011 to September 2022 and corresponding factor-adjusted alphas. We also provide the mean returns of the long-short portfolios that buy the winner quintile with net retail buy (net retail sell) and sell the loser quintile with net retail sell (net retail buy) within the large market cap (price) group. The FF3 alpha is based on the SGX version of market, size, and value factors and the FF5 alpha further includes investment and profitability factors in SGX. The data on factors is obtained from the Global Factor Data website (Jensen, Kelly, and Pedersen (2021)). Signed retail trading is defined as the retail buy trading volume divided the sum of retail buy and sell dollar volume and ranges from 0 to 1. Newey-West adjusted t-statistics are shown in the parenthesis and returns are equally-weighted.

Panel A: Market Cap, Signed Retail Trading, and the Profitability of Momentum Strategy							
Signed Retail Trading	Mom	Big			Small		
		Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Net Buy (NB)	Winner (W)	0.39	0.45	0.43	1.41**	1.41**	1.48**
		(0.81)	(1)	(0.92)	(2.1)	(2.09)	(2.09)
Net Sell (NS)	Winner (W)	0.64	0.74	0.68	1.56**	1.76**	1.75**
		(1.53)	(1.58)	(1.44)	(1.98)	(2.03)	(2.14)
Net Buy (NB)	Loser (L)	-1.04**	-1.13***	-1.16***	1.3	1.32	1.52
		(-2.07)	(-2.74)	(-2.89)	(1.22)	(1.29)	(1.36)
Net Sell (NS)	Loser (L)	-0.34	-0.51	-0.46	1.23	1.18	1.33
		(-0.53)	(-0.9)	(-0.69)	(1.57)	(1.44)	(1.58)
NB W – NS L (Momentum Chasing)		0.74	0.97*	0.88	0.19	0.23	0.15
		(1.44)	(1.86)	(1.62)	(0.23)	(0.26)	(0.17)
NS W – NB L (Contrarian Trading)		1.68***	1.87***	1.84***	0.26	0.44	0.23
		(4.06)	(4.11)	(4.27)	(0.32)	(0.58)	(0.3)
Contrarian Trading – Momentum Chasing		0.95**	0.9*	0.96*	0.07	0.21	0.08
		(1.98)	(1.82)	(1.8)	(0.07)	(0.18)	(0.07)

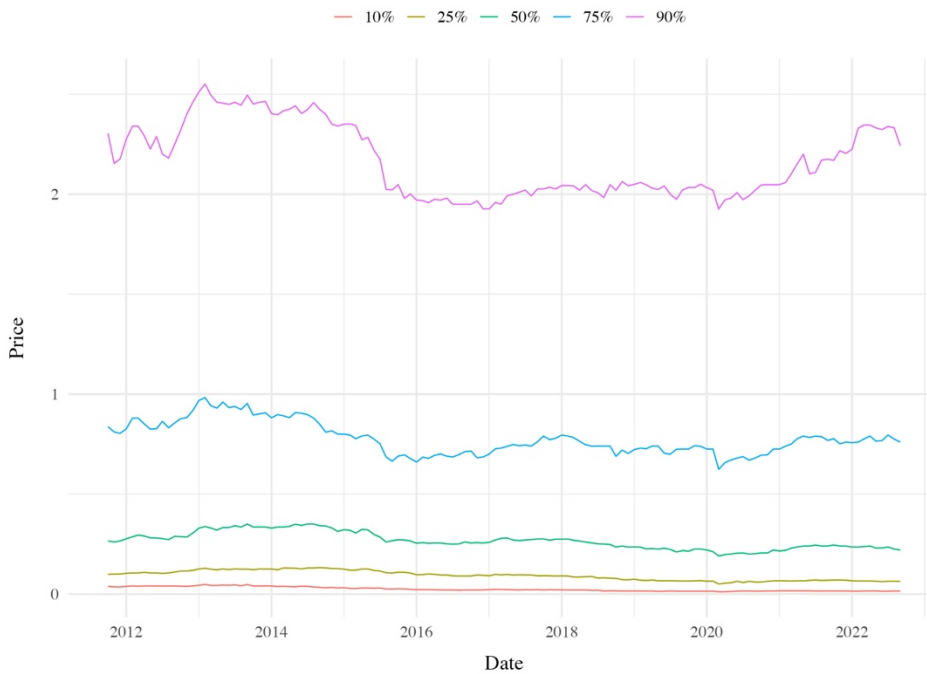
Panel B: Stock Price, Signed Retail Trading, and the Profitability of Momentum Strategy							
Signed Retail Trading	Mom	High-Priced			Low-Priced		
		Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
Net Buy (NB)	Winner (W)	0.71*	0.83**	0.84**	1.09	1.05	1.09
		(1.68)	(2.11)	(2.19)	(1.49)	(1.39)	(1.38)
Net Sell (NS)	Winner (W)	1.31***	1.44***	1.41***	0.7	0.83	0.75
		(2.42)	(2.41)	(2.47)	(0.95)	(1.05)	(1)
Net Buy (NB)	Loser (L)	-0.7	-0.77*	-0.85*	0.86	0.82	1.05
		(-1.43)	(-1.72)	(-1.94)	(0.88)	(0.88)	(1.04)
Net Sell (NS)	Loser (L)	-0.2	-0.35	-0.35	1.28	1.26	1.46
		(-0.46)	(-0.91)	(-0.87)	(1.42)	(1.36)	(1.44)
NB W – NS L (Momentum Chasing)		0.91**	1.18***	1.2***	-0.19	-0.21	-0.37
		(2.2)	(2.9)	(2.9)	(-0.22)	(-0.23)	(-0.39)
NS W – NB L (Contrarian Trading)		2.01***	2.21***	2.26***	-0.15	0.01	-0.3
		(4.53)	(4.81)	(4.93)	(-0.22)	(0.02)	(-0.47)
Contrarian Trading – Momentum Chasing		1.1***	1.03**	1.07**	0.03	0.22	0.07
		(2.41)	(2.09)	(2.27)	(0.04)	(0.23)	(0.07)

