INTERNATIONAL FUND FLOWS AND ANOMALIES IN ASIAN STOCK MARKETS

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ABSTRACT

This research examines the influence of foreign fund flows on the returns and trade value of emerging stock markets in Indonesia, South Korea, Taiwan and Thailand from 2009 to 2020. The selected sampling period reflects the massive capital created by the quantitative easing (QE) policies of all major central banks worldwide following the global financial crisis (GFC) of 2007–08 and in response to the outbreak of the COVID-19 pandemic. The methodology employed includes the ordinary least squares (OLS) model with lagged variables and the vector autoregressive (VAR) model to control the lag of the endogenous variables. It was found that foreign investors have superior information over domestic investors. Foreign fund flows directly influence the returns of all markets and the trading value in some markets. The inverse relationship between foreign fund flows and market volatility implies that foreign flows promote the efficiency of these markets.

Contribution/Originality: This research contributes to the studies on the impact of international fund flows on the emerging stock markets' returns, trade values, and volatility by applying the VAR model. This study adopts the Parkinson volatility for volatility measurement and uses multiple regression analysis for the robustness test. Unlike most of the previous studies which focus on the impact from foreign fund flows, this research examines the influence of foreign fund flows on markets' returns, trade value, and volatility and vice versa. Additionally, the robustness test is applied to reveal the immediate impact of the fund flows.

1. INTRODUCTION

This research is motivated by the movement of emerging stock markets in Asia due to international or foreign fund flows following the quantitative easing (QE) policies of all major central banks worldwide. A central bank runs a QE program by increasing money supply with the goal of bank lending and investing their reserves to stimulate overall economic growth and to bring the economy out of recession. In order to resolve the economic crises of the modern world, a considerable number of QE policies have been launched following the global financial crisis (GFC) of 2007–08 and in response to the COVID-19 pandemic.

Since 2008, major central banks around the world have decided to use QE monetary policy to inject money supply into their economies by repurchasing different financial assets. As a result, the world's economies are overwhelmed by excessive liquidity. The flow of money into the higher-return countries have led to a surge of capital fund flows in

many stock markets. The lucrative economies of Asian countries make their stock markets interesting targets for fund managers to put excess capital in these stock markets. The increase in demand for Asian stocks boosts the stock indices of these countries rapidly, and once the stock prices move beyond their appropriate level, a lot of capital outflows would quickly make the stock indices lower. Consequently, the impact on foreign fund flows is rather broad.

Nevertheless, there is wide suspicion regarding whether foreign investors have superior information over domestic investors. Fund flow information is presumed to be useful for investors in predicting the changes in stock indices, variation and trade value. However, most studies focus on the impact of mutual fund flows on the stock markets' performance. Additionally, very few studies have covered the period from 2009 to 2020 in which foreign funds play important roles in equity markets, especially in Asia's emerging markets. To fill this research gap, this study aims to clarify the influence of foreign trade on the stock prices, variation and trade value in Asian stock markets. The stock exchanges in Indonesia, South Korea, Taiwan and Thailand are used as proxies for the Asian stock markets. Data were collected from January 2009 to December 2020 for the investigation. The results are very useful for investors who would like to adjust their investment strategies with the information from foreign fund flows and this would help to achieve market efficiency in Asian capital markets.

2. LITERATURE REVIEW

The global financial crisis (GFC) caused the US stock market to crash on September 29, 2008, when the Dow Jones Industrial Average (DJIA) fell 777.68 points, which was the largest single-day loss in Dow Jones history with a close at 10,365.45[1]. By March 5, 2009, the DJIA had dropped to 6,594.44. In 2013, however, the DJIA began to recover and set a record of 27,359.16 on July 15, 2019. In addition to decreasing interest rates, the US Federal Reserve conducted four quantitative easing (QE) operations from September 2008 to September 2019. A US stock market crash occurred again in 2020 when the DJIA had the biggest one-day losses of 1,031.61 points on February 24 and 2,997.10 points on March 16, which was the one-day record loss until the end of 2020. The crash, of course, was because of the COVID-19 pandemic. By March 23, 2020, the DJIA had dropped to 18,591.93. The US stock market, however, has taken a very short time to recover and the DJIA has broken 30,000 for the first time, closing at 30,046.24 on November 24, 2020. There are many reasons for the US stock market recovery and the QE policy is one of the major reasons. QE policies are mentioned as the root of the global capital flows which move financial markets. Papadamou, Kyriazis, & Tzeremes (2020) reported that the massive amount of funds from US QE move into several emerging markets, and Shogbuyi & Steeley (2017) concluded that a country's QE program impacts other countries' equity markets. Jakl (2019) revealed that that the purchase of government bonds from QE policy causes investors to rebalance their portfolios towards higher risk assets, such as corporate bonds and common stocks. Cho & Rhee (2013) studied the effects of the US QE on capital flows and financial markets in Asia and found that large capital flows are obviously more toward portfolio investment and foreign direct investment.

The studies of the effect of foreign fund flows on stock market variables are relatively rare compared to mutual fund studies. Both groups of investors, however, show a significant role as market movers in most stock markets, especially in Asia. Boyer & Zheng (2009) and Kim & Jo (2019) found that fund flows from both mutual funds and foreign investors have significant and positive contemporaneous effects on stock market returns. The recent evidence from Almutiri (2020) exhibits that the movement of foreign fund flows significantly affects stock returns. The studies on the effect of mutual fund flows on stock market variables can be considered a guideline for studies on the impact of foreign fund flows. For instance, Warther (1995), Frankel & Schmukler (1996) and Pavabutr & Yan (2007) found that the rapid change in demand for stocks may push up the stock prices in the short-run only, and in the long-run, the prices tend to move back to their fundamental values. The surge of supply from investors' panic lowers the stock prices significantly. Cha & Lee (2001) concluded that fund flows are driven by investors' forecasts on stocks'

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fundamental values. Cao, Chang, & Wang (2008) applied the vector autoregressive (VAR) and multiple regression models to study the dynamic relation between aggregate mutual fund flows and market-wide volatility, and they found that market volatility is negatively related to concurrent and lagged flow.

The effect of fund flows, either from foreign or institutional investors, might signify the return–volume–volatility relationship in different ways. Foreign investors are always considered to be informed investors. Market participants believe that foreign investors possess superior information over domestic investors and know whether the market prices are right or not when they decide to move their funds into or out of a specific market. Therefore, foreign fund flows should provide some valuable information on the direction of stock market. For example, Richards (2005) conducted research on the aggregate daily trading of foreign investors in six Asian emerging equity markets and documented strong evidence of the positive relationship between domestic equity returns and foreign net buy. Foreign investors are better informed than domestic investors and external conditions have a larger impact on emerging markets than internal conditions. Seasholes (2000) reported the asymmetric information held by foreign investors and suggests that their trade provides valuable information for predicting a stock market's return. Grinblatt & Keloharju (2000) support the notion that foreign investors have superior information over domestic investors and presented evidence of asymmetric information in Finland's equity market. Razin & Sadka (1999) claim that, with superior information, foreign investors can sell their stocks at high prices. Ciner & Karagozoglu (2008) also reported that foreign investors can earn higher returns in their trading since they are well-informed.

