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# THE EFFECT OF TRADING VOLUME FROM DIFFERENT INVESTOR TYPES ON TRADING FRICTION ANOMALY RETURNS IN THAILAND: EVIDENCE FROM MARKET MICROSTRUCTURE DATA OF THE STOCK EXCHANGE OF THAILAND

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**ABSTRACT**
This study introduces a novel approach to understanding how trading volumes from individual, institutional, and foreign investors influence trading friction anomaly returns in Thailand's stock market. I integrate comprehensive analysis of seven trading friction anomalies with unique market microstructure data from the Stock Exchange of Thailand's database. This approach enables construction of long-short portfolio strategies, while accounting for the distinct trading behaviors of different investor groups during the period from 2011 to 2021. Remarkably, I discovered asymmetric effects where retail trading amplifies certain anomalies while reducing others, contradicting traditional noise trader theories. Furthermore, the integration of investor-type volume indicators with long-short anomaly strategies revealed that institutional investors in Thailand do not uniformly enhance market efficiency as observed in developed markets. Surprisingly, foreign investors exhibited patterns similar to individual investors in certain anomalies.
**Keywords:** Trading Volume, Trading Friction Anomaly, Market Microstructure Data, Investor Behavior

# INTRODUCTION

Financial markets have recently become increasingly complex with the growing participation of diverse investor types, creating challenges for understanding market efficiency and anomaly persistence. However, the most important thing for investors is to be aware of how different trader behaviors affect trading friction anomalies. Han and Zhang (2024) revealed that trading volume in retail-dominated markets amplifies rather than reduces anomaly returns, contradicting patterns in developed markets. De Long et al. (1990) and Shleifer and Vishny (1997) advocated that noise trader risk plays a significant role in sustaining market anomalies since it creates unpredictable sentiment-driven trading patterns that deter rational arbitrageurs. Trading friction anomalies are vital for understanding market inefficiencies because of their advantages in generating anomaly returns. Baker and Wurgler (2006) revealed that investor sentiment can have an influence on asset valuation and anomaly persistence. Therefore, market participants should put more effort into understanding how different investor types contribute to or eliminate these anomalies. Han and Shi (2022) revealed that in China's retail-dominated market, anomalies actually strengthen over time despite increased trading activity. On the other hand, Chordia et al. (2014) revealed that, in the U.S. markets, institutional trading reduces anomaly returns through improved arbitrage activity. However, there are few studies revealing the relationship among investor-type trading volumes, limits to arbitrage, and trading friction anomaly persistence. Therefore, this study aims to investigate the effect of trading volume from different investor types on trading friction anomaly returns in the Thai stock market by examining the seven trading friction anomalies.

# LITERATURE REVIEWS

## Presence and Significance of Trading Friction Anomalies

Trading friction anomalies are a group of market anomalies that arise from constraints in the trading process, leading to predictable patterns in stock returns that cannot be fully explained by traditional asset pricing models. Han and Zhang (2024) said that trading friction anomalies refer to pricing discrepancies arising from trading value, illiquidity, volume turnover, idiosyncratic volatility, size, price, and volatility characteristics. In order to understand the persistence of these anomalies, noise trader risk theory has been used as the theoretical framework to explain how irrational traders create unpredictable trading patterns, deterring rational arbitrageurs from correcting mispricing (De Long et al., 1990). Therefore, markets with high retail participation tend to exhibit stronger and more persistent trading friction anomalies. Accordingly, the following hypothesis derived for this study:

H1: Trading friction anomalies generate significant positive risk-adjusted returns in Thailand.

## Effect of Trading Volumes on Trading Friction Anomaly Returns

The impact of trading volume on market efficiency can establish different linkages depending on investor sophistication. Han and Zhang (2024) investigated the relationship between trading volume and anomalies in China and found that trading volume amplifies rather than reduces anomaly returns since it primarily represents noise trading activity. However, trading volume also has efficiency-enhancing effects. It was found that institutional trading can improve market efficiency because of sophisticated information processing and arbitrage activities (Chordia et al., 2014). Furthermore, Bekaert and Harvey (2000) discovered that foreign investor participation enhances price discovery. Accordingly, the following hypotheses derived for this study:

H2A: Trading volume of individual investors will amplify trading friction anomaly returns.

H2B: Trading volume of institutional investors will reduce trading friction anomaly returns.

H2C: Trading volume of foreign investors will decrease trading friction anomaly returns.

**Trading Volume as Limit to Arbitrage**

Trading volume from different investor types has been recognized as potential limit to arbitrage that prevent price corrections in financial markets. Limit to arbitrage are factors that prevent sophisticated investors from eliminating mispricing even when profitable opportunities exist (Shleifer & Vishny, 1997). Accordingly, the following hypotheses derived for this study:

H3A: Trading volume of individual investors will act as a limit to arbitrage even after controlling for other limits to arbitrage.

