Do They Trade by Sentiment? An Examination on the Mutual Fund in The Stock Exchange of Thailand

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Abstract

Conventional finance has long posited that institutional investors are rational and execute their trade on relevant information. On the other hand, retail investors are relatively irrational and frequently trade on sentiment. However, some empirical studies find evidence against these common beliefs. From our results, we find the association between domestic institutional investor's net trading volume and the change in an investor sentiment index. Further, we analyze each fund individually and find a positive relationship between their tradings' behavior and the sentiment index. Domestic institutional investors tend to buy high-volatility stocks when the sentiment is rising. We also document the simultaneous causality which means their purchasing behavior drive market sentiment and to be driven at the same time. Moreover, when they buy high-volatility stocks over low-volatility ones, market excess return appear to decline in the next period. Lastly, we suggest that trading behavior of domestic institutional investors plays an important role in guiding an investor sentiment index.

KEYWORDS

Institutional investors, Investor sentiment index (ISI), Trading behavior, rational investors

1. Introduction

Sentiment also known as belief, emotion or feeling, represents irrationality. Tversky and Kahneman (1974) introduce heuristic and biases theory which claim that when people have to make their decisions under uncertain events, their beliefs and past experiences affect their decision-makings. Furthermore, prospect theory (Kahneman and Tversky, 1979) suggests that people value gain and loss differently and underweight the outcome. Their execution is based on their satisfaction over the reasonable choices, so that the mispricing exists. Contrary to the conventional finance theories start from here, since one of the principal assumptions suggested that investors are rationale. In the meaning of 'rationality', investors make homogeneous

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decision based on relevant information and execute their trade correctly. Hence, an abnormal return does not exist (Fama, 1965).

When investors are influenced by their sentiment, mispricing tends to happen (De Long et al., 1990) and their risk aversion level is changed (Forgas, 1995). When investors are optimistic, they tend to buy high-risk stocks more than usual, even though the return on investing in high-risk stocks is lower when compared to investing in low-risk stocks during the same period (Baker & Wurgler, 2006). Numerous studies have found patterns of irrationality, inconsistency and incompetence in decision-making process of market participants which can influence the movement in stock prices (Rozeff & Kinney, 1976; De Bondt & Thaler, 1985; Haugen et al., 1996; Cahart, 1997). These findings conclude that investors' investment decisions are not based solely on reasonable factors, but also sentiment.

There are two broad types of investors in the market, sophisticated investor, and noise trader (De Bount et al., 1990). An institutional investor is praised as sophisticated investor who trade on relevant information. On the other hand, an individual or retail investor is in the latter group who is likely to be influenced by sentiment more than others (Lee et al., 1991, Baker & Wurgler, 2006, 2007; Phongluangtham, 2014). However, there are some studies that show contradict results to the traditional finance theory. Freidman (1984) suggests that there are plenty of reasons to believe that institutional investors are influenced by the market sentiment. Brunnermeier and Nagel (2004) find that hedge funds, which are non-retail investor, invested heavily in technology stocks during the financial bubble in 2000. They overinvest in inflated stocks which do not align with the investor's rational principal. Later, De Vault et al. (2019) argue that institutional investors trade on sentiment by buying high-risk stocks when the sentiment index is rising. They also introduced the behavior proxy called "Institutional demand shock of risky stocks". This measure is calculated from the change of the ownership level of each stock in funds' portfolio. By this method, we can observe how they rebalance their portfolio when their sentiment is changing.

To this point, we come up with an aim to examine the effects of the sentiment on investors' trading behavior in The Stock Exchange of Thailand (SET). To the best of our knowledge, there are few studies relevant to investor's sentiment. Using economic factors as a sentiment proxy, Phongluangtham (2014) argue that retail investors in Thailand are sentiment traders. Chuthanondha et al., (2015) construct Thai's investor sentiment index (ISI) following Baker and Wurgler (2006)'s approach. They also include foreign investors' trading value as one of the index components. In general perception, institutional investors should be a rational investor who know stock's intrinsic value because they can better access to non-public information and better process these information than retail investors. To the fact that, individual investors which mostly lack of financial knowledge have largely place their trust and saving on institutions to manage their investment. Therefore, understanding whether institutional investors making their decision rationally is really matter.

Our main research question is whether domestic institutional investors in Thailand make decisions based only on rational factors or not. We use the ISI as a sentiment proxy. As for the proxy of domestic institutional investors' trading behavior, we used both aggregate data and individual fund data. Chuthanondha et al., (2015) mention that trading value of foreign investor can be used as a sentiment proxy in Thailand. Since emerging stock markets are driven by foreign investors, Thai stock market is also one of them. However, their work overlook the role of domestic institutional investor as they follow the traditional sentiment literature which assume that institutional investors are rational and do not influenced by any sentimental. By using monthly net trading value ratio of domestic institutional investors, we find the relationship between their trading and the ISI. In our full range data from 2000 to 2019, the

negative correlation is observed. They tend to increase their positions when the sentiment is getting higher and decrease when the sentiment is getting lower.

Since our study aims to examine domestic institutional investors at a fund level, there are some limitations regarding to data availability. The Securities and Exchange Commission of Thailand (SEC) normally publishes fund reports twice a year, which are half-year and annual reports. The six-month time horizon raises an inaccuracy issue in capturing any sentiment effects occurred. Fortunately, quarterly reports have been recently available via Application Programming Interface (API) from the SEC's website since 2016. By choosing the more frequent data (quarterly), this study has to trade off with the narrower time period of study (4th quarter of 2016 to 3rd quarter of 2019).