However, some investors and researchers dispute the idea that foreign investors acquire better information than local investors. Foreign trading affects stock prices simply because of the demand and supply shock. Therefore, the unpredictable shock of foreign fund flows strongly impacts stocks' returns. In other words, the stock prices might rapidly rise when a lot of foreign capital flows into the markets, and the stock prices might suddenly drop when supply shock caused by the immense outflow of foreign investors' funds occurs. Conversely, the impact from foreign capital might not be significant any longer since most emerging markets have become more efficient. In fact, some researchers, for example, Edelen & Warner (2001) and Chakrabarti (2001) found that foreign investors are just followers (or price takers) who take action by using the return information from the market. Agudelo, Byder, & Yepes-Henao (2019) reported that foreign investors' performance in trade execution are the worst among all groups of investors and concluded that, consequently, the impact of foreign fund flows on stock markets could be explained by two interesting hypotheses: the hypothesis focusing on demand and supply shocks and the hypothesis pertaining to the asymmetric information of foreign investors. Whether foreign investors possess superior information over domestic investors or just trigger demand–supply shocks in the markets is quite a motivating research question for stock market participants. The results from this study will therefore contribute additional evidence regarding the effect of fund flows on the stock markets' performance and also the reasons for such an effect.

3. DATA AND METHODOLOGY

This research analyzes 2,608 observations of the daily trading days from four Asian stock markets – Indonesia, South Korea, Taiwan and Thailand – from January 2009 to December 2020 for two main reasons. First, the modern-day QE monetary policy began in November 2008 and has been ongoing with the unexpected outbreak of the COVID-19 pandemic in December 2019. Therefore, its impact should be counted in the years after. Second, these four Asian stock markets provide sufficient data for analyzing the effect of foreign fund flows. Foreign investors' net buy and net sell represent international fund inflows and outflows, respectively, and they are signified by using the logarithm of investors' buying values (B) over their selling values (S) (Nittayagasetwat, 2018) as follows:

$$NF_{i,t} = \ln\left(\frac{B_{i,t}}{S_{i,t}}\right) \tag{1}$$

Where $NF_{i,t}$ is the daily percentage of foreigners' net fund flows of stock market i for period t, $B_{i,t}$ is the daily foreigners' buying value of stock market i for period t, and $S_{i,t}$ is the daily foreigners' selling value of stock market i

for period t. If NFi,t is positive, it indicates foreign investors' net buy, and a negative sign indicates foreign investors' net sell. In order to find the influence of foreign investors' trading on stock market returns and trade value, the continuous daily stock returns and the change in market value are calculated according to the study of fund flows by Nittayagasetwat (2018) as follows:

$$R_{it} = \ln\left(\frac{SI_{i,t}}{SI_{i,t-1}}\right) \tag{2}$$

Where Ri,t is the daily continuous return of stock market i for period t, $SI_{i,t}$ is the stock index of stock market i for period t, and $SI_{i,t-1}$ is the stock index of stock market i for period t-1.

$$V_{i,t} = ln\left(\frac{v_{i,t}}{v_{i,t-1}}\right) \tag{3}$$

Where $V_{i,t}$ is the daily continuous change in the trading value of stock market i for period t, $v_{i,t}$ is the daily trading value of stock market i for period t, and $v_{i,t-1}$ is the daily trading value of stock market i for period t-1.

Next, the study applies the Parkinson volatility (Parkinson, 1980), which is presented in the research of Shu & Zhang (2006) to examine the impact on stock return volatility. The short form of the Parkinson volatility can be exhibited as follows:

$$\sigma_{i,t} = \sqrt{\frac{1}{4\ln 2}\left(\ln\frac{SI_{i,t}^{H}}{SI_{i,t}^{L}}\right)^2} \tag{4}$$

Where $\sigma_{i,t}$ is the daily volatility of stock market i for period t, $SI_{i,t}^{H}$ is the highest level of the stock index of stock market i for period t, and $SI_{i,t}^{L}$ is the lowest level of the stock index of stock market i for period t.

The VAR model is employed to find the influence from the lags of net foreign fund flows because this model is widely used to test the interrelationships of the endogenous variables in one equation. The examination begins with a stationarity test of the time series by applying the augmented Dickey–Fuller test (ADF) for the unit root investigation in order to avoid spurious issues in the data. The VAR models in this study are conducted as follows:

$$R_{i,t} = \alpha_i' + \sum_{j=1}^{k} \beta_{i,j}' NF_{i,t-j} + \sum_{j=1}^{k} \gamma_{i,j}' R_{i,t-j} + \varepsilon_{i,t}' \tag{5}$$

$$NF_{i,t} = \alpha_i^{f'} + \sum_{j=1}^{k} \beta_{i,j}^{f'} NF_{i,t-j} + \sum_{j=1}^{k} \gamma_{i,j}^{f'} R_{i,t-j} + \varepsilon_{i,t}^{f'} \tag{6}$$

$$V_{i,t} = \alpha_i'' + \sum_{j=1}^{k} \beta_{i,j}'' NF_{i,t-j} + \sum_{j=1}^{k} \gamma_{i,j}'' V_{i,t-j} + \varepsilon_{i,t}'' \tag{7}$$

$$NF_{i,t} = \alpha_i^{f''} + \sum_{j=1}^{k} \beta_{i,j}^{f''} NF_{i,t-j} + \sum_{j=1}^{k} \gamma_{i,j}^{f''} V_{i,t-j} + \varepsilon_{i,t}^{f''} \tag{8}$$

$$\sigma_{i,t} = \alpha_i''' + \sum_{j=1}^{k} \beta_{i,j}''' NF_{i,t-j} + \sum_{i=1}^{k} \gamma_{i,j}''' \sigma_{i,t-j} + \varepsilon_{i,t}''' \tag{9}$$

$$NF_{i,t} = \alpha_i^{f'''} + \sum_{j=1}^{k} \beta_{i,j}^{f'''} NF_{i,t-j} + \sum_{i=1}^{k} \gamma_{i,j}^{f'''} \sigma_{i,t-j} + \varepsilon_{i,t}^{f'''} \tag{10}$$

Nittayagasetwat (2018) also studied the concurrent effect of foreign fund flows on returns, trade value and volatility of the stock markets in the sample. Following the observations by Durbin (1970) and Oh & Parwada (2007), the lagged returns, volume and volatility are included in the model as controlled variables in order to prevent a positive bias in the regression. Therefore, the following models are applied in this study:

$$R_{i,t} = a_i' + b_i' NF_{i,t} + \sum_{j=1}^{k} c_{i,j}' R_{i,t-j} + e_{i,t}' \tag{11}$$

$$V_{i,t} = a_i'' + b_i'' NF_{i,t} + \sum_{j=1}^{k} c_{i,j}'' V_{i,t-j} + e_{i,t}'' \tag{12}$$

$$\sigma_{i,t}=a_i''' + b_i''' NF_{i,t} + \sum_{j=1}^{k} c_{i,j}''' \sigma_{i,t-j} + e_{i,t}''' \tag{13}$$

