

Investor trading volume, stock market return and volatility



Mr. Tossapon Wilaiprapakorn

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

An Independent Study Submitted in Partial Fulfillment of the
Requirements

for the Degree of Master of Science in Finance

Department of Banking and Finance

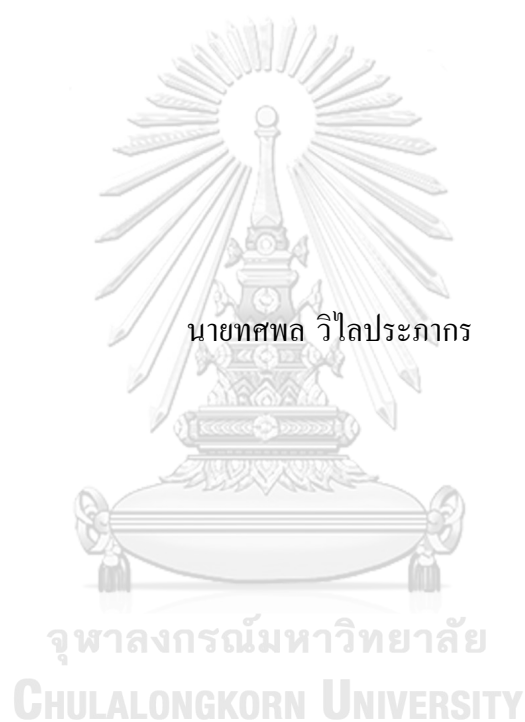
FACULTY OF COMMERCE AND ACCOUNTANCY

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By	Mr. Tossapon Wilaiprapakorn
Field of Study	Finance
Thesis Advisor	Assistant Professor ROONGKIAT RATANABANCHUEN, Ph.D.

Accepted by the FACULTY OF COMMERCE AND ACCOUNTANCY,
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INDEPENDENT STUDY COMMITTEE

..... Chairman
()

..... Advisor
(Assistant Professor ROONGKIAT RATANABANCHUEN, Ph.D.)

..... Examiner
(Assistant Professor RUTTACHAI SEELAJAROEN, Ph.D.)

..... Examiner
(Assistant Professor NATHRIDEE SUPPAKITJARAK, Ph.D.)



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CHULALONGKORN UNIVERSITY

ทศพล วิไลประภากร : -. (Investor trading volume, stock market return and volatility) อ.ที่ปรึกษาหลัก : ผศ.รุ่งเกียรติ รัตนบานชื่นPh.D.

This research studies the impact of trading volumes from each investor group on the return of the stock market return and volatility of the Thai stock market. It is considered in terms of economic factor and trading behavior of investor that affect to trading volume. It can be addressed as the following four main questions 1) Effect of trading volume due to economic factors to market return. 2) Effect of trading volume due to economic factors to market volatility. 3) Effect of trading volume from investor behavior to market return. 4) Effect of trading volume from investor behavior to market volatility.

The overall empirical results from linear regression between 2000 – 2018. Net trading volume of four investor types have been affected from two economic factors; 10yr government bond yield and nominal effective exchange rate. With effect from economic factors, net trading volume of proprietary traders have significant relation to market return. Only net trading volume of foreign investors have positive relation to market volatility. Based on investor behavior, no type of investor affects to market return and volatility



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ลายมือชื่อนิติ

ปีการศึกษา 2562

ลายมือชื่อ อ.ที่ปรึกษาหลัก

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Abstract

This research studies the impact of trading volumes from each investor group on the return of the stock market return and volatility of the Thai stock market. It is considered in terms of economic factor and trading behavior of investor that affect to trading volume. It can be addressed as the following four main questions 1) Effect of trading volume due to economic factors to market return. 2) Effect of trading volume due to economic factors to market volatility. 3) Effect of trading volume from investor behavior to market return. 4) Effect of trading volume from investor behavior to market volatility.

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1.Introduction

1.1Background, Significance of the Problem and Objective

The Stock Exchange of Thailand reports daily trading volume by investors. Investors in Thailand are divided into 4 types, institutional investors, proprietary traders, foreign investors and individual investors. Each type of investor is an important mechanism of the Thailand stock market because each type of investor has different trading volume and different investment characteristics which cause the market fluctuation.