H3B: Trading volume of institutional investors will contribute to market efficiency even after controlling for other limits to arbitrage.

H3C: Trading volume of foreign investors will contribute to market efficiency even after controlling for other limits to arbitrage.

# RESEARCH METHODOLOGY

In response to examining the effect of trading volume from different investor types on trading friction anomaly returns in the Thai stock market, the study was designed to adopt a quantitative research approach. The population in this study consisted of stocks listed in the SET100 index from January 2009 to December 2021. Due to the studied requirements for portfolio construction and statistical robustness, all 100 constituent stocks of the SET100 index were selected, representing the largest and most liquid securities in the Thai stock market.

The data collection used three primary sources. First, Refinitiv Workspace provided daily and monthly data including stock return indices, stock prices, trading values, outstanding shares, and book values. Second, the SET's database provided microstructure data containing daily trading values for three investor types. Third, ThaiBMA provided the one-month treasury bill rate.

Before the OLS regression analysis was conducted, seven trading friction anomaly factors were calculated: trading value, illiquidity (Amihud, 2002), volume turnover, idiosyncratic volatility, size, price, and volatility. The reliability and validity of these measures were established through their extensive use in prior literature (Han & Zhang, 2024). Portfolio construction followed the established methodology of creating long-short portfolios using both equal-weighted and value-weighted approaches, with max portfolios (long highest 10 stocks and short lowest 10 stocks) and min portfolios (long lowest 10 stocks and short highest 10 stocks) constructed for each of the seven trading friction anomalies. Ordinary least squares (OLS) regression analysis with robust standard errors was conducted to examine the relationships between trading volume and trading friction anomaly returns. The Fama and French three-factor model (Fama & French, 1992) was constructed specifically for SET100 stocks to calculate risk-adjusted returns.

To address the three objectives of this study, three analytical approaches were implemented: First, the seven trading friction anomaly portfolios were constructed through monthly rebalancing based on previous month's characteristics, with performance evaluated using risk-adjusted returns (alpha). Second, the impact of investor-type trading volumes was assessed using aggregate volume turnover (a value-weighted average monthly volume turnover that gives greater weight to larger capitalization stocks in the calculation of the trading volume indicator) and average volume turnover (an equal-weighted average of monthly stock turnover ratios, assigning the same importance to all stocks regardless of their market capitalization) through OLS regression analysis for both raw and risk-adjusted effects. Third, the role of trading volume as limit to arbitrage was examined by controlling for idiosyncratic risk and transaction costs through OLS regression analysis for both raw and risk-adjusted effects.

# RESEARCH RESULTS
**Examining the Risk-Adjusted Trading Friction Anomaly Returns (Alpha)**

**Table 1** Summary of the risk-adjusted performance of the seven trading friction anomaly portfolios, January 2011 to December 2021 by following equation: $R_{j,t} = \alpha_j + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{j,t}$. Statistical significance is assessed using robust standard t-tests. The ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

|  | Portfolio | Equal-weighted | Value-weighted |
|---|---|---|---|
| Trading Value | Min | 0.67% *** | 0.64% *** |
|  |  | (0.00213) | (0.00227) |
| Illiquidity | Max | 0.33% | 0.34% |
|  |  | (0.00207) | (0.00224) |
|  | Portfolio | Equal-weighted | Value-weighted |
| Volume Turnover | Max | 0.04% | 0.01% |
|  |  | (0.00291) | (0.00336) |
| Ivol | Max | 0.07% | 0.10% |
|  |  | (0.00241) | (0.00357) |
| Size | Min | 0.58% *** | 0.63% *** |
|  |  | (0.00191) | (0.00186) |
| Price | Min | 0.61% *** | 0.62% ** |
|  |  | (0.00218) | (0.00276) |
| Volatility | Min | 0.10% | 0.26% |
|  |  | (0.00270) | (0.00360) |

Table 1 reveals heterogeneous patterns in risk-adjusted trading friction anomaly returns (alpha) across the Thai stock market, with three trading friction anomalies demonstrating statistical significance of trading friction anomaly returns while four trading friction anomalies fail to generate statistical significance. Trading value anomaly generates significant positive alphas. The min portfolio takes long for low-trading-value stocks and short for heavily-traded stocks. This aligns with attention theory, where overlooked stocks become temporarily undervalued. The anomaly persists because behavioral biases and limited investor attention create exploitable mispricing in less actively traded stocks. Size anomaly produces significant positive alphas. The min portfolio exploits the small-firm effect by taking long small-cap stocks and short large-cap stocks. Small stocks face greater information asymmetry and trading frictions, allowing them to remain undervalued until prices gradually adjust. Price anomaly generates significant positive alphas. The min portfolio exploits the low-price effect by taking long low-priced stocks and short high-priced stocks. Low-priced stocks attract retail investors due to psychological factors and affordability, while institutional investors avoid them due to liquidity concerns and internal restrictions. This leaves retail traders as the dominant participants, who may not fully arbitrage the mispricing. Conversely, the unsuccessful anomalies involve characteristics that may be confounded by opposing market forces or may already be adequately captured by standard risk factors in asset pricing models.