For the robustness check, this research employs the studies of Nittayagasetwat (2018) to investigate the information contained in foreign fund flows. By using the ordinary least squares (OLS) estimation, the impact of the foreign capital flows on the return, trade value and volatility of stock markets is investigated in the same way as follows:

$$R_{i,t}=\alpha_i^{*'} + \sum_{j=0}^{k} \beta_{i,j}^{*'} NF_{i,t-j} + \sum_{j=1}^{k} \gamma_{i,j}^{*'} R_{i,t-j} + \varepsilon_{i,t}^{*'} \tag{14}$$

$$V_{i,t}=\alpha_i^{*''} + \sum_{j=0}^{k} \beta_{i,j}^{*''} NF_{i,t-j} + \sum_{j=1}^{k} \gamma_{i,j}^{*''} V_{i,t-j} + \varepsilon_{i,t}^{*''} \tag{15}$$

$$\sigma_{i,t}=\alpha_i^{*'''} + \sum_{j=0}^{k} \beta_{i,j}^{*'''} NF_{i,t-j} + \sum_{i=1}^{k} \gamma_{i,j}^{*'''} \sigma_{i,t-j} + \varepsilon_{i,t}^{*'''} \tag{16}$$

All of the tests focus on the consequential and contemporaneous effects of foreign fund flows on the stock returns, trade value and volatility. The results are shown in the next section.

4. RESULTS AND DISCUSSION

The results of this study begin with the descriptive analysis. In order to study the characteristics of the data, this analysis presents the statistics of foreign fund flows or net buy, daily returns, daily changes of trade value, and the Parkinson's volatility of the stock markets in four emerging markets in the Pacific Rim – Indonesia, South Korea, Taiwan and Thailand – from the beginning of January 2009 to the end of December 2020.

Panel A of Table 1 shows the descriptive data of foreign net buy from January 2009 to December 2020. During the past twelve years, foreign investors in South Korea and Taiwan have had a net buy in these stock markets, while foreign investors in Indonesia's and Thailand's stock exchanges have had a net sell. The average foreign net buys of the stock markets in Indonesia, South Korea, Taiwan and Thailand are rather close to zero. That means foreign investors' buying and selling values of all markets in the sample are not far from each other. Taiwan's average net buy is the highest at 2.80%, or the daily buying values are 2.80% higher than the daily selling values. South Korea's average net buy is 1.17%, while Indonesia and Thailand are the two countries where foreign fund flows are negative with average net buys of -0.32% and -1.37%, respectively. Foreign investors who trade in the Thai stock market sell more stocks than they buy by a daily average of 1.37%. The most volatile market is Indonesia at 39.57%, and the least volatile market is South Korea at 21.76%. Foreign funds that flow into and out of the Indonesian stock market are highly volatile compared to the rest.

For the stock indices' daily returns, Panel B of Table 1 reports that all stock markets have had positive daily returns on average during the past twelve years. Indonesia's, Taiwan's and Thailand's average (mean) daily returns are at the same high of 0.05%, while South Korea's average daily return is the lowest at 0.03%. The returns' fluctuations measured by standard deviation of all markets are approximately the same; Indonesia at 1.12%, South Korea at 1.06%, Taiwan at1.00%, and Thailand at 1.09%. All stock markets' daily returns are slightly skewed to the left with a high kurtosis of 8.37 to 14.85.

Panel C of Table 1 shows that the stock market with the highest average daily changes in trade value is that of Indonesia at 0.42%, followed by the stock markets in South Korea at 0.32%, Taiwan at 0.09% and Thailand at -0.24%. Interestingly, the Thai stock market is the only market in the sample that has a decreasing daily average trade value and it also has the highest foreign outflow (see Panel A). Each stock market's deviation on the change in trade value is obviously high (i.e., Indonesia = 32.16%, Thailand = 27.38%, South Korea = 22.85%, and Taiwan = 17.04%). The fluctuation in the trade value of each stock market is confirmed by the high difference between its maximum and minimum values. Panel D of Table 1 provides details of the Parkinson volatilities of the stock exchanges in Indonesia, South Korea, Taiwan and Thailand. The volatility values average from 0.61% to 0.75%, and the variation of each market's volatility measured by standard deviation is from 0.40% to 0.54%. The Parkinson volatility in this study

represents the daily fluctuation of a stock market's index or price level. The results imply that the stock market in South Korea has the highest volatile index while the market in Indonesia has the highest volatile market returns on daily average. The Taiwan stock market is the least volatile market in the sample in terms of both index and market returns.

Table 1 contains the descriptive analyses of the daily average data of the foreign net buys (Panel A), the stock market returns (Panel B), trade values (Panel C), and Parkinson volatilities (Panel D) of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Table 1A. Descriptive data on the daily foreign net buy of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Descriptive Statistics	Foreign Net Buy			
	Indonesia	South Korea	Taiwan	Thailand
Mean (%)	-0.32	1.17	2.80	-1.37
Median (%)	-0.58	0.67	3.65	-2.09
Maximum (%)	285.21	83.57	127.76	135.25
Minimum (%)	-238.47	-99.57	-115.36	-137.63
Std. Dev. (%)	39.57	21.84	28.47	21.76
Skewness	0.32	-0.15	-0.04	0.07
Kurtosis	8.90	4.35	3.65	7.49
Observations	3131	3131	3131	3131

Table 1B. Descriptive data on the daily returns of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Descriptive Statistics	Daily Return			
	Indonesia	South Korea	Taiwan	Thailand
Mean (%)	0.05	0.03	0.05	0.05
Median (%)	0.03	0.01	0.04	0.02
Maximum (%)	9.70	8.25	6.52	7.70
Minimum (%)	-9.30	-8.77	-6.52	-11.45
Std. Dev. (%)	1.12	1.06	1.00	1.09
Skewness	-0.23	-0.37	-0.50	-0.90
Kurtosis	10.04	10.13	8.37	14.85
Observations	3131	3131	3131	3131

Table 1C. Descriptive data on the changes in the trade values of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Descriptive Statistics	Change in Trade Values			
	Indonesia	South Korea	Taiwan	Thailand
Mean (%)	0.42	0.32	0.09	-0.24
Median (%)	0.73	0.26	-0.09	-0.74
Maximum (%)	315.09	711.53	72.82	738.30
Minimum (%)	-283.12	-57.00	-76.57	-129.71
Std. Dev. (%)	32.16	22.85	17.04	27.38
Skewness	0.28	13.88	0.08	9.07
Kurtosis	15.06	432.97	3.96	245.83
Observations	3131	3131	3131	3131

For the time-series analyses, the research begins with the unit root test. The results from the unit root test in Table 2 show that the t-statistics of all variables in the sample are statistically significant. Therefore, the overall time-series of the logarithm of foreign net buy, returns, trade value, and standard deviation are stationary. Applying the augmented Dickey–Fuller statistics, as shown in Table 2, the study finds no spurious problems for the time-series analysis in the next section. All variables are statistically significant at the 1% level. For the stock market in South Korea, the Parkinson volatility ($\sigma_{i,t}$) is the only variable that is statistically significant at the 5%

level. Table 3 exhibits the results of the vector autoregressive (VAR) model investigation using five lags of the tested variables.