There are four types of investor in Thailand stock market. First, institutional investors mostly are financial institution e.g., Bank of Thailand, Commercial bank, Social Security Fund, Mutual funds which have proportion of trading volume around 11% . Second, proprietary traders are the traders of brokerage firm who have proportion of trading volume around 12% . Third, foreign investors are like institutional investors from foreign country who have the proportion of trading volume around 34% . Fourth, individual investors having the largest trading volume proportion around 43% are retail investors residential in Thailand.

Trading volume of investors is expected to come from 3 factors which are macroeconomic factors, specific factors of business and investor behavior. Macroeconomic factors cannot be eliminated through risk diversification. They consist of interest rate, inflation, exchange rate. Specific factors of business or industry such as business risk, liquidity risk can be eliminated by diversification. In this report, I use trading data of SET Index which already eliminated the specific factors of securities. Therefore, there are 2 factors existing to test the effect to market return and volatility.

In regard to effect of economic factors to market return, Previous research mentioned that economic factors have an impact to market movement. Chen, et al. (1986) found that the industrial production, unanticipated change in the risk premium,

unanticipated inflation, and, a slightly weaker, the unanticipated change in term structure, are the most important factors affecting expected stock returns.

Variables used by Chen, et al. (1986) in their notable study on U.S. stock returns include industrial production, inflation, risk premium, term structure, market index, consumption and oil prices. The authors found that the industrial production, unanticipated change in the risk premium, unanticipated inflation, and, a slightly weaker, the unanticipated change in term structure, are the most important factors affecting expected stock returns. Unanticipated inflation and change in expected inflation show particularly high significance in the period of highly volatile inflation.

In regard to effect of trading behavior to market return, the previous studies show that trading of each investor type have the different effect to market return. Hsieh (2013) investigated herding on individual and institutional investors in Taiwan Stock Exchange. It was observed that institutional herding behavior has overcome the individual herding behavior. Especially with the uncertainty conditions in markets, it was seen that buying behavior of institutional investors intensively displayed herding. Yet, individual investors lost money due to herding behavior while institutional investors generated returns.

This overlaps with the finding of Chang et al. (2012) that institutional investors exhibited rational herding behavior, whereas individual investors displayed irrational herding. Similar to other research findings, Hsieh (2013) asserted that institutional investors displayed information-driven herding behavior.

Proprietary traders are found to follow persistent trading strategies which lead to good short-term performance. Kamesaka et al.(2003) find that proprietary traders on Taiwan Stock Exchange are good market timer.

Foreign investment capital is the second largest in Thai stock market. Kamesaka et al.(2003), Choe et al.(1999) concluded that foreign investors have a significant role in moving the stock market up and down by herding on the same trends of market and act as free riders. Therefore, if they trade by herding, it has significant impact to market movement.

In regard to effect of trading behavior to market volatility, the previous studies show that trading style of investors is a significant factor that affect volatility of the stock market. Trading style can be divided into momentum strategy and contrarian strategy. There are studies about impact of trading styles to market volatility. De Long et al. (1990) develop a model that shows positive feedback trading (momentum trading) increases stock return volatility. Avramov et al. (2006) present evidence that contrarian trading reduces volatility and momentum trading increases volatility.

From previous studies, institutional investors have been found that they have herding behavior which may lead to use momentum strategy on trading. Lakonishok et al. (1992), Nofsinger and Sias (1999), Griffin et al. (2003), and Cai and Zheng (2004) find United States institutional investors follow momentum trading patterns.

For proprietary traders, they are employed by financial institution to generate daily return. They are restricted by the policies to hold the securities overnight to prevent the risk during non-trading period. To make profit day by day, they are expected to use momentum strategy in trading. Bae et al. (2006) find weak evidence that Japanese proprietary traders follow momentum strategies, and do not reach a conclusion regarding their trading patterns.

Due to the large investment capital, foreign investors cannot trade all position in one time because of liquidity problem. Their trading strategy would gradually buy or sell that result in stock price to move along with fund flow. Foreign investors are found to follow momentum trading strategies, especially in emerging markets, with foreign inflows predicting positive future returns in the markets receiving the cash inflows (Froot et al., 2001). Lin and Swanson (2003) find that foreign investors in Taiwan employ momentum strategies whereby they buy past winners and sell past losers. Richards (2005) finds strong evidence that foreign investors engage in momentum trading in six Asian emerging equity markets. Choe et al. (1999), Grinblatt and Keloharju (2000), and Kamesaka et al. (2003) provide an information-based explanation of the momentum trading pattern of foreign investors.