There were 24 asset-management companies and more than 1,838 mutual funds at the end of 2019. We classify fund types by the nature of their information that was registered with the SEC. This research focused focuses on only two types of funds which are equity fund and mixed fund. Only 883 funds meet the criteria. Furthermore, we exclude index funds, sector funds, ETFs (Exchange Traded Funds), fund of funds and other passive funds since the change of their portfolio are limited by the strictly policy. There are 710 active funds left in the pool. We also impose another condition is that the funds must own hold at least one Thai stock and hold any Thai stocks for more than two consecutive quarters. Therefore, the 384 funds shall consist of 252 equity funds and 132 mixed funds, remained remain in our final sample.

We follow De Vault et al. (2019) to construct the "domestic institutional demand shock in risky stocks" factor as fund's behavior proxy. The volatility of daily return is represented the risk level. We define domestic institutional investors active-equity funds and active-mixed funds. We divided all the stocks that held by 384 funds into 3 groups by its volatility, i.e., high, low, and neutral. Demand shock in risky stocks defined as the different between the high-volatility and the low-volatility group. In line with De Valut et al. (2019), we find that domestic institutional investors' trading behavior toward high-volatility stocks is positive correlated with the change of ISI. However, we do not observe any correlation between low-vola stocks and the ISI. Moreover, there is no correlation between the demand shock of risk stocks and the change of ISI which is inconsistence to De Vault et al.'s (2019) suggestion. At this point, we can conclude that their actions may differ based on risk level of the stocks. We aware that correlation does not explain the cause and the effect of the relationship. We, further, tested the Granger-causality effects since domestic institutional investors may be the cause of the change of ISI the same as foreign investors. We document two-way Granger-causal between domestic institutional investors' trading behavior and the change of ISI. Their trading behavior make the market sentiment changes. At the same time, their trading decision also affect by the market sentiment. Our last test to confirm our finding is not spurious relationship is the cointegration test. The result supports a concrete relationship between the two.

Lastly, since we found the relationship between the ISI and domestic institutional investors' trading behavior, according to the result from both Baker and Wurgler (2006) and Chuthanondha et al., (2015) that the sentiment index can predict stocks return. Then, does their trading behavior forecast Thailand stock market return? We used Chuthanondha et al.'s, (2015) equation to test our behavioral factor, demand shock on risky stocks. When they bought high-volatility stocks more than low-volatility stocks then the excess return is going to decline in the next period.

2. Literature reviews

In an Efficient Market Hypothesis regime, assets are always traded at their fair value. Even though there are some noise traders who don't use an available information to evaluate the assets price, the market is still efficient given that these noise traders are minority (Fama, 1970). Moreover, there are arbitragers who step in to take the benefit of these asset mispricing.

On the other hand, Tversky and Kahneman (1974) suggest that when people have to make their decisions under uncertain events, their beliefs and past experiences affect their decision-makings. Moreover, Kahneman and Tversky (1979) find the behavioral of loss aversion which point out the differentiate of the satisfaction between gains and losses. Given the same amount of loss and gain, investors' utility reduces with a higher magnitude than when it increases from the gain. Because of the limit of arbitrage, the arbitrage process is too risky and too costly (Shleifer et al., 1997). Thus, rational investor can not properly arbitrage, and the assets price are not traded at their fair value. Moreover, an over arbitraging against noise traders make the arbitrager have less rationality and more sensitive to sentiment. When investors are driven by their sentiment, they tend to misjudge future cash flow and cause the mispricing (De Bount et al., 1990). Hence, irrational investors exist, and their action affect stocks price.

Conventional theory addressed that sentiment traders or irrational investors are retail investors. Most of them lack knowledge or accessibility to information as other groups of investors. Lee et al., (1991) report that the change of the closed-end fund discount is related to the change of retail investors' sentiment level. When small stocks perform well, the closed-end fund discount rate is getting smaller. The discounts are low when the retail investors are optimistic about future returns, and high when retail investors are pessimistic. Odean (1998) find that retail investors tend to hold an unrealize loss positions because they believe that their stocks will perform well in futures. In the other hand, they tend to realize profit too early. Moreover, Barber and Odean (1998) find that retail investors are overconfidence. They are overtrading which make their wealth decrease because of trading fees. Baker and Wurgler (2006) who invented the most widely known composite investor sentiment index suggest that retail investors are sensitive to the change of the sentiment. The small stocks, young stocks, high volatility stocks, unprofitable stocks, non-dividend-paying stocks, extreme growth stocks, and distressed stocks get relatively high returns when the sentiment level at the beginning of the period is lower than at the ending. In the other hand, these stocks get a relatively low returns when the sentiment is relatively high at the beginning of the period. Due to the fact that the majority owner of these categories of stocks are retail investors thus they are affected by the sentiment.

Institutional investors, on the other hand, are rational investor since they access to as much information and have knowledge to process an information correctly. However, some studies document the relationship between institutional investors and the sentiment. Brunnermeier and Nagel (2004) find that hedge funds, which are non-retail investor, play an important role in the financial bubble in 2000. They invested heavily in technology stocks, which they somehow had incredibly sold them before the prices fell. According to Brunnermeier and Nagel, hedge funds' trading behavior was caused by two reasons: first, they could predict the market sentiment; and second, arbitrage was harder and more expensive than riding the bubble. It seemed that they logically traded by using sentiment as one of the decision factors. Later, De Vault et al. (2019) show that institutional investors, who are also non-retail, trade based on sentiment by buying high-risk stocks when the sentiment index is raising. They also introduced the "demand shock in risky assets (stocks)" factor which captures institutional investors' trading behavior. The evidence supporting such a new factor was strong because the factor was examined with a variety of sentiment proxies (e.g., sentiment index by Baker and

Wurgler (2006), VIX index, economic factors, customer confidence, mutual fund and venture capital flows and American association of individual investors sentiment).