Table 1D. Descriptive data on the Parkinson volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Descriptive Statistics	Parkinson Volatility			
	Indonesia	South Korea	Taiwan	Thailand
Mean (%)	0.75	0.67	0.61	0.69
Median (%)	0.59	0.55	0.51	0.57
Maximum (%)	6.29	7.32	4.16	11.01
Minimum (%)	0.13	0.17	0.15	0.16
Std. Dev. (%)	0.54	0.46	0.40	0.48
Skewness	2.96	4.05	2.96	6.40
Kurtosis	17.63	34.94	17.11	101.26
Observations	3131	3131	3131	3131

The VAR analysis of returns and foreign investors' net buy in Panel A of Table 3 reports that, beginning from a day lag, foreigners' net buy can influence the returns of the stock markets in Indonesia, Taiwan and Thailand, and the relationships are significantly positive. Therefore, the foreign net buy can significantly drive up the stock indices of most markets in the sample. The only unexpected setback is the stock market in South Korea, where the impact begins on the second lag of foreign net buy and is significantly negative. For South Korea's stock market, since the impact of the lag of foreign net buy on the stock returns is not significant from the first lag, the negative impact from the second lag is inconclusive. In addition, the lags of the returns in South Korea's, Taiwan's and Thailand's stock markets can negatively affect its current return. The positively statistically significant impact of the returns on the foreign net buy was also discovered in the stock markets in Indonesia and Thailand from one-day lags of returns, while the impact in South Korea was significantly negative and began from one-day lagged return. Additionally, the lags of the foreign net buy in all markets in the sample were able to positively affect its current foreign net buy. Notably, the lagged foreign net buy could influence the current net buy of these markets by up to five days. This means that foreign investors often conduct consecutive trading in stock markets for many days. Panel B of Table 3 reports the influence of foreign fund flows on the trade value of the stock markets in Indonesia, South Korea, Taiwan and Thailand. The impact of foreign fund flows on the trade value is significantly negative in Indonesia's stock market from the first lag of foreign fund flows and in Taiwan from the second lag, while it is significantly positive in Thailand from the first lag. Surprisingly, there is no impact from foreign fund flows on trade value in South Korea. In turn, the impact of trade value on foreign fund flows is statistically significant in the stock market in Indonesia for the first three lags of trade value, in Taiwan for the first lag, and becomes significant in South Korea on the third lag. The relationship between the foreign net buy and trade value is somehow inclusive. The lags of trade value have a positive effect on the current trade value in all markets except Indonesia. This means that heavy trade value is often followed by greater trade value in most markets. Panel C in Table 3 reveals that the lags of foreign net buy statistically and significantly influences the volatility of the stock markets in all countries in the sample. The relationships are negative from the first lags as the foreign fund flows decrease the stock market volatility in all markets. This result is consistent with the study of Nittayagasetwat (2018) and is evidence that foreign investors are well-informed, as explained by Hung (2016). Their trading reduces the stock market volatility and improves the market efficiency. However, the impact of the lags of stock market volatility on the foreign net buy is mostly not significant, or in other words, the volatility cannot influence foreign net buy. Table 3 shows the results of the VAR analyses on the impact of the foreign net buy on the stock market returns (Panel A), changes in trade value (Panel B), and the Parkinson volatility (Panel C) of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Table 2. The unit root test of the time-series data of the daily foreign net buy, returns, trade value, and Parkinson volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using augmented Dickey–Fuller statistics.

Variable	Country	Condition	T-Statistics	P-Value
$NF_{i,t}$	Indonesia***	No intercept	-12.533	0.000
	Indonesia***	With intercept	-12.533	0.000
	Indonesia***	With intercept and trend	-13.142	0.000
	South Korea***	No intercept	-12.181	0.000
	South Korea***	With intercept	-12.246	0.000
	South Korea***	With intercept and trend	-12.252	0.000
	Taiwan***	No intercept	-17.138	0.000
	Taiwan***	With intercept	-17.291	0.000
	Taiwan***	With intercept and trend	-17.368	0.000
	Thailand***	No intercept	-17.507	0.000
	Thailand***	With intercept	-17.574	0.000
	Thailand***	With intercept and trend	-17.699	0.000
$R_{i,t}$	Indonesia***	No intercept	-53.142	0.000
	Indonesia***	With intercept	-53.224	0.000
	Indonesia***	With intercept and trend	-53.313	0.000
	South Korea***	No intercept	-56.142	0.000
	South Korea***	With intercept	-56.178	0.000
	South Korea***	With intercept and trend	-56.175	0.000
	Taiwan***	No intercept	-53.843	0.000
	Taiwan***	With intercept	-53.972	0.000
	Taiwan***	With intercept and trend	-53.966	0.000
	Thailand***	No intercept	-57.569	0.000
	Thailand***	With intercept	-57.675	0.000
	Thailand***	With intercept and trend	-57.772	0.000
$V_{i,t}$	Indonesia***	No intercept	-32.543	0.000
	Indonesia***	With intercept	-32.654	0.000
	Indonesia***	With intercept and trend	-32.644	0.000
	South Korea***	No intercept	-17.979	0.000
	South Korea***	With intercept	-18.012	0.000
	South Korea***	With intercept and trend	-18.077	0.000
	Taiwan***	No intercept	-38.272	0.000
	Taiwan***	With intercept	-38.250	0.000
	Taiwan***	With intercept and trend	-38.242	0.000
	Thailand***	No intercept	-28.991	0.000
	Thailand***	With intercept	-28.981	0.000
	Thailand***	With intercept and trend	-29.008	0.000
$\sigma_{i,t}$	Indonesia***	No intercept	-2.741	0.006
	Indonesia***	With intercept	-6.872	0.000
	Indonesia***	With intercept and trend	-7.108	0.000
	South Korea**	No intercept	-5.305	0.000
	South Korea***	With intercept	-10.437	0.000
	South Korea***	With intercept and trend	-10.649	0.000
	Taiwan***	No intercept	-3.825	0.000
	Taiwan***	With intercept	-9.067	0.000
	Taiwan***	With intercept and trend	-9.524	0.000
	Thailand***	No intercept	-6.137	0.000
	Thailand***	With intercept	-11.674	0.000
	Thailand***	With intercept and trend	-11.785	0.000

Note: ** Significant at the 5% level; *** Significant at the 1% level.