For individual investors, Barber et al. (2007) examined the disposition effect (the tendency of selling assets which are already increasing in volume sooner and of holding those whose prices are decreasing.). Thus, this effect has been seen among individual investors while it has not appeared among individual and foreign

institutional investors. Therefore, individual investors tend to be contrarian traders who always trade against the major trend.

1.2 Objective of The Study

Since previous research is a test to find the behavior of each investor group from trading volume. From my perspective, trading volume of investors come from 3 factors which are macroeconomic factors, specific factors of business and investor behavior. Since I use trading data of SET index to test the hypothesis, it is already diversified to eliminate specific factors of business. Hence, this test considers only two main factors which are macroeconomic factors and investor behavior about how these factors affect to market return and volatility.

2.Literature Review

2.1 Concept, Theory and Relevant Research

Trading volume of investors is expected to come from 3 factors which are macroeconomic factors, specific factors of business and investor behavior. Macroeconomic factors cannot be eliminated through risk diversification. They consist of interest rate, inflation, exchange rate. Specific factors of business or industry such as business risk, liquidity risk can be eliminated by diversification. In this report, I use trading data of SET Index which already eliminated the specific factors of securities. Therefore, there are 2 factors existing to test the effect to market return and volatility.

Effect from economic factors to market return

Economic factors are used to test the relationship with the trading volume of investors. Consumer price index (CPI) is a representative of inflation. Mild positive inflation will be good for the economy. Production index (PI) is a representative of producer in the market. The growth from PI indicates that economy is still growing. It can be interpreted that the economy is in expansion period. 10-year government bond is used by government to control money supply. Nominal effective exchange rate is an indicator of a country's international competitiveness in terms of the foreign

exchange market. The rising NEER means that baht depreciating when compared to foreign currency. Thailand would get benefits from THB depreciation because export and tourism are the main portion of Thailand's GDP.

Previous research mentioned that economic factors have an impact to market movement. Chen, et al. (1986) found that the industrial production, unanticipated change in the risk premium, unanticipated inflation, and, a slightly weaker, the unanticipated change in term structure, are the most important factors affecting expected stock returns.

Variables used by Chen, et al. (1986) in their notable study on U.S. stock returns include industrial production, inflation, risk premium, term structure, market index, consumption and oil prices. It is found that the industrial production, unanticipated change in the risk premium, unanticipated inflation, and, a slightly weaker, the unanticipated change in term structure, are the most important factors affecting expected stock returns. Unanticipated inflation and change in expected inflation show particularly high significance in the period of highly volatile inflation.

Bodurtha, Cho and Senbet (1989) expanded the work of Chen, et al. (1986) by including international factors. First, they replicated the Chen-Roll-Ross (CRR) analysis by using five CRR domestic factors: anticipated inflation, term premium, U.S. junk bond premium, inflation and the industrial production growth. Only industrial production showed as significant, but a shorter sample period was used than in CRR. Moreover, mentioned domestic factors were enlarged with five international factors: domestic country stock return index, the rest-of-the-world industrial production growth, the rest-of-the-world stock return index, the rest-of-the-world bond return index and the oil price. The inclusion of international factors gave better results than the solely domestic case, since more factors, precisely, the rest-of-the-world industrial production growth, domestic industrial production growth and the rest-of-the-world bond returns turned to be significant.

Trading behavior perspective

The previous studies show that trading behavior of each investor type have the different effect to market return. Hsieh (2013) investigated herding on individual and institutional investors in Taiwan Stock Exchange. It was observed that institutional

herding behavior has overcome the individual herding behavior. Especially with the uncertainty conditions in markets, it was seen that buying behavior of institutional investors intensively displayed herding. Yet, individual investors lost money due to herding behavior while institutional investors generated returns. This overlaps with the finding of Chang et al. (2012) that institutional investors exhibited rational herding behavior, whereas individual investors displayed irrational herding. Similar to other research findings, Hsieh (2013) asserted that institutional investors displayed information-driven herding behavior.

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Trading strategy to market volatility

For volatility perspective, the previous studies show that trading style of investors is a significant factor that affect volatility of the stock market. Trading style can be divided into momentum strategy and contrarian strategy. There are studies about impact of trading styles to market volatility. De Long et al. (1990) develop a model that shows positive feedback trading (momentum trading) increases stock return volatility. Avramov et al. (2006) present evidence that contrarian trading reduces volatility and momentum trading increases volatility.