The investor sentiment theory does not get much attention in Thailand since there are a few of studies. Phongluangtham (2014) find that retail investors are related to the sentiment. They tend to buy more stocks when they are optimistic in the period of a bull market. The macro economic factors are used as a sentiment proxy i.e., unexpected inflation, manufacturing product index, unemployment rate, and the difference between 10-years and 1-year government bond yield. By following Baker and Wurgler (2006) methodology, Chuthanondha et al., (2015) constructed the ISI in Thailand. They test many potential investor sentiment proxies, i.e., six proxies introduced by Baker and Wurgler (2006), volatility premium, consumer confidence index by Lemmon & Portniaguina (2006), retail investor trades, foreign investor trades, long-short future contract ratio, trade value turnover, and number of stocks in cash balance account. Only four factors are consisted in the index, of which three are the factors suggested by Baker and Wurgler (2006) which are number of IPOs, shares turnover, and total share of equity issue in total equity and debt issue. The last factor that was newly proposed, is the ratio of foreign investors' net buy value and total trading value. Foreign investors held the second largest trading value proportion in Thailand stock market and their trade size is massive, that's why their action affects market sentiment. Residual regression was also used to eliminate business cycle effects. The principal component analysis explains 23 percent of the variables. The ISI explains an uptrend of SET index better than a downtrend. Moreover, The ISI explains mai index better than SET index (There are two stocks markets in Thailand which are SET and mai) which is corresponding with the Baker and Wurgler (2006)'s conclusion that the sentiment index explains small and risky stocks better than large and low-risk stocks.

3. Methodology

3.1. Research questions

Traditional behavioral finance conclude that retail investors are sensitive to the change of sentiment (Lee et al., 1991; Baker & Wurgler, 2007). In Thailand, Phongluangtham's (2014) conclude that the result is identical regardless the factors are economic or sentiment. Foreign investors always play an important role in an emerging stock market. Chuthanondha et al. (2015) find that foreign investors play a significant role by being not only the second largest trading proportion in the market, but also be a sentiment driver too. With the recent finding from De Vault et al., (2019), institutional investors were the one who trade on sentiment, not retail investors. An interesting question is whether Domestic institutional investors in Thailand behave as De Vault et al.'s, (2019) conclusion or not.

Our objective is to understand local institutional investors' trading behavior represented by mutual funds which investment policy are focus on equity and mixed financial assets. We use both aggregate and individual fund data. We explore aggregate data by starting on a simple but meaningful dataset, the net trading value ratio. Our first hypothesis, based on Chuthanondha et al., (2015), examine which types of investors in Thai stock markets is correlated with the sentiment index. There are four main types of investors in Thailand stock markets, including domestic retail investors, domestic institutional investors, domestic proprietary traders, and foreign investors.

Hypothesis 1: There is no relationship between net investors' trading value ratio and the change of ISI.

Second hypothesis examines further about trading behavior of domestic institutional investors. As we discussed earlier, this study would only focus on active equity funds and active mixed funds. Active fund managers are human being with decisions that could be influenced by changes in market sentiment. Following the methodology devised by De Vault et al., (2019), the change in ownership level of every stock in a fund's portfolio is constructed to capture overall trading patterns. As Baker and Wurgler (2006) suggested, the risk profile of a stock also affects the decisions of fund managers due to changes in their sentiment. So, we divided the stocks into 3 groups based on their 90-days daily return volatility. Their trading behavior is defined as the average change in ownership level. We then examine the correlation between the change in ownership level of each group and the change of the ISI.

Hypothesis 2: There is no relationship between the average change in ownership level and the change of the ISI.

As an emerging market, both foreign and institutional investors significantly influence the market. Since Chuthanondha et al., (2015) show the evidence that foreign investors have an influence on Thai market sentiment. The question is whether domestic institutional investors also have an influence on market sentiment if there were a relationship between trading behavior and the ISI according to Hypothesis 2, what kind of the relationship would it be? Do domestic institutional investors influence the market sentiment? And are they influenced by the sentiment at the same time? A causality test is used to explain the cause and the effect of such a relationship. This hypothesis therefore examines the relationship between the change in ownership level of each stock volatility group and the change of the ISI.

Hypothesis 3: There is no causality effect between domestic institutional investors' trading behavior and the change of ISI index.

To prove that the relationship between domestic institutional investors' trading behavior and the ISI is not a spurious one, we use a cointegration test. This hypothesis examines only between domestic institutional demand shock in risky stocks of all 384 funds ($\overline{InstDS}_t^{f,\sigma^{H-L}}$) and the change of the ISI.

Hypothesis 4: There is no cointegration effect between domestic institutional demand shock in risk stocks and the change of the ISI.

Our last hypothesis, Baker and Wurgler (2006) confirm that the sentiment index influenced stocks' return. Chuthanondha et al., (2015) also confirm that ISI has a potential to predict Thailand stock markets' excess return. If domestic institutional investors' trading behavior has a relationship with the ISI, then could their trading behavior predict the SET index excess return as well?

Hypothesis 5: Domestic institutional investors' demand shock in risky stocks could not predict the SET index's excess return.

3.2. Modeling

The empirical test of our study is based on methodologies used in Chuthanondha et al. (2015) and De Vault et al. (2019). Correlation, Granger-causality and Cointegration tests are our main methods to identify the relationships between domestic institutional in Thailand and Thailand sentiment index. Panel data are used since we can observe each of the 384 funds individually in every period over twelve quarters.