Table 3A. The VAR analysis of the daily returns and foreign net buy of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Variable	Indonesia		South Korea		Taiwan		Thailand	
	Rit	NF it	R it	NFit	Rit	NFit	Rit	NFit
Rit (-1)	0.030 [1.616]	6.299*** [9.916]	-0.006 [-0.344]	-0.994*** [-2.724]	-0.027 [-1.109]	-0.411 [-0.710]	-0.061*** [-3.318]	2.985*** [9.756]
Rit (-2)	-0.019 [-0.993]	2.766*** [4.291]	0.055*** [2.930]	-1.326*** [-3.631]	0.051** [2.149]	0.406 [0.705]	-0.006 [-0.312]	0.280 [0.899]
Rit (-3)	-0.051*** [-2.762]	0.974 [1.516]	0.011 [0.588]	-0.287 [-0.783]	-0.003 [-0.137]	0.012 [0.021]	0.008 [0.410]	-0.328 [-1.058]
Rit (-4)	-0.060*** [-3.211]	-1.465** [-2.280]	-0.036* [-1.936]	-0.045 [-0.123]	-0.005 [-0.226]	0.082 [0.144]	0.002 [0.106]	0.124 [0.401]
Rit (-5)	-0.011 [-0.572]	-0.715 [-1.113]	-0.021 [-1.121]	-0.358 [-0.983]	-0.017 [-0.773]	-1.335** [-2.495]	0.071*** [3.811]	0.088 [0.286]
NFit (-1)	0.002*** [4.275]	0.022 [1.216]	-0.000 [-0.315]	0.173*** [9.283]	0.004*** [4.104]	0.440*** [18.355]	0.006*** [5.491]	0.387*** [20.912]
NFit (-2)	-0.000 [-0.369]	0.037** [2.018]	-0.003*** [-2.700]	0.118*** [6.278]	-0.004*** [-3.677]	0.051** [2.001]	0.002 [1.574]	0.107*** [5.426]
NFit (-3)	0.001 [0.858]	0.046** [2.499]	0.002** [2.052]	0.108*** [5.679]	0.002 [1.431]	0.054** [2.114]	-0.002** [-1.870]	0.052*** [2.633]
NFit (-4)	0.001* [1.686]	0.087*** [4.795]	0.001 [1.399]	0.058*** [3.083]	-0.001 [-1.306]	0.070*** [2.736]	-0.002 [-1.414]	0.053 [2.672]
NFit (-5)	0.000 [0.592]	0.068*** [3.781]	-0.001 [-0.931]	0.051*** [2.760]	0.001 [0.589]	0.077*** [3.359]	-0.002* [-1.662]	0.042** [2.338]
C	0.001*** [2.636]	-0.006 [-0.865]	0.000 [1.458]	0.006* [1.688]	0.001*** [2.650]	0.009** [2.104]	0.001** [2.541]	-0.007** [-1.991]
Adj. R-squared	0.011	0.063	0.004	0.097	0.007	0.293	0.017	0.325
F-statistic	4.436	22.047	2.309	34.371	3.177	130.455	6.535	151.488
AIC	-6.164	0.920	-6.257	-0.306	-6.386	-0.018	-6.218	-0.604
Count	3131	3131	3131	3131	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 3B. The VAR analysis of the daily changes in trade value and foreign net buy of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Variable	Indonesia		South Korea		Taiwan		Thailand	
	Vit	NFit	Vit	NFit	Vit	NFit	Vit	NFit
Vit (-1)	-0.476***	0.213***	0.127***	0.010	0.400***	0.027**	0.375***	0.002
	[-21.011]	[6.496]	[6.088]	[0.404]	[19.342]	[2.101]	[16.953]	[0.045]
Vit (-2)	-0.346***	0.135***	0.111***	-0.032	0.071***	0.004	0.102***	0.005
	[-13.342]	[3.579]	[5.319]	[-1.349]	[3.204]	[0.270]	[4.321]	[0.138]
Vit (-3)	-0.251***	0.058*	0.124***	0.052**	0.060***	0.009	0.064***	0.039
	[-10.456]	[1.653]	[5.965]	[2.204]	[2.692]	[0.618]	[2.636]	[1.074]
Vit (-4)	-0.168***	0.038	0.071***	-0.005	0.071***	-0.023	0.067***	0.008
	[-7.799]	[1.230]	[3.420]	[-0.199]	[3.168]	[-1.637]	[2.781]	[0.231]
Vit (-5)	-0.081***	0.004	0.040*	0.012	0.059***	0.011	0.050**	-0.018
	[-4.795]	[0.180]	[1.938]	[0.515]	[2.790]	[0.857]	[2.176]	[-0.534]
NFit (-1)	-0.274***	-0.016	0.025	-0.277***	-0.012	-0.504***	0.025*	-0.274***
	[-17.944]	[-0.740]	[1.330]	[-13.194]	[-0.344]	[-24.336]	[1.704]	[-12.472]
NFit (-2)	0.020	0.153***	0.010	-0.150***	-0.069*	-0.324	0.014	-0.166***
	[1.187]	[6.323]	[0.522]	[-6.900]	[-1.850]	[-14.129]	[0.918]	[-7.240]
NFit (-3)	0.047***	0.069***	0.017	-0.078***	-0.062*	-0.279***	-0.000	-0.110***
	[2.755]	[2.776]	[0.886]	[-3.587]	[-1.654]	[-11.978]	[-0.020]	[-4.744]
NFit (-4)	0.038**	0.042*	0.024	-0.034	-0.036	-0.190***	0.004	-0.048**
	[2.293]	[1.765]	[1.220]	[-1.575]	[-0.960]	[-8.190]	[0.221]	[-2.077]
NFit (-5)	0.005	0.043*	0.001	-0.006	-0.027	-0.011	0.012	0.017
	[0.324]	[1.793]	[0.038]	[-0.300]	[-0.789]	[-0.541]	[0.783]	[0.735]
C	0.009	-0.014*	0.003	0.005	0.013**	-0.002	0.002	0.003
	[1.596]	[-1.742]	[0.630]	[0.925]	[2.519]	[-0.504]	[0.532]	[0.452]
Adj. R-squared	0.357	0.039	0.080	0.075	0.255	0.215	0.254	0.077
F-statistic	121.443	9.734	20.962	19.642	82.575	66.203	72.059	18.345
AIC	0.134	0.878	-0.293	-0.059	0.0420	-0.921	-0.518	0.266
Count	3131	3131	3131	3131	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 3C. The VAR analysis of the daily Parkinson volatility and foreign net buy of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Variable	Indonesia		South Korea		Taiwan		Thailand	
	σit	NFit	σit	NFit	σit	NFit	σit	NFit
σit (-1)	0.407*** [19.182]	-2.865 [-1.404]	0.325*** [15.993]	2.304* [1.851]	0.214*** [10.787]	0.105 [0.067]	0.435*** [20.606]	-1.576 [-1.515]
σit (-2)	0.160*** [6.981]	-0.458 [-0.207]	0.180*** [8.455]	-2.990** [-2.297]	0.183*** [9.114]	-2.034 [-1.290]	0.076*** [3.295]	1.150 [1.011]
σit (-3)	0.081*** [3.526]	2.607 [1.176]	0.141*** [6.595]	-1.272 [-0.971]	0.130*** [6.419]	-1.808 [-1.134]	0.069*** [3.060]	1.215 [1.091]
σit (-4)	0.100*** [4.361]	5.585** [2.530]	0.115*** [5.385]	-1.295 [-0.991]	0.092*** [4.569]	2.247 [1.426]	0.097*** [4.344]	-0.724 [-0.656]
σit (-5)	0.035* [1.686]	-3.035 [-1.514]	0.049** [2.410]	-1.502 [-1.199]	0.132*** [6.776]	-0.531 [-0.346]	0.0730*** [3.547]	-0.323 [-0.319]
NFit (-1)	-0.0010** [-4.636]	0.034 [1.619]	-0.001* [-1.822]	0.121*** [5.974]	-0.002*** [-8.115]	0.404*** [20.118]	-0.001** [-2.512]	0.378*** [17.678]
NFit (-2)	-0.001** [-2.536]	0.095*** [4.385]	-0.001** [-2.181]	0.105*** [5.237]	0.001** [1.995]	0.064*** [2.956]	-0.000 [-0.913]	0.103*** [4.454]
NFit (-3)	0.001** [2.379]	0.060*** [2.721]	-0.000 [-0.865]	0.107*** [5.311]	-0.000 [-0.997]	0.043** [1.987]	0.001 [1.433]	0.054** [2.269]
NFit (-4)	0.000* [1.675]	0.070*** [3.139]	-0.001** [-2.052]	0.056*** [2.772]	0.000** [0.247]	0.076*** [3.503]	-0.000 [-0.478]	0.074*** [3.083]
NFit (-5)	0.000 [0.171]	0.060*** [2.675]	0.001** [2.211]	0.032 [1.605]	0.001*** [2.767]	0.053*** [2.595]	0.001*** [2.612]	0.050** [2.230]
C	0.002*** [9.451]	-0.023 [-1.372]	0.001*** [8.555]	0.035*** [3.896]	0.002*** [10.0139]	0.026*** [2.151]	0.002*** [9.847]	0.002 [0.205]
Adj. R-squared	0.423	0.026	0.466	0.084	0.356	0.255	0.385	0.251
F-statistic	168.477	7.174	215.198	23.452	140.666	87.472	139.584	75.433
AIC	-8.229	0.906	-8.525	-0.296	-8.696	0.035	-8.303	-0.508
Count	3131	3131	3131	3131	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 4 repeats the study of Nittayagasetwat (2018), which uses the OLS estimation to explore the concurrent impact of foreign net buy on the daily returns, changes in trade value, and volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand with the extended data from January 2009 to December 2020. Panel A of Table 4 reports that foreigners' net buy can concurrently influence the daily returns of all stock markets in the sample, and the relationships are significantly positive. Therefore, the foreign net buy can significantly drive up the stock indices of all markets in the sample. Panel B evidences the concurrent influence of foreign fund flows on the trade value of the stock markets in Indonesia, Taiwan and Thailand. The concurrent impact of foreign fund flows on the trade value is significantly positive in those three markets in the sample. Therefore, the foreign fund inflows can actually drive up the trade value of those markets. Panel C shows that the foreign net buy statistically and significantly influences the volatility of the stock markets in all countries in the sample. The concurrent relationships are negative as the foreign fund flows decrease the stock market volatility in all markets.