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2.2 Research Hypothesis and Conceptual Framework

The paper examines how net buy/sell from each investor type affect to market volatility in order to determine net buy/sell from which type increase/decrease the market volatility. As institutional and foreign investors are a group that has large asset under management. In addition, they have the tools and analysts to analyze economic. Therefore, it is expected that trading volume from institutional and foreign investors with effect from economic factors will have a positive effect on market return.

Proprietary traders are investors who have day-by-day trading behavior. Therefore, it is expected that economic factors will not be used for investment decisions. For individual investors, their investment process is done individually. Furthermore, they cannot access to the advanced tool and information as fast as other

type of investors. On average, individual investors cannot consider economic factor as part of investment decision.

H1: Effect of trading volume from institutional investors to market return.

H1.1: With economic factors, it is expected that net trading volume from institutional investors will have positive relation to market return due to analysis skill.

H1.2: With investor behaviors, it is expected that net trading volume of institutional investors will have positive relation to market return due to herding behavior.

H2: Effect of trading volume from proprietary traders to market return.

H2.1: With economic factors, it is expected that net trading volume from proprietary traders is insignificant to market return because of day-by-day trading behavior.

H2.2: With investor behaviors, it is expected that net trading volume of proprietary traders will have positive relation to positive market return because they are a good market timer.

H3: Effect of trading volume from foreign investors to market return.

H3.1: With economic factors, it is expected that net trading volume from foreign investors leads to positive market return due to analysis skill.

H3.2: With investor behaviors, it is expected that net trading volume of foreign investors leads to positive market return due to herding behavior.

H4: Effect of trading volume from individual investors to market return.

H4.1: With economic factors, it is expected that net trading volume from individual investors is insignificant to market return due to lack of analysis skill.

H4.2: With investor behaviors, it is expected that net trading volume of individual investors leads to negative market return due to lack of herding behavior.

H5: Effect of trading volume from institutional investors to market volatility.

H5.1: With economic factors, it is expected that net trading volume from institutional investors leads to positive market volatility due to analysis skill.

H5.2: With investor behaviors, it is expected that net trading volume of institutional investors leads to positive market volatility due to herding behavior.

H6: Effect of trading volume from proprietary traders to market volatility.

H6.1: With economic factors, it is expected that net trading volume from proprietary traders is insignificant to market volatility because of day-by-day trading behavior.

H6.2: With investor behaviors, it is expected that net trading volume of proprietary traders leads to positive market volatility because they use momentum strategy.

H7: Effect of trading volume from foreign investors to market volatility.

H7.1: With economic factors, it is expected that net trading volume from foreign investors will have positive relation to market volatility due to analysis skill.

H7.2: With investor behaviors, it is expected that net trading volume of foreign investors will have positive market volatility due to herding behavior.

H8: Effect of trading volume from individual investors to market volatility.

H8.1: With economic factors, it is expected that net trading volume from individual investors is insignificant to market volatility due to lack of analysis skill.

H8.2: With investor behaviors, it is expected that net trading volume of individual investors leads to negative market volatility because they use contrarian strategy and lack of herding behavior.

3. Data

In order to test how trading volume from each investor type affect to the market volatility, my paper applies the monthly data of net trading volume from each investor type and data of historical monthly trading of SET index such as open price, close price, high price and low price. The data of SET index are used to estimate the monthly volatility of SET index. The trading data of each group of investors are retrieved from the SETSMART. The historical trading data of the SET index are retrieved from Bloomberg and used to find market volatility. Moreover, there are 4 economic factors such as CPI, 10-Year Government bond yield, production index and nominal effective exchange rate. These data are retrieved from Reuter Refinitive in monthly basis as well.

The data are collected since Jan 2000 to May 2019. The reason for selecting the sampling period of 19 years is that it has the significant change of trading volume and proportion of each investor type. In 2000, the largest trading volume come from individual investors accounting for 70% of total trading volume. The second is foreign investors accounting for 24% of total trading volume. The third and the fourth are institutional investors and brokerage accounts which are accounting. for 4% and 1% respectively. In 2019, individual investors are still the largest trading volume with less proportion 43% of total trading volume. The second is foreign investors accounting for 34 % of total trading volume. The third and the fourth are brokerage accounts and institutional investors which are accounting for 12% and 11% respectively. The reason to use the data during 19 years period because it passed through many crucial events such as 911 World trade center, coup d'etat, intervention from BOT, Hamburger crisis and quantitative easing from around the world which makes higher liquidity to financial market.