## The Effect of Trading Volume on Trading Friction Anomaly Returns

**Table 2** The effect of trading volume from different investor types (Individual investors (C), institutional investors (M), and foreign investors (F)) on trading friction anomaly returns (Raw Effects), January 2011 to December 2021 by following equation: $R_{j,t} = \alpha + \beta_1 \text{Volume Indicator}_{C,j,t-1} + \beta_2 \text{Volume Indicator}_{M,j,t-1} + \beta_3 \text{Volume Indicator}_{F,j,t-1} + \varepsilon_{j,t}$ . Statistical significance is assessed using robust standard t-tests. The ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | | Trading Value Min Portfolio | Illiquidity Max Portfolio | Volume Turnover Max Portfolio | Ivol Max Portfolio | Size Min Portfolio | Price Min Portfolio | Volatility Min Portfolio |
|---|---|---|---|---|---|---|---|---|
| Equal-weighted | Agg_C | 10.22 | -2.944 | -3.095* | -3.827 | 15.14 | 5.513 | 0.226 |
| | | (6.561) | (10.95) | (1.736) | (4.042) | (15.46) | (7.149) | (2.333) |
| | Agg_M | -10.09 | 7.107 | 2.097 | 18.31 | -25.46 | -22.65 | 4.779 |
| | | (17.09) | (23.22) | (9.674) | (19.21) | (29.53) | (21.14) | (17.45) |
| | Agg_F | 1.63 | 7.245 | -3.06 | 6.725 | 8.566 | 4.507 | -4.988 |
| | | (5.096) | (8.877) | (4.315) | (5.253) | (11.02) | (5.653) | (5.701) |
| | Avg_C | 2.623 | 0.115 | -0.287 | 0.286 | 2.897* | 4.297** | -0.408 |
| | | (1.928) | (2.839) | (1.057) | (1.19) | (1.72) | (2.17) | (1.331) |
| | Avg_M | -0.505 | -16.37 | -8.248 | 17.31* | -50.93** | -43.57*** | -5.492 |
| | | (9.692) | (21.15) | (8.528) | (10.32) | (19.91) | (16.51) | (10.26) |
| | Avg_F | 3.028 | 6.544 | 0.753 | -2.465 | 23.33** | 10.2** | 0.0252 |
| | | (3.798) | (5.583) | (3.941) | (4.181) | (8.998) | (4.567) | (4.122) |
| Value-weighted | Agg_C | 8.142 | -0.136 | -4.363** | -12.81** | 18.05 | -0.24 | 5.625* |
| | | (6.146) | (10.28) | (2.029) | (5.68) | (14.51) | (7.087) | (3.029) |
| | Agg_M | -9.252 | 6.708 | 3.287 | 55.96** | -28.85 | -4.856 | -24.67 |
| | | (14.97) | (20.48) | (10.99) | (24.21) | (28.12) | (18.65) | (20.73) |
| | Agg_F | 1.374 | 1.632 | 1.154 | 2.919 | 7.851 | 2.809 | 4.087 |
| | | (4.851) | (7.794) | (4.695) | (6.866) | (10.65) | (5.346) | (7.033) |
| | Avg_C | 2.262 | 0.676 | -0.931 | -0.236 | 3.281* | 3.6* | 0.18 |
| | | (1.993) | (2.737) | (1.228) | (1.28) | (1.682) | (2.126) | (1.631) |
| | Avg_M | 0.623 | -17.57 | -1.184 | 17.15 | -55.39*** | -31.14* | -2.877 |
| | | (8.446) | (20.94) | (8.872) | (11.83) | (19.07) | (18.19) | (12.55) |
| | Avg_F | 2.952 | 3.28 | 1.326 | -4.944 | 25.03*** | 5.973 | 2.451 |
| | | (4.247) | (5.382) | (3.783) | (4.818) | (8.603) | (4.899) | (4.874) |

Table 2 reveals individual investor effects: The raw analysis reveals an asymmetric pattern in how retail trading affects trading friction anomaly returns, with contrasting effects between max and min portfolios. For max portfolios, retail trading shows negative effects that reduce anomaly returns. Volume turnover exhibits significant negative effects, suggesting that increased retail trading reduces returns from high-turnover strategies. Ivol demonstrates a negative effect, indicating that retail trading substantially reduces returns from high idiosyncratic volatility strategies. These negative effects on max portfolios directly contradict Han and Zhang (2024), who argue that retail trading should amplify anomaly returns through noise trading activity. In contrast, for min portfolios, retail trading shows positive effects that amplify anomaly returns. Size displays weakly significant positive effects, though this weakly significant suggest only marginal evidence that retail trading amplifies the small-firm effect. Price shows stronger positive effects, indicating more robust evidence that retail trading enhances low-price anomaly returns. Volatility exhibits a weakly significant positive effect.