The results of the OLS estimation are consistent with the study of Nittayagasetwat (2018) and are still promising that the foreign fund flows have a significant, positive effect on the daily returns and a negative effect on the daily volatility of all stock markets in the sample. For the relationship between the foreign fund flows and the trade value, this study evidences the significantly positive relationships in the stock markets in Indonesia, Taiwan and Thailand. Therefore, as presented by Nittayagasetwat (2018), the results show strong evidence that foreign investors have strong purchasing power in the stock markets in Asia and their demand can drive up the stock prices. Further, the foreign net buy has a negative impact on the stock market volatility, and this seems to imply that foreigners are informed investors since their buying power not only induces trade value, but also reduces volatility and stabilizes stock prices.

Table 4 comprises the results of the multiple regression models, which exhibit the impact of the foreign net buy on the stock market returns (Panel A), changes in trade value (Panel B), and the Parkinson volatility (Panel C) of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Table 4A. The multiple regression models showing the concurrent impact of the foreign net buy on the daily returns of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using the five-day lags of daily returns as the control variables.

Variable	Indonesia	South Korea	Taiwan	Thailand
C	0.001***	0.000	7.57E-05	0.001***
	[2.779]	[0.705]	[0.531]	[3.772]
NF_{it}	0.007***	0.0124***	0.023***	0.014***
	[13.201]	[14.798]	[42.753]	[15.100]
$R_{it}(-1)$	0.004	-0.007	-0.119***	-0.100***
	[0.214]	[-0.387]	[-8.115]	[-5.606]
$R_{it}(-2)$	-0.027	0.048***	-0.074***	-0.011
	[-1.525]	[2.780]	[-5.110]	[-0.631]
$R_{it}(-3)$	-0.052***	0.022	-0.054***	-0.005
	[-2.989]	[1.247]	[-3.787]	[-0.299]
$R_{it}(-4)$	-0.044**	-0.028	-0.090***	-0.030*
	[-2.532]	[-1.633]	[-6.285]	[-1.749]
$R_{it}(-5)$	-0.005	-0.026	-0.059***	0.039**
	[-0.292]	[-1.485]	[-4.158]	[2.237]
Adjusted R-squared	0.057	0.067	0.370	0.072
Count	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 4B. The multiple regression models showing the concurrent impact of the foreign net buy on the daily changes in trade value of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using the five-day lags of daily changes in trade value as the control variables.

Variable	Indonesia	South Korea	Taiwan	Thailand
C	0.017***	0.005	-0.003	0.003
	[2.971]	[0.955]	[-1.110]	[0.503]
N F$_{it}$	0.192***	-0.022	0.087***	0.110***
	[12.741]	[-0.964]	[8.060]	[3.924]
V$_{it}$ (-1)	-0.619***	-0.278***	-0.507***	-0.279***
	[-29.324]	[-13.262]	[-25.069]	[-12.804]
V$_{it}$ (-2)	-0.485***	-0.148***	-0.322***	-0.171***
	[-19.758]	[-6.844]	[-14.464]	[-7.524]
V$_{it}$ (-3)	-0.337***	-0.080***	-0.276***	-0.110***
	[-14.304]	[-3.656]	[-12.233]	[-4.798]
V$_{it}$ (-4)	-0.219***	-0.033	-0.196***	-0.048**
	[-10.229]	[-1.526]	[-8.698]	[-2.100]
V$_{it}$ (-5)	-0.105***	-0.006	-0.014	0.014
	[-6.008]	[-0.303]	[-0.706]	[0.621]
Adjusted R-squared	0.313	0.074	0.234	0.084
Count	3131	3131	3131	3131

Note: ** Significant at the 5% level; *** Significant at the 1% level.

Table 4C. The multiple regression models showing the concurrent impact of the foreign net buy on the daily Parkinson volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using the five-day lags of daily Parkinson volatility as the control variables.