Descriptive statistic

The monthly data from January 2000 to May 2019 consists of 232 months. Table 1 reports the descriptive statistic represented the mean, median, standard deviation, maximum and minimum. Table 2 shows the distribution of trading volume of each investor type. Table 3 shows the correlation matrix of trading volume of each

investor type. Lastly, table 4 and table 5 show statistics of economic factors and economic factors change year over year respectively.

Table 1 Descriptive statistic of raw data

Variable	Obs	Mean	Std.Dev.	Min	Max
Return	232	0.73%	6.32%	-30.18%	23.62%
Volatility	233	5.10%	3.09%	0.00%	19.56%
Net_volume_Inst	233	2220.8	9047.6	-24457.7	34095.0
Net_volume_Prop	233	160.6	2980.6	-14333.7	10523.1
Net_volume_Foreign	233	-1649.9	19739.7	-64299.2	74815.9
Net_volume_Individual	233	-731.4	16192.1	-50776.3	50865.3

According to the Table1, the average market return during 232 months is still positive 0.73% per month. From the four types of investor, there are 2 types of investors which are net buyer on average. Institutional investors have average of trading volume 2,220 MBt. Proprietary traders have average of trading volume 160 MBt. There are 2 types of investors which are net seller on average. Foreign investors have average of trading volume -1,649 MBt. Individual investors have average of trading volume -731 MBt.

Table 2 Distribution of trading volume of each investor type

Min	Max	Inst			Prop			Foreign			Ind		
		Return	SD	Frq	Return	SD	Frq	Return	SD	Frq	Return	SD	Frq
	-24458							-6%	7%		6%	4%	
								(0.63%)	(0.71%)	27	(0.61%)	(0.70%)	14
-24458	-19358	5%	3%					-1%	5%		5%	4%	
		(1.88%)	(0.47%)	2				(1.96%)	(1.15%)	6	(1.47%)	(0.83%)	6
-19358	-14258	2%	4%					-4%	7%		4%	3%	
		(1.34%)	(0.47%)	9				(2.52%)	(1.47%)	13	(0.58%)	(0.28%)	22
-14258	-9158	5%	4%		-4%	7%		-1%	5%		4%	3%	
		(1.28%)	(0.63%)	8	(2.01%)	(4.55%)	2	(1.86%)	(0.88%)	16	(0.49%)	(0.30%)	25
-9158	-4058	1%	5%		-4%	5%		0%	6%		5%	5%	
		(0.95%)	(0.46%)	32	(1.98%)	(0.96%)	9	(1.35%)	(0.64%)	26	(1.12%)	(0.47%)	28
-4058	1042	1%	6%		1%	6%		0%	5%		2%	6%	
		(1.08%)	(0.41%)	62	(0.53%)	(0.25%)	166	(0.60%)	(0.33%)	47	(1.03%)	(0.43%)	38
1042	6142	1%	5%		2%	4%		3%	4%		-2%	6%	
		(0.71%)	(0.42%)	50	(0.56%)	(0.33%)	46	(1.27%)	(0.49%)	31	(0.85%)	(0.45%)	40
6142	11242	0%	5%		3%	5%		5%	5%		-1%	6%	
		(1.00%)	(0.49%)	33	(0.70%)	(0.99%)	8	(0.99%)	(0.57%)	18	(0.71%)	(1.05%)	13
11242	16342	-1%	6%					4%	4%		-4%	5%	
		(1.33%)	(0.93%)	21				(1.13%)	(0.74%)	14	(2.40%)	(1.18%)	15
16342	21442	-1%	4%					2%	4%		-7%	9%	
		(1.19%)	(0.43%)	7				(0.97%)	(0.42%)	11	(1.29%)	(1.98%)	7
21442	26542	-4%	7%					5%	4%		-7%	7%	
		(1.46%)	(1.72%)	5				(0.97%)	(0.68%)	7	(1.26%)	(1.03%)	11
26542	31642	-2%	7%					6%	5%		-6%	8%	
		(5.19%)	(4.38%)	2				(0.96%)	(1.00%)	7	(0.86%)	(1.44%)	5
31642	36742							4%	4%		-7%	5%	
								(1.55%)	(0.29%)	3	(1.18%)	(1.08%)	3
36742								7%	3%		-4%	6%	
								(0.69%)	(0.46%)	6	(1.40%)	(0.83%)	5

According to the data in the table 2, net sales of institutional investors resulted in the positive return and cause lower SD. On contrary, net buy of institutional investors resulted in the negative return and cause higher SD. Reduced trading volume of institutional investor would cause the market return being negative and positive between -1% to + 1% and cause higher SD. Most trading volume of institutional investors cluster between -9,157 and +16,342 MBt

Most trading volume of proprietary trader cluster between -4,057 and 6,142 MBt. The net sales of proprietary traders have resulted in high negative return. Net volume of proprietary traders is small and clustered when compare to other investor types.