Institutional investor effects: Institutional trading reveals surprising patterns that challenge conventional efficiency theories. For max portfolios, institutions show positive effects that amplify rather than reduce anomaly returns. Ivol demonstrates significant positive effects, providing evidence that institutional trading amplifies high idiosyncratic volatility returns. This finding directly contradicts Chordia et al. (2014), who document that institutional trading leads to more efficient markets and lower anomaly returns in the U.S. market. Conversely, for min portfolios, institutions exhibit negative effects that reduce anomaly returns. Size shows negative effects, indicating that institutional trading reduces the small-firm effect. Price

demonstrates negative effects. These negative effects on min portfolios partially align with theoretical expectations that institutional trading should reduce anomaly returns, but the asymmetric pattern across portfolio types reveals that Thai institutions do not uniformly enhance market efficiency.

Foreign investor effects: Foreign investors show the most limited impact on raw anomaly returns. Size (Min portfolio) represents positive effects, suggesting that foreign trading helps maintain the small-firm premium. Price (Min portfolio) shows a moderately positive effect.

**Table 3**: The effect of trading volume from different investor types on trading friction anomaly returns (Risk-Adjusted Effects), January 2011 to December 2021 by following equation:

$$R_{j,t} = \alpha + \beta_1 \text{Volume Indicator}_{C,j,t-1} + \beta_2 \text{Volume Indicator}_{M,j,t-1} + \beta_3 \text{Volume Indicator}_{F,j,t-1} + \beta_4 \text{MKT}_t + \beta_5 \text{SMB}_t + \beta_6 \text{HML}_t + \varepsilon_{j,t}.$$

Statistical significance is assessed using robust standard t-tests. The ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | | Trading Value Min Portfolio | Illiquidity Max Portfolio | Volume Turnover Max Portfolio | Ivol Max Portfolio | Size Min Portfolio | Price Min Portfolio | Volatility Min Portfolio |
|---|---|---|---|---|---|---|---|---|
| Equal-weighted | Agg_C | 2.134 | -18.75* | -5.963*** | -8.505*** | -14.65 | -8.024 | 4.968** |
| | | (6.081) | (9.493) | (1.615) | (3.091) | (11.69) | (6.101) | (2.016) |
| | Agg_M | 2.395 | 26.21 | 17.37** | 35.28** | 11.89 | 1.843 | -23.57* |
| | | (12.65) | (16.81) | (7.591) | (15.56) | (17.96) | (17.88) | (13.9) |
| | Agg_F | 0.429 | 6.412 | -10.1** | -0.674 | 5.836 | 1.836 | 5.708 |
| | | (4.27) | (5.808) | (4.174) | (4.532) | (5.945) | (4.069) | (4.771) |
| | Avg_C | 0.628 | -4.244** | -2.126*** | -2.44*** | -1.75 | -0.0107 | 2.44** |
| | | (1.918) | (2.129) | (0.727) | (0.73) | (1.411) | (1.501) | (0.934) |
| | Avg_M | 5.623 | 10.13 | 4.996 | 41.03*** | 2.761 | -8.849 | -29.69*** |
| | | (8.332) | (15.01) | (6.491) | (7.573) | (13.9) | (12.4) | (8.594) |
| | Avg_F | 0.248 | -0.174 | -5.809* | -12.17*** | -1.336 | -1.158 | 9.836** |
| | | (3.73) | (3.862) | (3.366) | (3.455) | (4.899) | (3.803) | (3.807) |
| Value-weighted | Agg_C | -0.0606 | -13.48 | -6.902*** | -17.46*** | -11.27 | -10.4* | 9.885*** |
| | | (5.957) | (9.288) | (1.813) | (5.321) | (10.97) | (6.073) | (3.281) |
| | Agg_M | 3.211 | 22.85 | 15.9* | 72.32*** | 7.687 | 14.17 | -50.85** |
| | | (10.45) | (15.55) | (9.353) | (20.84) | (16.82) | (16.04) | (19.44) |
| | Agg_F | 0.0762 | 0.504 | -5.269 | -3.934 | 5.087 | 0.279 | 13.51* |
| | | (4.552) | (5.659) | (4.708) | (6.433) | (5.806) | (4.185) | (6.839) |
| | Avg_C | 0.151 | -3.168 | -2.459*** | -2.668** | -1.369 | 0.762 | 2.807** |
| | | (1.919) | (1.997) | (0.921) | (1.073) | (1.395) | (1.633) | (1.347) |
| | Avg_M | 6.777 | 6.592 | 10.16 | 38.06*** | -2.578 | -5.822 | -25.37** |
| | | (6.855) | (14.72) | (7.224) | (10.35) | (13.11) | (14.1) | (12.05) |
| | Avg_F | 0.104 | -3.198 | -4.541 | -13.54*** | 0.658 | -2.735 | 11.09** |
| | | (4.288) | (4.232) | (3.24) | (4.075) | (4.59) | (3.894) | (4.871) |