Figure 1: Distribution of stock prices and market cap of SGX Stocks

The figures show the time-series of cross-sectional distribution of the nominal prices and market cap of all stocks in SGX over the period from October 2011 to September 2022. The figures plot the market capitalization in Panel A and prices in Panel B at the 10%, 25%, 50%, 75%, and 90% of the cross-sectional distribution across all stocks, each month.



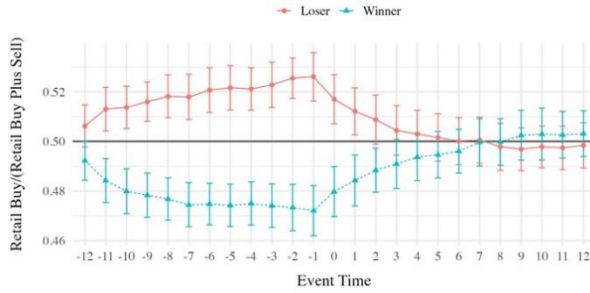
Panel A: The distribution of Market Capitalization over time



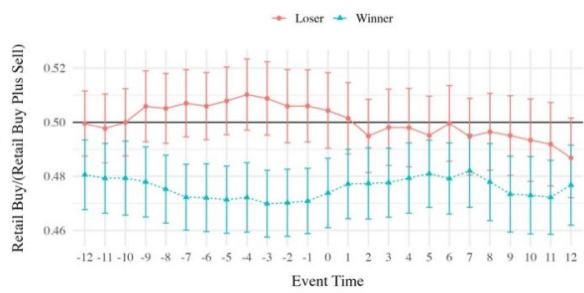
Panel B: The distribution of Prices over time

Figure 2: Signed Retail Trading Along the Formation of the Momentum Strategy

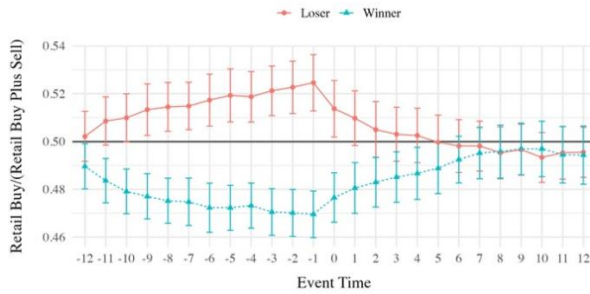
The figures report the signed retail trading around the formation of the momentum strategy from $t - 12$ to $t + 12$. In particular, we first sort stocks into two groups based on market cap or price in month t and then further sort each group into quintiles based on previous annual returns ($t - 12$ to $t - 1$). We report the average signed retail trading in 25-months around the formation month. We show the dynamics of signed retail trading for big stocks, small stocks, high-priced stocks, and low-priced stocks in Panel A, B, C, and D, respectively. Signed retail trading is defined as the retail buy trading volume divided the sum of retail buy and sell dollar volume and ranges from 0 to 1. The bars represent 95% confidence intervals.