Hypothesis 1; Correlation

$$\rho(NTVR_m^v, lnISI_t^{\perp}) = 0 \quad (1)$$

By $NTVR_t^i$ is net trading ratio of investors v at time m

$lnISI_m^{\perp}$ is the change of the ISI at time m

Hypothesis 2; Correlation

$$\rho\left(\overline{\Delta Inst}_t^{f,\sigma}, \overline{\Delta ISI}_t^{\perp}\right) = 0 \quad (2)$$

By $\overline{\Delta Inst}_t^{f,\sigma}$ is the average change in ownership level in a group risk profile σ at time t of fund f

Hypothesis 3; Granger-causality

$$InstDS_t^{f,\sigma^{H-L}} = \sum_{m=1}^{n} \nu_m \overline{\Delta ISI}_{t-m}^{\perp} + \sum_{p=1}^{q} \tau_p \, InstDS_{t-p}^{f,\sigma^{H-L}} + \varepsilon_t \quad (3)$$

$$\overline{\Delta ISI}_t^{\perp} = \sum_{m=1}^{n} \nu_m InstDS_{t-m}^{f,\sigma^{H-L}} + \sum_{p=1}^{q} \tau_p \, \overline{\Delta ISI}_{t-p}^{\perp} + \varepsilon_t \quad (4)$$

By $InstDS_t^{f,\sigma^{H-L}}$ is institutional demand shock in risky stocks of fund f at time t

p, m are lag of periods

Hypothesis 4; Cointegration

$$InstDS_t^{f,\sigma^{H-L}} = \beta_0 + \beta_1 \overline{\Delta ISI}_t^{\perp} + \varepsilon_t \quad (5)$$

$$\widehat{\varepsilon_t} = InstDS_t^{f,\sigma^{H-L}} - \widehat{\beta_0} - \widehat{\beta_1} \overline{\Delta ISI}_t^{\perp} \quad (6)$$

Hypothesis 5; Regression

Model 1; $$lnExSET_{t+1} = \beta_0 + \beta_1 \overline{Senti}_t^{\perp} + \beta_2 lnExSET_t + \beta_3 \Delta VolP_t + \varepsilon_t \quad (7)$$

Model 2; $$lnExSET_{t+1} = \beta_0 + \beta_1 \overline{\Delta ISI}_t^{\perp} + \beta_2 lnExSET_t + \beta_3 \Delta VolP_t + \varepsilon_t \quad (8)$$

Model 3; $$lnExSET_{t+1} = \beta_0 + \beta_1 \overline{InstDS}_t^{All,\sigma^{H-L}} + \beta_2 lnExSET_t + \beta_3 \Delta VolP_t + \varepsilon_t \quad (9)$$

Model 4; $$lnExSET_{t+1} = \beta_0 + \beta_1 \overline{Senti}_t^{\perp} + \beta_2 \overline{\Delta ISI}_t^{\perp} + \beta_3 \overline{InstDS}_t^{All,\sigma^{H-L}} + \beta_4 lnExSET_t + \beta_5 \Delta VolP_t + \varepsilon_t \quad (10)$$

Model R1; $$lnExSET_{t+1} = \beta_0 + \beta_1 \overline{Senti}_t^{\perp} + \beta_2 \overline{sqSenti}_t^{\perp} + \beta_3 lnExSET_t + \beta_4 \Delta VolP_t + \varepsilon_t \quad (11)$$

Model R2; $$lnExSET_{t+1} = \beta_0 + \beta_1 \overline{Senti}_t^{\perp} + \beta_2 \overline{sqSenti}_t^{\perp} + \beta_3 \overline{\Delta ISI}_t^{\perp} + \beta_4 \overline{InstDS}_t^{All,\sigma^{H-L}} + \beta_5 lnExSET_t + \beta_6 \Delta VolP_t + \varepsilon_t \quad (12)$$

By $lnExSET_{t+1}$ is SET excess return at time $t+1$

$\overline{Senti}_t^{\perp}$ is ISI level at time t

$\Delta VolP_t$ is SET volatility premium

$\overline{sqSenti}_t^{\perp}$ is squared ISI level at time t

3.3. Data

3.3.1. Thailand sentiment index

As we mentioned earlier, the ISI is reported on a monthly basis. However, our main dataset, demand shock in risky stocks, is reported on a quarterly basis so the ISI must be converted

from monthly basis to quarterly basis. Quarterly ISI index ($\overline{Senti_t^{\perp}}$) was calculated from the average 3 month of monthly ISI index, showed in equation 13. Since we want to capture all the change of the sentiment throughout the period so that we calculated quarterly change of ISI ($\overline{\Delta ISI_t^{\perp}}$) by using average 3 monthly log return, shown in equation 14.

$$\overline{Senti_t^{\perp}} = \frac{Senti_m^{\perp} + Senti_{m-1}^{\perp} + Senti_{m-2}^{\perp}}{3} \tag{13}$$

$$\overline{\Delta ISI_t^{\perp}} = \frac{\left[ln\left(\frac{Senti_m^{\perp}}{Senti_{m-1}^{\perp}}\right) + ln\left(\frac{Senti_{m-1}^{\perp}}{Senti_{m-2}^{\perp}}\right) + ln\left(\frac{Senti_{m-2}^{\perp}}{Senti_{m-3}^{\perp}}\right)\right]}{3} \tag{14}$$

3.3.2. Net trading value ratio

Investors' trading value data is reported daily by SET. Annual and monthly basis data are available on SETSMART's website. Net investor trading value ratio ($NTVR_t^v$) is calculated from net trading value (NTV_t^v) divided by either absolute total investor buy value ($|TBV_t^v|$) or absolute total investor sell value ($|TSV_t^v|$) depending on which number is the highest on a monthly basis. The ratio is a positive value if it is divided by the total buy value, shown in Equation 15. On the other hand, the ratio is a negative value when it is divided by the total sell value, shown in Equation 16. v is type of investor.