Table 3 reveals individual investor effects: The risk-adjusted analysis strengthens and clarifies the asymmetric pattern in how retail trading affects anomaly returns. For max portfolios, retail trading shows consistently negative effects that reduce anomaly returns. Illiquidity shows significant negative effects. Volume turnover exhibits strongly negative effects, providing evidence that retail trading reduces high-turnover anomaly returns. Ivol also shows strongly negative effects, confirming that retail trading substantially reduces high idiosyncratic volatility premiums. However, for min portfolios, the positive effects become more pronounced after risk adjustment. Volatility shows positive effects, indicating that retail trading amplifies low-volatility anomaly returns. These risk-adjusted results confirm that retail trading in Thailand creates an asymmetric effect that contradicts De Long et al. (1990)'s prediction of uniform noise trader impacts.

Institutional investor effects: After risk adjustment, institutional trading continues to show effects that challenge conventional efficiency theories. For max portfolios, institutions maintain positive effects that amplify anomaly returns. Volume turnover demonstrates positive effects. Ivol exhibits strongly positive effects, confirming that institutional trading amplifies

rather than reduces high idiosyncratic volatility returns. However, for min portfolios, institutions continue to show negative effects. Volatility shows negative effects, indicating that institutions reduce low-volatility anomaly returns. These asymmetric effects (amplifying max portfolio returns while reducing min portfolio returns) directly contradict Chordia et al. (2011)'s findings that sophisticated investors uniformly improve market efficiency.

Foreign investor effects: After risk adjustment, foreign investors show more pronounced and theoretically consistent effects. For max portfolios, foreign trading shows consistently negative effects that reduce anomaly returns. Volume turnover demonstrates negative effects. Ivol shows strongly negative effects, indicating that foreign trading reduces high idiosyncratic volatility returns. However, for min portfolio, volatility exhibits positive effects, suggesting that foreign trading amplifies low-volatility anomaly returns. These results partially align with Bekaert and Harvey (2000)'s findings that foreign trading enhances price discovery.

**Trading Volume as A Limit to Arbitrage Controlling for Other Arbitrage Constraints**

**Table 4**: The effect of trading volume from different investor types on trading friction anomaly returns controlling for other limits to arbitrage (Raw Effects), January 2011 to December 2021 by following equation: $R_{j,t} = \alpha + \beta_1 \text{Volume Indicator}_{C,j,t-1} + \beta_2 \text{Volume Indicator}_{M,j,t-1} + \beta_3 \text{Volume Indicator}_{F,j,t-1} + \beta_4 \text{Avg IVOL}_{t-1} + \beta_5 \text{Avg Illiquidity}_{t-1} + \varepsilon_{j,t}$.

Statistical significance is assessed using robust standard t-tests. The \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | | Trading Value Min Portfolio | Illiquidity Max Portfolio | Volume Turnover Max Portfolio | Ivol Max Portfolio | Size Min Portfolio | Price Min Portfolio | Volatility Min Portfolio |
|---|---|---|---|---|---|---|---|---|
| Equal-weighted | Agg_C | 8.573 | -1.604 | -4.325** | -2.539 | 15.83 | 7.966 | 0.23 |
| | | (6.165) | (10.42) | (1.99) | (3.819) | (14.95) | (6.364) | (2.367) |
| | Agg_M | -13.85 | -4.811 | -0.967 | 6.878 | -53.47* | -49.04** | 9.222 |
| | | (17.68) | (22.84) | (10) | (20.44) | (27.87) | (22.96) | (18.48) |
| | Agg_F | 4.797 | 5.203 | -5.438 | 3.368 | 5.623 | 7.45 | -2.887 |
| | | (5.181) | (7.565) | (4.717) | (5.431) | (9.505) | (6.058) | (6.02) |
| | Avg_C | 2.451 | 0.237 | -0.678 | 0.124 | 2.642 | 4.726** | -0.149 |
| | | (1.86) | (2.691) | (1.102) | (1.191) | (1.728) | (2.177) | (1.382) |
| | Avg_M | -6.122 | -27.46 | -10.91 | 13.12 | -51.85*** | -61.98*** | -2.848 |
| | | (10.99) | (21.24) | (8.707) | (11.08) | (19.41) | (18.48) | (11.28) |
| | Avg_F | 5.221 | 5.54 | 0.053 | -3.366 | 22.7*** | 13.45*** | 0.571 |
| | | (4.238) | (4.641) | (3.903) | (3.986) | (7.749) | (5.009) | (4.056) |
| Value-weighted | Agg_C | 6.208 | 1.016 | -5.938*** | -12.09** | 18.63 | 1.676 | 5.74* |
| | | (6.241) | (10.1) | (2.258) | (5.731) | (13.95) | (6.521) | (3.048) |
| | Agg_M | -13.73 | -3.155 | 0.39 | 49.57* | -55.77** | -33.83* | -22.32 |
| | | (17.03) | (21.25) | (11.12) | (26.21) | (26.38) | (19.98) | (22.04) |
| | Agg_F | 5.091 | -0.25 | -0.227 | 0.971 | 5.866 | 8.014 | 7.358 |
| | | (5.803) | (7.562) | (5.097) | (7.137) | (9.342) | (5.603) | (7.526) |
| | Avg_C | 2 | 0.795 | -1.333 | -0.506 | 3.068* | 4.096* | 0.481 |
| | | (2.005) | (2.642) | (1.292) | (1.282) | (1.691) | (2.123) | (1.625) |
| | Avg_M | -5.185 | -27.43 | -3.752 | 12.09 | -56.07*** | -52.88*** | 0.982 |
| | | (9.992) | (20.54) | (8.942) | (12.75) | (18.58) | (19.2) | (13.65) |
| | Avg_F | 5.742 | 2.629 | 1.023 | -5.97 | 25.08*** | 10.73** | 3.574 |
| | | (4.844) | (5.023) | (3.803) | (4.816) | (7.472) | (5.056) | (4.795) |