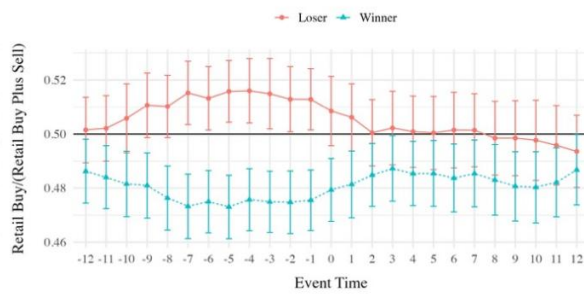
Panel A: Dynamics of Signed Retail Trading for Big Stocks



Panel B: Dynamics of Signed Retail Trading for Small Stocks



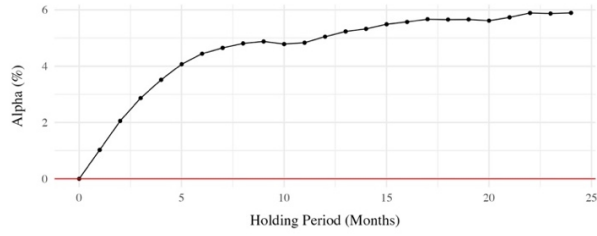
Panel C: Dynamics of Signed Retail Trading for High-Priced Stocks



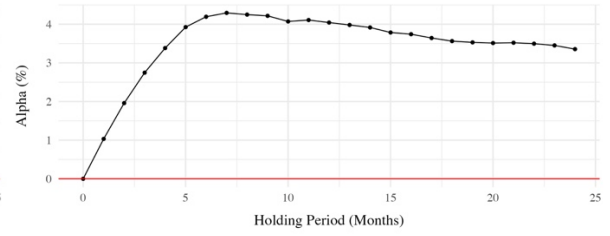
Panel D: Dynamics of Signed Retail Trading for Low-Priced Stocks

Figure 3: Long-Term Performance

The figures show the long-term dynamics of the momentum strategy for big stocks and high-priced stocks by reporting the cumulative performance of the momentum strategy from month $t + 1$ to $t + 24$. We first sort stocks into two groups based on market cap or price in month t and then further sort each group into quintiles based on previous 12-months returns ($t - 1$ to $t - 12$). We report the cumulative alpha (based on Fama-French 5-factor model) from the first month to the 24th month after the formation month.



Panel A: Long-Term Performance for Big Stocks



Panel B: Long-Term Performance for High-Priced Stocks

Appendix Table A1: Value-Weighted Momentum Portfolio Returns

This table replicates the profitability of momentum strategies shown in previous tables in value-weighted portfolios. In Panel A, we replicate Table 2 by sorting big stocks or high-priced stocks into quintiles based on previous 12-months returns ($t - 12$ to $t - 1$). In Panel B, we replicate Table 4. We first independently sort big or high-priced stocks into three groups based on retail trading in month t and then further sort each group into quintiles based on previous 12-months returns ($t - 12$ to $t - 1$). In Panel C, we replicate Table 7. We first independently sort big or high-priced stocks into two groups based on signed retail trading in month t and then further sort each group into quintiles based on previous 12-months returns ($t - 12$ to $t - 1$). For all panels, we report the average holding-period returns in month $t + 1$ for the period October 2011 to September 2022 and corresponding factor-adjusted alphas. The “W-L” group provides the mean returns of the strategy that buys the winner quintile and sells the corresponding loser quintile. The FF3 alpha is based on the SGX version of market, size, and value factors and the FF5 alpha further includes investment and profitability factors in SGX. The data on factors is obtained from the Global Factor Data website (Jensen, Kelly, and Pedersen (2021)). Retail trading volume is defined as the sum of retail buy and sell dollar volume divided by the market cap. Signed retail trading is defined as the retail buy volume divided by the sum of retail buy and sell dollar volume. Stocks are considered to be big or high-priced if their market cap or price is above the median value of each cross-section. Newey-West adjusted t-statistics are shown in the parenthesis and returns are value-weighted.