Variable	Indonesia	South Korea	Taiwan	Thailand
C	0.002***	0.001***	0.002***	0.002***
	[9.587]	[8.813]	[11.191]	[10.025]
NF$_{it}$	-0.001***	-0.002***	-0.002***	-0.001***
	[-3.978]	[-4.771]	[-8.763]	[-3.636]
σ_{it} (-1)	0.416***	0.333***	0.225***	0.435***
	[19.742]	[16.503]	[11.506]	[20.657]
σ_{it} (-2)	0.158***	0.180***	0.176***	0.079***
	[6.887]	[8.497]	[8.911]	[3.441]
σ_{it} (-3)	0.076***	0.139***	0.129***	0.067***
	[3.305]	[6.516]	[6.434]	[2.958]
σ_{it} (-4)	0.102***	0.116***	0.088***	0.092***
	[4.430]	[5.463]	[4.474]	[4.131]
σ_{it} (-5)	0.029	0.044**	0.121***	0.070***
	[1.396]	[2.158]	[6.243]	[3.429]
Adjusted R-squared	0.420	0.468	0.358	0.385
Count	3131	3131	3131	3131

Note: ** Significant at the 5% level; *** Significant at the 1% level.

For the robustness check, this study follows Nittayagasetwat (2018) and uses the multiple regression models to explore the impact of concurrent and lagged foreign net buy on the daily returns, trade value, and volatility of the four stock markets in the sample. Panel A of Table 5 shows that the foreign fund flows have a positive and concurrent impact on the daily returns of all stock markets, but the effect of the lagged foreign fund flows is inconclusive. The lagged returns are obviously negatively related to current returns only in Indonesia's stock market. Panel B shows that the foreign fund flows have a negative and concurrent impact on the trade value of stock markets only in Taiwan, but the effect of the lagged foreign fund flows is inconclusive. The lagged returns are negatively related to current returns in all stock markets in the sample. The most promising results are the negative impacts of the current and lagged fund flows on stock market volatility, as shown in Panel C. The foreign net buy could reduce the daily volatility of all stock markets in the sample, and it has a continuing effect on some stock markets.

Table 5A. The multiple regression models showing the concurrent impact of the foreign net buy and its lags on the daily returns of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using the five-day lags of daily returns as the control variables.

Variable	Indonesia	South Korea	Taiwan	Thailand
C	0.001***	0.000	0.000*	0.001
	[2.906]	[1.036]	[1.673]	[-0.108]
$R_{it}(-1)$	-0.012	0.008	-0.015	3.160
	[-0.634]	[0.445]	[-0.853]	[-0.010]
$R_{it}(-2)$	-0.037**	0.073***	0.040**	-5.953
	[-2.009]	[4.066]	[2.251]	[0.013]
$R_{it}(-3)$	-0.0578**	0.015	-0.004	-0.564
	[-3.186]	[0.833]	[-0.203]	[0.707]
$R_{it}(-4)$	-0.050***	-0.035**	-0.008	0.000
	[-2.765]	[-1.977]	[-0.432]	[0.003]
$R_{it}(-5)$	-0.006	-0.016	0.020	0.069***
	[-0.329]	[-0.886]	[1.189]	[3.868]
NF_{it}	0.007***	0.014***	0.028***	0.016***
	[12.955]	[15.833]	[49.799]	[14.926]
$NF_{it}(-1)$	0.002***	-0.003***	-0.008***	0.000
	[4.105]	[-2.921]	[-10.333]	[0.085]
$NF_{it}(-2)$	-0.000	-0.004	-0.005***	0.000
	[-0.847]	[-4.559]	[-6.708]	[0.177]
$NF_{it}(-3)$	0.000	0.001	0.000	-0.003***
	[0.301]	[0.519]	[0.032]	[-2.636]
$NF_{it}(-4)$	0.000	0.001	-0.003***	-0.003**
	[0.615]	[0.578]	[-4.186]	[-2.175]
$NF_{it}(-5)$	-0.000	-0.002*	-0.002**	-0.002**
	[-0.270]	[-1.749]	[-2.204]	[-2.344]
Adjusted R-squared	0.061	0.078	0.447	0.083
Count	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

The positive impact of the lagged volatility on current volatility shows that the fluctuation lasted for many days for all stock markets in the sample. Table 5 shows the results of the multiple regression models exhibiting the impact of the foreign net buy and its lags on the stock market returns (Panel A), changes in trade value (Panel B), and the Parkinson volatility (Panel C) of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Table 6 concludes the results of the VAR analyses and the multiple regression models focusing on the lagged and concurrent impacts of the foreign net buy on the daily returns, the daily changes in trade value, and the daily Parkinson volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020. The majority of empirical evidence indicates that foreigners' net buy has a positive impact on the returns of the stock markets in Asia on the same day and the following days. The fund flows also drive up the trading value on the same day, but not the following day. The most promising result implies a negative relationship between the foreign net buy and the market volatility on the same day and the following day, which is consistent with the previous studies.

Therefore, this study shows that foreign investors are influential players in the Asian stock markets since their purchasing power can drive up the market returns, and they possess superior information that reduces market volatility and improves market efficiency.

Table 5B. The multiple regression models showing the concurrent impact of the foreign net buy and its lags on the daily changes in trade value of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using the five-day lags of daily changes in trade value as the control variables.

Variable	Indonesia	South Korea	Taiwan	Thailand
C	0.003	-0.003	0.005	0.012**
	[0.407]	[-0.920]	[0.943]	[2.170]
V_{it} (-1)	-0.277***	-0.503***	-0.276***	-0.517***
	[-12.662]	[-24.596]	[-13.154]	[-23.558]
V_{it} (-2)	-0.168***	-0.3169***	-0.149***	-0.372***
	[-7.347]	[-14.001]	[-6.886]	[-14.901]
V_{it} (-3)	-0.110***	-0.273***	-0.078***	-0.262***
	[-4.760]	[-11.857]	[-3.562]	[-11.368]
V_{it} (-4)	-0.049**	-0.187***	-0.034	-0.175***
	[-2.104]	[-8.138]	[-1.542]	[-8.481]
V_{it} (-5)	0.015	-0.009	-0.006	-0.082***
	[0.667]	[-0.420]	[-0.299]	[-5.047]
NF_{it}	0.132***	0.099***	-0.031	0.194***
	[4.084]	[7.947]	[-1.314]	[13.597]
NF_{it} (-1)	-0.048	-0.013	0.013	-0.271***
	[-1.380]	[-0.952]	[0.567]	[-18.473]
NF_{it} (-2)	-0.009	-0.003	-0.028	-0.010
	[-0.248]	[-0.248]	[-1.196]	[-0.608]
NF_{it} (-3)	0.030	0.003	0.055**	0.034**
	[0.841]	[0.187]	[2.350]	[2.054]
NF_{it} (-4)	-0.001	-0.030**	-0.003	0.030*
	[-0.017]	[-2.170]	[-0.105]	[1.871]
NF_{it} (-5)	-0.025	0.005	0.013	-0.003
	[-0.730]	[0.413]	[0.567]	[-0.187]
Adjusted R-squared	0.084	0.235	0.075	0.407
Count	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 5C. The multiple regression models showing the concurrent impact of the foreign net buy and its lags on the daily Parkinson volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020 using the five-day lags of the daily Parkinson volatility as the control variables.