Table 4 reveals individual investor effects: After controlling for traditional limits to arbitrage, individual investors continue to show asymmetric effects that confirm their role as an independent arbitrage constraint. For max portfolios, retail trading maintains negative effects that reduce anomaly returns. Volume turnover shows negative effects, demonstrating that retail trading reduces high-turnover returns beyond what can be explained by idiosyncratic risk or transaction costs. Ivol exhibits a moderately negative effect. However, for min portfolios, retail trading shows positive effects even after controls. Size shows a weakly positive effect. Price also shows positive effects. Volatility exhibits a weakly positive effect. These persistent asymmetric effects after controlling for traditional constraints confirm that retail trading

represents an independent source of limits to arbitrage, consistent with De Long et al. (1990)'s noise trader risk theory.

Institutional investor effects: Institutional trading continues to show surprising patterns after controlling for traditional arbitrage constraints. For max portfolios, institutions maintain positive effects that amplify anomaly returns. Ivol shows a weakly positive effect. However, for min portfolios, institutions demonstrate strong negative effects that persist after controls. Size exhibits strongly negative effects, confirming that institutional trading reduces small-firm returns beyond effects attributable to idiosyncratic risk or transaction costs. Price also shows strongly negative effects, indicating that institutions reduce low-price anomaly returns. These persistent institutional effects after controlling for traditional constraints suggest that Thai institutions create their own form of limits to arbitrage, possibly through herding or momentum trading that amplifies certain inefficiencies while correcting others.

Foreign investor effects: Foreign investors show limited significant effects after controlling for traditional arbitrage constraints. Size (Min portfolio) shows strongly positive effects, suggesting that foreign trading helps preserve the small-firm premium beyond other limits to arbitrage effects. Price (Min portfolio) also shows strongly positive effects.

**Table 5** The effect of trading volume from different investor types on trading friction anomaly returns controlling for other limits to arbitrage (Risk-Adjusted Effects), January 2011 to December 2021 by following equation: $R_{j,t} = \alpha + \beta_1 \text{Volume Indicator}_{C,j,t-1} + \beta_2 \text{Volume Indicator}_{M,j,t-1} + \beta_3 \text{Volume Indicator}_{F,j,t-1} + \beta_4 \text{Avg IVOL}_{t-1} + \beta_5 \text{Avg Illiquidity}_{t-1} + \beta_6 \text{MKT}_t + \beta_7 \text{SMB}_t + \beta_8 \text{HML}_t + \varepsilon_{j,t}$.