Panel A: Momentum Strategies in Big or High-Priced Stocks

Mom	Big			High-Priced		
	Raw Return	FF3 Alpha	FF5 Alpha	Raw Return	FF3 Alpha	FF5 Alpha
	Loser (L)	-0.61 (-1.42)	-0.81** (-2.22)	-0.83** (-2.23)	-0.42 (-1.03)	-0.61* (-1.78)
2	-0.16 (-0.85)	-0.2 (-1.19)	-0.2 (-1.26)	-0.01 (-0.07)	-0.02 (-0.2)	-0.04 (-0.34)
3	-0.05** (-2.14)	-0.05** (-2.17)	-0.06** (-2.4)	-0.04* (-1.92)	-0.04* (-1.82)	-0.05* (-1.86)
4	0.13 (1)	0.09 (0.73)	0.07 (0.53)	0.16 (1.12)	0.14 (0.95)	0.1 (0.73)
Winner (W)	0.57* (1.66)	0.59* (1.79)	0.55* (1.65)	0.65** (2.11)	0.69** (2.32)	0.65** (2.27)
W - L	1.18*** (4.19)	1.41*** (4.83)	1.38*** (5.41)	1.07*** (3.88)	1.29*** (5)	1.28*** (5.45)

Panel B: Momentum Strategies in Big or High-Priced Stocks Sorted by Retail Trading Volume

Retail Trading Mom		Big		High-Priced			
		Raw Return	FF3 Alpha	Raw Return	FF3 Alpha	Raw Return	FF3 Alpha
		Loser (L)	-0.65 (-1.32)	-0.82* (-1.78)	-0.86* (-1.85)	-0.84* (-1.76)	-1.05*** (-2.38)
Low (L)	Winner (W)	0.53 (1.27)	0.52 (1.32)	0.4 (1.02)	0.54 (1.38)	0.49 (1.32)	0.39 (1.04)
	W - L	1.18*** (3.3)	1.33*** (3.64)	1.26*** (3.42)	1.38*** (3.6)	1.53*** (3.86)	1.49*** (3.59)
	Loser (L)	-1.54* (-1.82)	-1.71* (-2.15)	-1.56* (-1.93)	-0.96 (-1.29)	-1.12 (-1.63)	-1.11* (-1.73)
High (H)	Winner (W)	1.21 (1.42)	1.39 (1.57)	1.47 (1.55)	1.5* (1.72)	1.76* (1.95)	1.85** (2.07)
	W - L	2.76*** (3.17)	3.1*** (3.48)	3.03*** (3.68)	2.45*** (2.57)	2.88*** (3.04)	2.96*** (3.26)
	Loser (L)	-0.9 (-1.34)	-0.9 (-1.3)	-0.7 (-1.04)	-0.12 (-0.19)	-0.07 (-0.11)	-0.01 (-0.02)
H - L	Winner (W)	0.68 (0.83)	0.87 (1.01)	1.07 (1.2)	0.96 (1.07)	1.27 (1.37)	1.46 (1.63)
	W - L	1.58* (1.73)	1.77* (1.9)	1.77** (2.02)	1.07 (1.09)	1.34 (1.31)	1.47 (1.49)

Panel C: Momentum Strategies in Big or High-Priced Stocks Sorted by Signed Retail Trading

Retail Trading	Mom	Big		High-Priced			
		Raw Return	FF3 Alpha	Raw Return	FF3 Alpha		
Net Buy (NB)	Winner (W)	0.47	0.52	0.53	0.6	0.62	0.61
		(0.85)	(0.96)	(0.96)	(1.22)	(1.24)	(1.3)
Net Sell (NS)	Winner (W)	1.1**	1.3**	1.24**	1.36**	1.63***	1.61***
		(2)	(2.16)	(2.09)	(2.18)	(2.36)	(2.34)
Net Buy (NB)	Loser (L)	-1.24**	-1.27***	-1.28***	-0.84	-0.84	-0.92*
		(-2.22)	(-2.6)	(-2.74)	(-1.49)	(-1.64)	(-1.86)
Net Sell (NS)	Loser (L)	-0.31	-0.46	-0.44	0	-0.11	-0.11
		(-0.41)	(-0.65)	(-0.55)	(0)	(-0.24)	(-0.21)
NB W– NS L (Momentum Chasing)		0.78	0.98	0.97	0.6	0.73	0.72
		(1.24)	(1.52)	(1.41)	(1.1)	(1.38)	(1.34)
NS W– NB L (Contrarian Trading)		2.34***	2.57***	2.52***	2.21***	2.47***	2.53***
		(4.67)	(4.62)	(4.89)	(4.27)	(4.32)	(4.67)
Contrarian Trading – Momentum Chasing		1.56***	1.59***	1.55***	1.61***	1.75***	1.81***
		(2.85)	(2.63)	(2.44)	(2.98)	(2.73)	(2.81)