$$NTVR_t^v = \left(\frac{NTV_t^v}{|TBV_t^I|}\right) \tag{15}$$

$$-NTVR_t^v = -\left(\frac{NTV_t^v}{|TSV_t^v|}\right) \tag{16}$$

3.3.3. Institutional demand shock in risky stocks

We constructed institutional investors' demand shock in risky stocks from the information of quarterly fund reports. The factor is calculated in three steps as follows. First, the stock ownership level is constructed by calculating the total number of shares held by a fund in period t divided by the total shares outstanding in period t, shown in equation 17. $OWNER_{i,t}^f$ is ownership level (%) of stock i in period t of fund f. $NSH_{i,t}^f$ is number of shares holding of stock i in period t by fund f. $SO_{i,t}$ is the number of shares outstanding of stock i in period t.

$$OWNER_{i,t}^f = \frac{NSH_{i,t}^f}{SO_{i,t}} \tag{17}$$

The second step is calculating the change in ownership level as shown in Equation 18. $\Delta OWNER_{i,t}^f$ is the change in ownership level in stock i in period t of fund f.

$$\Delta OWNER_{i,t}^f = ln\left(\frac{OWNER_{i,t}^f}{OWNER_{i,t-1}^f}\right) \tag{18}$$

Before going to the last step, we defined the risk profile of a fund as a volatility of 90-day daily return as discussed earlier. All of the stocks held by any fund in the period is ranked by its volatility. We plotted standard deviation of return of every stocks then we winsorized data by eliminating stocks that have absolute standard deviation of stock return higher than 0.06. Then the stocks are divided into three groups which are low-volatility: σ^L (percentile 0 - 30), neutral: σ^M (percentile 31 - 70) and high-volatility: σ^H (percentile 71 - 100). After being

classified by its risk profile, the average change in ownership level of each fund in the same risk profile is calculated in this last step, as shown in Equation 19. $\overline{\Delta Inst}_t^{f,\sigma}$ is the average change in ownership level in a group risk profile σ in time t of fund f. $n_{f,t}^{\sigma}$ is number of stocks in a group risk profile σ of fund f in time t.

$$\overline{\Delta Inst}_t^{f,\sigma} = \frac{\sum_{i_{f,t}^{\sigma}}^{n_{f,t}^{\sigma}} \Delta OWNER_{i^{\sigma},t}^{f}}{n_{f,t}^{\sigma}} \tag{19}$$

The institutional demand shock in risky stocks ($\overline{InstDS}_t^{f,\sigma^{H-L}}$) is calculated from the difference between the average change in ownership level between high- and low-volatility stocks group of each fund as shown in Equation 20.

$$\overline{InstDS}_t^{f,\sigma^{H-L}} = \overline{\Delta Inst}_t^{f,\sigma^{H}} - \overline{\Delta Inst}_t^{f,\sigma^{L}} \tag{20}$$

4. Results and discussion

An empirical approach of our study is developed from Chuthanondha et al. (2015) and De Vault et al. (2019). Correlation, causality and cointegration tests are main quantitative tools to identify the relationship between domestic institutional trading behaviors and the sentiment index in Thailand. Panel data of 384 funds on quarterly basis over three years are examined.

The results of correlation testing for *Hypothesis 1* are presented in Table I's panel A. As we expected, the change of total market trading value (lnTotalVal) is positively correlated with the change of ISI. All investors tended to trade more when their sentiment is good. Consistent with Chuthanondha et al. (2015), the net trading value ratio of foreign investors is positively correlated with the change of ISI. Unsurprisingly, domestic institutional investor's net trading value ratio is correlated with the change of ISI as what De Vault et al. (2019) found. However, the direction of our finding is negative which is really unexpected. It means that domestic institutional investors tend to buy more stocks when sentiment is expected to be lower than that in the previous period. This is opposite to foreign investors' action. Lastly, domestic retail investors' trading value is also correlated with the change of ISI in a negative direction. For the last two decades, both domestic institutional investors and domestic retail investors in Thailand behave in a similar way according to the change in market sentiment.

Table I. Correlation metric between trading value and the change of sentiment index

All data is in monthly basis. *** is P-value < 0.01. ** is P-vale < 0.05. * is P-value < 0.1. Local Inst = net trading value ratio of local institution. Prop Trade = net trading value ratio of proprietary trading investor. Foreign = net trading value ratio of foreign investor. Local Retail = net trading value ratio of local retail investor. TotalVal = ln(total market trading value in month T/total market trading value in month T-1). ChgISI = ln(ISI Index in month T/ ISI Index in month T-1). See net trading value ratio calculation method in section 3.3.2.

Panel A	January 2000 - December 2019 (Monthly)					
	Local Inst	Prop trade	Foreign	Local retail	lnTotalVal	lnISI
Local Inst	1.00	0.09	-0.66***	0.33***	-0.35***	-0.18***
Prop trade		1.00	-0.07	-0.08	0.05	0.05
Foreign			1.00	-0.86***	0.37***	0.20***
Local retail				1.00	-0.28***	-0.19***
lnTotalVal					1.00	0.38***
lnISI						1.00

Panel B	October 2016 - December 2019 (Monthly)					
	Local Inst	Prop trade	Foreign	Local retail	lnTotalVal	lnISI
Local Inst	1.00	-0.10	-0.51***	-0.08	-0.33**	-0.03
Prop trade		1.00	0.34**	-0.60***	0.13	0.25
Foreign			1.00	-0.74***	0.18	0.30*
Local retail				1.00	0.01	-0.35**
lnTotalVal					1.00	0.29*
lnISI						1.00

Regarding to our data constraint, we also run a robust correlation test by using the three-year monthly dataset from October 2016 to December 2019. Table I's panel B shows our findings. The quality of our results are similar to our full range data, the total market trading value also correlate with the change of ISI in the positive direction. Foreign and domestic retail investors' trading value is positively and negatively correlated to the change of ISI, respectively. Inconsistent with the prior results, domestic institutional investors' trading value is not correlated with the change of ISI. However, there is only the net trading value ratio of domestic institutional investors that correlates with the change of total trading value. Hence, domestic institutional investors' trading value is indirectly related with the change of the ISI via total market trading value.