Statistical significance is assessed using robust standard t-tests. The ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | | Trading Value Min Portfolio | Illiquidity Max Portfolio | Volume Turnover Max Portfolio | Ivol Max Portfolio | Size Min Portfolio | Price Min Portfolio | Volatility Min Portfolio |
|---|---|---|---|---|---|---|---|---|
| Equal-weighted | Agg_C | -0.308 | -19.41** | -6.602*** | -8.716*** | -14.04 | -8.63 | 5.063** |
| | | (5.823) | (8.928) | (1.769) | (3.175) | (11.7) | (6.109) | (2.09) |
| | Agg_M | 9.406 | 30.49* | 15.59** | 38.19** | 3.068 | 3.26 | -23.56 |
| | | (14.56) | (17.41) | (7.576) | (17.95) | (19.03) | (19.93) | (15.06) |
| | Agg_F | 4.439 | 6.843 | -10.99** | -4.8 | 6.81 | 2.9 | 7.423 |
| | | (5.219) | (6.03) | (4.575) | (5.045) | (6.876) | (4.655) | (5.245) |
| | Avg_C | 0.328 | -4.234** | -2.282*** | -2.411*** | -1.821 | 0.0193 | 2.458*** |
| | | (1.853) | (1.98) | (0.771) | (0.706) | (1.497) | (1.502) | (0.904) |
| | Avg_M | 7.073 | 7.377 | 3.438 | 38.02*** | 1.567 | -9.978 | -29.49*** |
| | | (9.21) | (15.59) | (6.739) | (7.828) | (14.12) | (14.26) | (9.349) |
| | Avg_F | 1.707 | -1.897 | -6.351* | -12.83*** | -1.009 | -0.715 | 9.855** |
| | | (4.136) | (3.626) | (3.44) | (3.432) | (5.556) | (4.306) | (3.881) |
| Value-weighted | Agg_C | -2.433 | -13.83 | -7.866*** | -18.11*** | -10.7 | -11.03* | 10.08*** |
| | | (6.167) | (9.009) | (1.957) | (5.591) | (10.97) | (6.262) | (3.334) |
| | Agg_M | 8.545 | 26.17 | 14.15 | 79.25*** | -1.033 | 9.637 | -52.08** |
| | | (13.83) | (16.92) | (9.528) | (24.02) | (18.1) | (18.82) | (21.06) |
| | Agg_F | 4.208 | 0.0451 | -5.466 | -6.945 | 6.598 | 3.94 | 16.18** |
| | | (5.953) | (6.475) | (4.936) | (6.885) | (6.752) | (4.581) | (7.507) |
| | Avg_C | -0.201 | -3.149 | -2.622*** | -2.767** | -1.411 | 0.959 | 2.913** |
| | | (1.912) | (1.906) | (0.99) | (1.063) | (1.468) | (1.629) | (1.297) |
| | Avg_M | 7.867 | 3.71 | 8.805 | 33.55*** | -3.672 | -13.06 | -23.29* |
| | | (8.485) | (15.38) | (7.659) | (10.91) | (13.36) | (15.27) | (13.36) |
| | Avg_F | 2.001 | -4.771 | -4.789 | -14.26*** | 1.468 | -0.0667 | 11.57** |
| | | (4.787) | (4.278) | (3.357) | (4.253) | (5.217) | (4.216) | (4.844) |

Table 5 reveals individual investor effects: The risk-adjusted analysis with controls strengthens evidence that retail trading serves as an independent limit to arbitrage with pronounced asymmetric effects. For max portfolios, retail trading shows negative effects. Illiquidity shows moderately negative effects, indicating that retail trading reduces illiquidity premiums beyond

traditional constraints and risk factors. Volume turnover exhibits strongly negative effects, providing evidence that retail trading acts as a reverse limit to arbitrage, facilitating price discovery in high-turnover stocks. Ivol also shows strongly negative effects, confirming that retail trading substantially reduces high idiosyncratic volatility returns. However, for min portfolios, the positive effects persist and strengthen. Volatility shows positive effects, strongly confirming that retail trading creates noise trader risk that deters arbitrageurs from exploiting low-volatility anomalies.

Institutional investor effects: After risk adjustment and controls, institutional trading continues to demonstrate effects that fundamentally challenge efficiency theories. For max portfolios, institutions maintain positive effects that amplify anomaly returns beyond traditional constraints. Illiquidity shows a weakly positive effect. Volume turnover demonstrates a moderately positive effect. Ivol exhibits strongly positive effects, confirming that institutional trading amplifies high idiosyncratic volatility returns. However, for min portfolios, volatility shows negative effects. These results confirm that Thai institutional investors do not uniformly enhance market efficiency but instead create their own form of limits to arbitrage that amplifies certain inefficiencies while potentially correcting others. This pattern directly contradicts Chordia et al. (2014)'s findings and suggests that institutional behavior in emerging markets differs from developed markets.

Foreign investor effects: After risk adjustment and controlling for traditional constraints, foreign investors show more theoretically consistent patterns. Volume turnover (Max portfolio) demonstrates negative effects, indicating that foreign trading reduces high-turnover anomaly returns. Ivol (Max portfolio) shows strongly negative effects, confirming that foreign trading reduces high idiosyncratic volatility returns. However, volatility (Min portfolio) exhibits moderately positive effects, suggesting that foreign trading may create its own form of limits to arbitrage for low-volatility strategies.

## DISCUSSION & CONCLUSION

The investigation of seven trading friction anomalies reveals selective persistence in the Thai stock market. Three anomalies generate statistically significant risk-adjusted returns: trading value, size, and price. In contrast, illiquidity, volume turnover, idiosyncratic volatility, and volatility anomalies fail to produce significant risk-adjusted returns. The results partially support H1, which predicted that trading friction anomalies would generate significant positive risk-adjusted returns. The selective of anomaly persistence suggests that the Thai market exhibits characteristics between fully efficient and inefficient states.