Variable	Indonesia	South Korea	Taiwan	Thailand
C	0.002***	0.001***	0.002***	0.002***
	[9.364]	[8.874]	[10.361]	[9.885]
σ_{it} (-1)	0.404***	0.328***	0.214***	0.433***
	[19.118]	[16.184]	[10.882]	[20.535]
σ_{it} (-2)	0.160***	0.176***	0.179***	0.078***
	[6.985]	[8.284]	[9.018]	[3.374]
σ_{it} (-3)	0.083***	0.139***	0.127***	0.071***
	[3.631]	[6.535]	[6.323]	[3.144]
σ_{it} (-4)	0.105***	0.113***	0.095***	0.096***
	[4.573]	[5.320]	[4.787]	[4.306]
σ_{it} (-5)	0.033	0.047**	0.131***	0.073***
	[1.568]	[2.319]	[6.786]	[3.532]
NF_{it}	-0.001***	-0.001***	-0.002***	-0.002***
	[-3.861]	[-4.049]	[-6.450]	[-3.370]
NF_{it} (-1)	-0.001***	-0.000	-0.001***	-0.001
	[-4.517]	[-1.329]	[-5.191]	[-1.170]
NF_{it} (-2)	-0.001**	-0.001	0.001**	-0.000
	[-2.179]	[-1.749]*	[2.387]	[-0.593]
NF_{it} (-3)	0.001***	-0.000	-0.000	0.001
	[2.602]	[-0.430]	[-0.749]	[1.597]
NF_{it} (-4)	0.000*	-0.001*	0.000	-0.000
	[1.930]	[-1.829]	[0.697]	[-0.257]
NF_{it} (-5)	8.98E-05	0.001**	0.001***	0.001***
	[0.387]	[2.348]	[3.119]	[2.775]
Adjusted R-squared	0.427	0.470	0.366	0.387
Count	3131	3131	3131	3131

Note: * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.

Table 6. The summary of Table 3 (VAR analyses) and Table 4 (multiple regression models) exhibiting the impact of the foreign net buy on the stock market returns, changes in trade value, and the Parkinson volatility of the stock markets in Indonesia, South Korea, Taiwan and Thailand from January 2009 to December 2020.

Impact of foreign net buy	Indonesia	South Korea	Taiwan	Thailand
VAR analysis on Return	Positively influenced by net foreign buy beginning in the first lag.	Negatively influenced by net foreign buy beginning in the second lag.	Positively influenced by net foreign buy beginning in the first lag.	Positively influenced by net foreign buy beginning in the first lag.
VAR analysis on Trade Value	Negatively influenced by net foreign buy beginning in the first lag.	-	Negatively influenced by net foreign buy beginning in the second lag.	Positively influenced by net foreign buy beginning in the first lag.
VAR analysis on Volatility	Negatively influenced by net foreign buy beginning in the first lag.	Negatively influenced by net foreign buy beginning in the first lag.	Negatively influenced by net foreign buy beginning in the first lag.	Negatively influenced by net foreign buy beginning in the first lag.
Multiple Regression analysis on Return	Positively influenced by the net foreign buy on the same day.	Positively influenced by the net foreign buy on the same day.	Positively influenced by the net foreign buy on the same day.	Positively influenced by the net foreign buy on the same day.
Multiple Regression analysis on Trade Value	Positively influenced by the net foreign buy on the same day.	-	Positively influenced by the net foreign buy on the same day.	Positively influenced by the net foreign buy on the same day.
Multiple Regression analysis on Volatility	Negatively influenced by the net foreign buy on the same day.	Negatively influenced by the net foreign buy on the same day.	Negatively influenced by the net foreign buy on the same day.	Negatively influenced by the net foreign buy on the same day.

5. CONCLUSION

The global money supply has been growing since the global financial crisis (GFC) in 2008, during which quantitative easing (QE) policies were launched by many countries to ease the crisis. Although QE has been purposely alleviated after the recovery of the GFC, major central banks worldwide have been continuously engaged in QE measures to cope with the COVID-19 pandemic. As a result, the world is overwhelmed by excessive liquidity. The flows of money to achieve superior returns have led to a surge of capital fund flows in many Asian stock markets. The increase in demand for Asian stocks has boosted the stock indices of these countries rapidly as the foreign funds flow. Consequently, this study explores the impact of foreign fund flows on the returns, trade value, and volatility of some stock markets in Asia with the question whether foreign investors have superior information over domestic investors. Therefore, the fund flow information is presumed to be useful information for investors in predicting the changes in stock indices, trade value, volatility and stock market efficiency.

The VAR model was employed to ascertain the influence of the lags of net foreign fund flows and the endogenous interrelationships of foreign fund flows and stock market returns, trade value, and volatility. The VAR analysis of returns and foreign investors' net buy reports that foreign net buy can positively influence the returns of the stock markets in Indonesia, Taiwan and Thailand, and the foreign net buy could significantly drive up the stock indices of most markets in the sample. The positive impact of the returns on the foreign net buy has also been discovered in the stock markets in Indonesia and in Thailand. In addition, the positive influence of foreign fund flows on the trade value of the stock markets has been observed in South Korea's and Taiwan's stock markets. In turn, the impact of trade value on foreign fund flows is statistically significant only in the stock market in Indonesia. Finally, the foreign net buy statistically significantly influences the volatility of the stock markets in all countries in the sample. The relationships are negative so the foreign fund flows decrease the stock market volatility. This result is consistent with

the studies of Nittayagasetwat (2018) and indicates that foreign investors are well-informed and their trading improves the stock market efficiency.

In terms of a robustness check, this paper follows the studies of Nittayagasetwat (2018) to explore the concurrent and lagged impact of foreign fund flows on stock market returns, trade value, and volatility. By using multiple regression, the results are still promising – that foreign investors' net buy has a positive effect on the daily returns and has a negative effect on the daily volatility for all of the stock markets in the sample. Therefore, foreign investors have shown to be influencers in the stock markets in Asia and their fund flows improve market efficiency.

By using the VAR model and several multiple regression models, the empirical results confirm the role of foreign investors as market movers in the stock markets in these four countries in Asia. Consistent with the studies by Reilly & Wachowicz (1979); Berk & Green (2004); Richards (2005) and a recent study by Nittayagasetwat (2018), this research concludes that the foreign net buy supports positive returns in the stock markets, fund inflows increase stock market liquidity, and finally, foreigners in the Asian stock markets are considered as informed investors since their trading reduces stock market volatility. There seems to be asymmetric information in the Asian stock markets that foreign investors possess superior information over domestic ones. Foreign investors' knowledge has been applied to reduce market volatility and improve market efficiency.

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