Our first hypothesis confirms that three out of four investors' types in Thai stock market are associate with the change of sentiment index at an aggregate level, using the net trading value ratio. Domestic institutional and domestic retail investors are likely to behave in a same way, while foreign investors act in an opposite direction.

Table II. Correlation metric between the change of owner level in each stock risk profile group and the change of ISI index.

*** is P-value < 0.01. ** is P-vale < 0.05. * is P-value < 0.1. All data is in quarterly basis from 3Q2016 to 3Q2019. Low vol. stocks (Low σ) is the average change of the ownership level of low-volatility stocks. High vol. stocks (High σ) is the average change of the ownership level of high-volatility stocks. High σ – low σ is the difference between average c high-volatility and low-volatility or institutional demand shock in risk stocks ($\overline{InstDS}_t^{f,\sigma^{H-L}}$). Section 3.3.3. show the calculation method.

Risk profile	$\rho(\overline{\Delta Inst}_t^{f,\sigma}, \overline{\Delta ISI}_t^{\perp})$		
	All Funds	**Equity Funds**	**Mixed Fund**
Low vol. stocks	0.4861	0.4798	0.3780
2	0.3495	0.4778	-0.1102
High vol. stocks	0.6466**	0.5752*	0.5893*
High σ – low σ ($\overline{InstDS}_t^{f,\sigma^{H-L}}$)	0.2274	0.0684	0.4511

Considering *Hypothesis 2*, according to Baker and Wurgler (2006) and De Vault et al. (2019), we expect the negative correlation of the average change in ownership level of low-volatility stocks, the positive correlation of the average change in ownership level of high-volatility stocks and the positive correlation of the difference between the average change in ownership level between high- and low-volatility stocks (denoted as *institutional demand shock in risk stocks*). After running our test on all funds data, only the correlation between high-volatility group and the change of ISI has a statistically significant correlation, positive sign is shown. These results are consistent with the findings of De Vault et al. (2019). Institution investors buy risky stocks when the sentiment is rising. For the low-volatility group,

the correlation showed a positive sign which was against De Vault et al. (2019), however, the results are insignificant. Lastly, correlation between the institutional demand shock in risky stocks and the change of Thailand sentiment index is statistically insignificant with a positive sign.

As discussed earlier, we categorized funds into two groups which are equity and mixed funds. Since their policies are different, we expect to see a diverse result. However, both of them produce a similar result. The positive correlation appears in all volatility groups, but only that in the high-vola group is statistically significant. In conclusion, we can confirm that trading behavior of domestic institutional investors in Thailand is correlated with Thailand sentiment index. They tended to buy high-volatility stocks when the sentiment has risen. Table II shows all the test results.

Since *Hypothesis 2* confirm the relationship between domestic institutional investor's trading behavior and the ISI, *Hypothesis 3* examine the characteristic of the relationship between them. We used Granger-causality test to explain the cause and effect of these finding relationships. Since our dataset is panel data, we follow Dumitrescu and Hurlin (2012)'s panel Granger-causality method.

Table III presents the result of this testing. We find a causality effect between domestic institutional investors' trading behavior and the change of sentiment index. Focusing on the institutional demand shock in risky stocks ($\overline{InstDS}_t^{f,\sigma^{H-L}}$), *High σ – low σ,* there are two-way relationships for all groups of funds. The signs of z-statistic are mostly positive which means that when sentiment index rises, it causes domestic institutional investors to buy high-volatility stocks more than low-volatility stocks. Conversely, when domestic institutional investors buy high-volatility stocks more than low-volatility stock, it causes the ISI to rise. Our conclusion was that trading behavior of domestic institutional investors is caused by the change of the sentiment. At the same time market sentiment is also influenced by domestic institutional investors' trading behavior. When institutional investors trade, their trades size is relatively large which easily influence the market. However, in Thailand, foreign investors are the most important player in the market. Their fund is immense so that their trade leads the market both price and sentiment. That's why domestic institutional investors be influenced.

Table III. Result of panel Granger causality testing (Dumitrescu and Hurlin, 2012)

$\Delta\overline{ISI}_t \sim \Delta Inst_t$ means the change of Thailand sentiment index (ISI index) caused by the change of ownership level (or demand shock in risky stocks when we consider High σ – low σ group). $\Delta Inst_t \sim \Delta\overline{ISI}_t$ mean the change of ownership level (or demand shock in risky stocks when we consider High σ – low σ group) caused by the change of Thailand sentiment index (ISI index). The value in the table is a standardize statistic recommended by Dumitrescu and Hurlin (2012). *** is P-value < 0.01. ** is P-vale < 0.05. * is P-value < 0.1. All data is in quarterly basis, 3Q2016 to 3Q2019. High σ – low σ is the different between high-volatility and low-volatility or institutional demand shock in risk stocks ($\overline{InstDS}_t^{f,\sigma^{H-L}}$). Section 3.3.3. show the calculation method.

	All Funds		Equity Funds		Mixed Funds	
	$\Delta Inst_t^{\sigma} \sim \Delta ISI_t$	$\Delta ISI_t \sim \Delta Inst_t^{\sigma}$	$\Delta Inst_t^{\sigma} \sim \Delta ISI_t$	$\Delta ISI_t \sim \Delta Inst_t^{\sigma}$	$\Delta Inst_t^{\sigma} \sim \Delta ISI_t$	$\Delta ISI_t \sim \Delta Inst_t^{\sigma}$
High σ – low σ	8.90***	74.95***	-1.70*	32.05***	3.35***	16.08***

Table IV. Result of panel cointegration testing (Pedroni, 1999)

All data is in quarterly basis from 3Q2016 to 3Q2019. Pedroni (1999) suggested 7 tests for panel data cointegration. The first 4 method is a within-dimensions-based statistics simply as panel cointegration statistics, the other three are between-dimensions-based statistics as group mean panel cointegration. Compare the empirical value to critical value (m = 2 or 2 regressors), if empirical value higher (for nipanel) or lower (other six testing methods) than the critical value which suggest by the theory the accept H1. H0; No cointegration. Our research used only ADF t-statistics of panel regression (tpanelpar) to test our hypothesis. We tested institutional demand shock in risky stocks of all funds with the change of Thailand sentiment index (ISI index).