**Table 6** The summary of effects of each investor type across all trading volume indicators, January 2011 to December 2021. Positive effects (+) indicate that higher trading volume from the respective investor type amplifies trading friction anomaly returns, while negative effects (-) indicate that higher trading volume reduces trading friction anomaly returns. The *** indicates strongly significant effects, ** indicates moderately significant effects, and * indicates weakly significant effects. Empty cells indicate no significant relationships were found across any specifications for that investor type and portfolio combination.

| | Trading Value Min Portfolio | Size Min Portfolio | Price Min Portfolio | Volatility Min Portfolio | Illiquidity Max Portfolio | Volume Turnover Max Portfolio | Ivol Max Portfolio |
|---|---|---|---|---|---|---|---|
| Individual investors | | +* | +** | +*** | -** | -*** | -*** |
| Institutional investors | | -*** | -*** | -*** | +* | +** | +*** |
| Foreign investors | | +*** | +*** | +** | | -** | -*** |

Table 6 reveals size anomaly (Min portfolio): Individual investors exhibit weakly positive effects, marginally amplifying small-firm anomaly returns. This finding supports for H2A and H3A, suggesting that retail trading creates barriers to arbitrage in small-capitalization stocks.

Institutional investors demonstrate strongly negative effects, providing empirical support for H2B and H3B by confirming that institutional trading reduces the small-firm effect and enhances market efficiency. Foreign investors display strongly positive effects, contradicting H2C and H3C by amplifying rather than reducing the size anomaly.

Price anomaly (Min portfolio): Individual investors exhibit moderately positive effects, substantially amplifying low-price anomaly returns. This finding aligns with H2A within the context of low-friction portfolios, demonstrating that retail investors generate mispricing through their systematic preference patterns. The result also supports H3A by confirming that retail trading sustains price anomaly as an effective limit to arbitrage. Institutional investors demonstrate strongly negative effects, providing robust empirical support for H2B and H3B by eliminating mispricing in low-priced stocks. Foreign investors display strongly positive effects, contradicting H2C and H3C.

Volatility anomaly (Min portfolio): Individual investors exhibit strongly positive effects, substantially amplifying low-volatility anomaly returns. This finding supports H2A within the context of low-volatility stocks, where retail investor avoidance creates systematic undervaluation. The result also supports H3A by demonstrating that retail trading patterns establish barriers to arbitrage within low-volatility market segments. Institutional investors demonstrate strongly negative effects, providing empirical support for H2B and H3B by reducing low-volatility anomaly profits through their trading activities. Foreign investors display moderately positive effects, contradicting H2C and H3C by amplifying rather than reducing volatility anomaly. This unexpected finding suggests that foreign investors may similarly exhibit avoidance behaviors toward low-volatility stocks.

Illiquidity anomaly (Max portfolio): Individual investors exhibit moderately negative effects, indicating that retail trading activity reduces illiquidity premiums. This finding strongly contradicts H2A and H3A, as retail trading eliminates rather than amplifies illiquidity anomaly. Institutional investors display weakly positive effects, directly contradicting H2B and H3B, which predicted that institutional trading would reduce anomaly returns. This finding suggests that Thai institutional investors may accidentally amplify illiquidity-based mispricing through their trading behavior.

Volume Turnover anomaly (Max portfolio): Individual investors exhibit strongly negative effects, indicating that retail trading activity substantially reduces high-turnover anomaly returns. This finding contradicts the predictions of H2A and H3A. Institutional investors display moderately positive effects, contradicting H2B and H3B, suggesting that institutional trading amplifies rather than corrects this particular mispricing. Foreign investors demonstrate moderately negative effects, providing empirical support for H2C and H3C by confirming that foreign investor trading enhances market efficiency and reduces anomaly returns.

Idiosyncratic volatility (Max Portfolio): Individual investors exhibit strongly negative effects, reducing anomaly returns associated with high idiosyncratic volatility strategies. This finding contradicts the noise trader predictions of H2A and refutes H3A by indicating that retail investors facilitate the elimination rather than the sustenance of mispricing. Institutional investors demonstrate strongly positive effects, fundamentally contradicting H2B and H3B. This amplification effect suggests that Thai institutional investors engage in destabilizing trading behaviors that exacerbate rather than mitigate mispricing in high idiosyncratic volatility stocks. Foreign investors demonstrate strongly negative effects, providing empirical support for H2C and H3C by confirming that foreign investor trading enhances market efficiency and reduces anomaly returns as theoretically predicted.

Thai retail investors behave differently from those in developed markets due to three key factors: A cultural preference for speculation over long-term investing, limited financial knowledge that leads to trend-following behavior, and attraction to high-risk stocks for their lottery-like payoffs. Unlike developed markets where retail trading consistently increases

market inefficiencies, Thai retail investors show a split effect - they create mispricing in some anomalies while accidentally helping correct prices in others. This happens because when Thai retail investors crowd into popular stocks, they create enough trading volume to make it easier and cheaper for professional investors to trade against them and correct any mispricing.

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