Cointegration ($\overline{InstDS}_t^{All\ fund,\sigma^{H-L}}, \overline{\Delta ISI}_t^{\perp}$)				
	Testing Methods	Empirical	Standardized	Critical Value (2)
nipanel	Variance Ratio statistics	6.82	-12.49	> 6.982
rhopanel	Philips and Perron rho-statistics	-196.77	-10.93	< -6.388
tpanelnonpar	Philips and Perron t-statistics	-68.85	-32.39	< -1.662
tpanelpar	Augmented Dickey Fuller t-statistics	-2,540.23	-2011.72	< -1.662
rhogroup	Philips and Perron rho-statistics	-196.25	-4.21	< -9.889
tgroupnonpar	Philips and Perron t-statistics	-69.22	-43.67	< -1.992
tgrouppar	Augmented Dickey Fuller t-statistics	-65.64	-39.22	< -1.992

The results of *Hypothesis 4* support a non-spurious relationship between our main dataset, the institutional demand shock in risky stocks ($\overline{InstDS}_t^{f,\sigma^{H-L}}$) and Thai sentiment index. Similar to our previous test, the dataset is panel data, we run panel cointegration by using "PCO" package in R programing which was constructed by Georgi Marinov (2015) based on Pedroni (1999). Table IV shows the results of panel cointegration testing. This testing method consists of seven test statistics and the critical values were suggested by Pedroni (1999). However, our study focuses on Augmented Dickey Fuller test (denote as *tpanelpar* which is called by the PCO package). We compared a standardized value with critical value. The standardized value is -2,011 which is lower than -1.662 of the critical value, hence H1 is accepted. The testing result confirms the cointegration between institutional demand shock in risky stocks and the change of ISI. Thus, the relationship between the two is concrete.

Lastly, *Hypothesis 5* examines the predictive power of our main factor "*institutional demand shock in risky stocks*" on SET index's excess return over the three-month Thailand government bills using random effect panel regression.

Table V. Random effect panel regression

*** is P-value < 0.01. ** is P-vale < 0.05. * is P-value < 0.1. All data display in quarterly basis, 3Q2016 to 3Q2019. $\overline{Senti}_t^{\perp}$ is Thailand sentiment index (ISI index). $\overline{sqSenti}_t^{\perp}$ is the square value of Thailand sentiment index (ISI index). $\overline{\Delta ISI}_t^{\perp}$ is the change of Thailand sentiment index (ISI index). $\overline{InstDS}_t^{All\ Fund,\sigma^{H-L}}$ is institution (all 384 funds data) demand shock in risky stocks. $lnExSET_{t-1}$ is SET Index quarterly return over 3-month Thailand Government bond. $\Delta VolP_t$ is volatility premium. Model1; $lnExSET_{t+1} = \beta_0 + \beta_1\overline{Senti}_t^{\perp} + \beta_2 lnExSET_t + \beta_3\Delta VolP_t + \varepsilon_t$. Model2; $lnExSET_{t+1} = \beta_0 + \beta_1\overline{\Delta ISI}_t^{\perp} + \beta_2 lnExSET_t + \beta_3\Delta VolP_t + \varepsilon_t$. Model 3; $lnExSET_{t+1} = \beta_0 + \beta_1\overline{InstDS}_t^{All,\sigma^{H-L}} + \beta_2 lnExSET_t + \beta_3\Delta VolP_t + \varepsilon_t$. Model 4; $lnExSET_{t+1} = \beta_0 + \beta_1\overline{Senti}_t^{\perp} + \beta_2\overline{\Delta ISI}_t^{\perp} + \beta_3\overline{InstDS}_t^{All,\sigma^{H-L}} + \beta_4 lnExSET_t + \beta_5\Delta VolP_t + \varepsilon_t$. Model R1; $lnExSET_{t+1} = \beta_0 + \beta_1\overline{Senti}_t^{\perp} + \beta_2\overline{sqSenti}_t^{\perp} + \beta_3 lnExSET_t + \beta_4\Delta VolP_t + \varepsilon_t$. Model R2; $lnExSET_{t+1} = \beta_0 + \beta_1\overline{Senti}_t^{\perp} + \beta_2\overline{sqSenti}_t^{\perp} + \beta_3\overline{\Delta ISI}_t^{\perp} + \beta_4\overline{InstDS}_t^{All,\sigma^{H-L}} + \beta_5 lnExSET_t + \beta_6\Delta VolP_t + \varepsilon_t$.

Coefficient	Model 1	Model 2	Model 3	Model 4	Model R1	Model R2
Intercept	-0.4068*	-3.2553***	-2.5095***	-7.9540***	-5.4811***	-9.0613***
$\overline{Senti}_t^{\perp}$	-0.0607***			0.1336***	0.2737***	0.2102***
$\overline{sqSenti}_t^{\perp}$					-0.0046***	-0.0011**
$\overline{\Delta ISI}_t^{\perp}$		14.6239***		19.5755***		19.3220***
$\overline{InstDS}_t^{All,\sigma^{H-L}}$			-0.6508***	-0.6630***		-0.6633***
$lnSET_t$	-0.6807***	-1.2359***	-0.7275***	-1.4925***	-0.7117***	-1.4890***
$\Delta VolP_t$	0.1337***	0.2702***	0.1581***	0.3527***	0.1081***	0.3437***
R-Squared	32.37%	48.07%	33.01%	53.33%	33.77%	53.41%
Adj.R-Squared	32.32%	48.03%	32.96%	53.27%	33.71%	53.33%

The results are demonstrated in Table V. In a similar fashion to Chuthanondha et al. (2015), our test uses same factors but on a quarterly basis instead of a monthly basis as shown in Model 1. The negative coefficient, -0.0607, of Thailand sentiment index ($\overline{Senti}_t^{\perp}$) is in accordance with Chuthanondha et al. (2015)'s finding. The higher sentiment level, the lower market return in the next period. Model 2 shows a positive coefficient, 14.62, of the change of ISI ($\overline{\Delta ISI}_t^{\perp}$). Market excess return rises in the next period when the sentiment index at the end of period is higher than at the beginning of period. Even though the theory suggests a higher return for only high-risk stocks when the sentiment index is low in the beginning of the period (Baker & Wurgler, 2006), it is possible that the market excess return increases due to a lower risk aversion (Forgas, 1995) and mispricing (De Long et al.,1990). In Model 3, we test our main dataset, institutional demand shock in risky stocks ($\overline{InstDS}_{t-1}^{All,\sigma^{H-L}}$). As expected, our factor can predict the SET index excess return. The result is surprising because of a negative coefficient, -0.65. When domestic institutional investors buy high-volatility more than low-volatility stocks, excess return would decrease in the next period. We believed that institutional investors employ the market timing strategy, since they are the first party who buy the stocks when they hit the bottom.

Lastly, we considered all three factors in Model 4, Thailand sentiment index ($\overline{Senti}_t^{\perp}$), The change of sentiment index ($\overline{\Delta ISI}_t^{\perp}$) and institutional demand shock in risky stocks ($\overline{InstDS}_{t-1}^{All,\sigma^{H-L}}$). Only the sign of the coefficient of $\overline{\Delta ISI}_t^{\perp}$ had changes from negative to positive. This result is against most theories. The value of ISI is low throughout our testing period, with the highest value at 62, which is still relatively low. The value above 70 is considered to be a high sentiment. Moreover, we believed there is a non-linear relationship between the ISI and the market return, so we constructed the squared value of ISI ($\overline{sqSenti}_t^{\perp}$). We also include the squared value of sentiment index in Model 1 and Model 4.

As expected, the squared value of the sentiment shows the negative coefficient in Model R1, -0.0046, and Model R2, -0.0011. These results confirmed the non-linear relationship and the explanatory power of the high value of ISI. Nevertheless, the coefficient of ISI index still has a positive sign.

5. Conclusions and recommendations

It is important to understand the impact of market sentiment on market participant' trading behaviors. Still on going, the argument between conventional and behavioral finance regarding whether or not investors are rational. Especially institutional investors who are recognized as rational investors for a long time, meanwhile retail investors are irrational and driven by the sentiment. However, De Vault et al., (2019) report the evidence that change the primal perception, institutional investors are sentiment trader instead of retail investors. Our study focuses only on Thai stock market, one of the most attractive emerging stock markets in the world. First, we examine the relationship between investors type and the Thailand sentiment index. By using aggregate data, net trading value, 3 of 4 investors type in Thailand have relationship with the sentiment index which are foreign investors, local retail investors and local institutional investors. We followed De Vault et al., (2019) method to construct a proxy, institutional demand shock in risky assets, which can help to understand their trading behavioral. We find that institutional investors tend to buy high-risk stocks rather than low-risk stocks when the sentiment is rising.

Institutional investors have played an important role in a capital market, no exception for Thai stock market. Nevertheless, for an emerging markets foreign investor are also equally important. Since Chuthanondha et al. (2015) report that foreign investor is one of the sentiment

proxies for Thai stock market, we expect that local institutional investors can potentially be too. The results of causality test confirm the two-way relationship. Not only domestic institutional trading behaviors are influenced by the change of the sentiment index but at the same time influence the change of the sentiment index. To support our findings, we run cointegration test to affirm that there is no spurious relationship between our main data set and the change of ISI index, and it is.

Lastly, we examine the probability that domestic institutional trading behaviors can potentially predict Thai stock market return. As we expected, institutional demand shock in risky stocks can predict market return. Coefficient is negative so when they buy high-risk more than low-risk, market return decline.

To sum up, most investors in Thailand are likely to be influenced by the change in the market sentiment. Align with De Vault et al. (2019) findings, these investors include domestic institutional investors. However, our conclusions are made during our short study period and cannot claim that domestic institutional investors are pure sentiment traders. Moreover, in this study, we do not intend to measure their investment performance. Given that their decisions are driven by sentiment, they can either outperform or underperform the market. Most importantly, a chance of domestic institutional investors in Thailand to execute their trades irrationally is higher than what conventional theory suggested.

Although, our findings confirm some irrationality of domestic institutional investors' trading behaviors, there are some limitations in our study. First, due to the short-time horizon funds' data, our conclusions can examine their trading behaviors only for the period of 2016 to 2019. Second, the frequency of the funds' data used in this study is on quarterly basis which is too long. Monthly data is more desirable since it can better capture their portfolio movement driven by the sentiment. Lastly, our sample size is a bit too small. Only 384 funds' data are used, represent around 54% of domestic institutional investors in Thailand.

We hope this research is useful to other researchers whose are interested in investor sentiment in emerging markets including Thailand. Simple way to build on our study is to acquire sufficient historical funds' data on monthly basis and explore other sentiment factors which can affect investors' trading behavior. Moreover, our empirical test of market excess return is based on Chuthanondha et al.'s, (2015) equation. There are other models that used to determine the market excess return. Lastly, since we find that domestic institutional investors trade by sentiment, do they perform well? This is also an interesting question.

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