Trading volume of foreign investors are wide range and well distributed. The large portion of trading volume are net sale which cause negative return and higher volatility. When foreign investors take buy side that results in positive market return and lower volatility.

Net sales of individual investors result in a very positive market return in the range of 2% to 6%, but lower volatility. When individual investors are net buyer, the return of the SET is very negative in the range of -4% to -7% but higher volatility.

Figure 1: Average Return of Institutional Investor by Volume

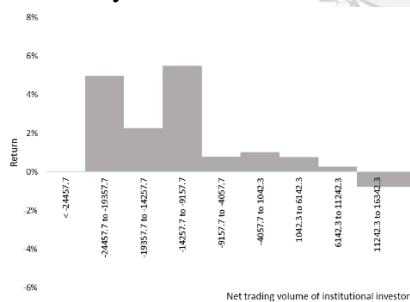


Figure 2: Average Volatility of Institutional Investor by Volume

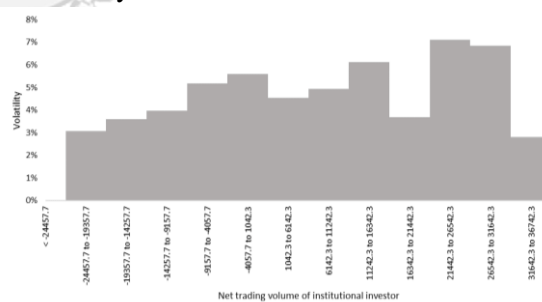


Figure 3: Average Return of Proprietary Trader by Volume

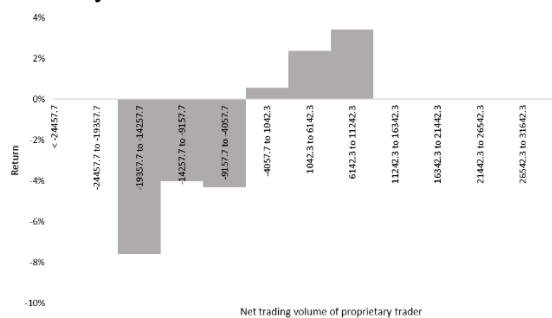


Figure 4: Average Volatility of Proprietary Trader by Volume

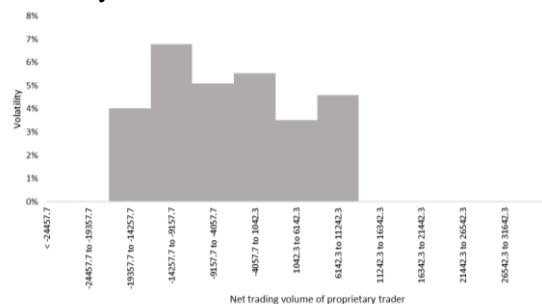


Figure 5: Average Return of Foreign Investor by Volume

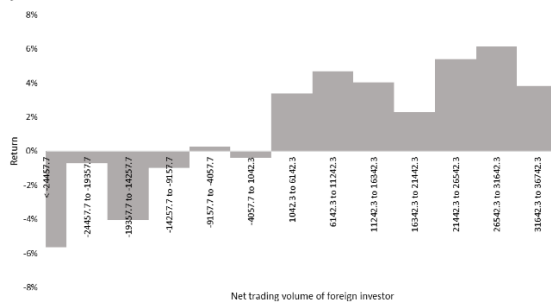


Figure 6: Average Volatility of Foreign Investor by Volume

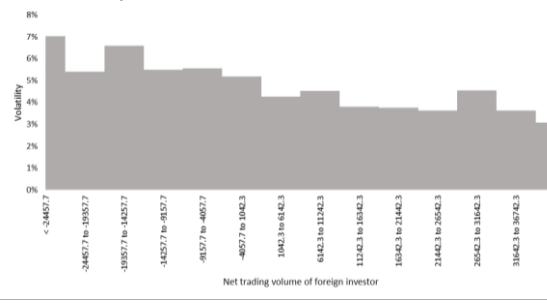


Figure 7: Average Return of Individual Investor by Volume

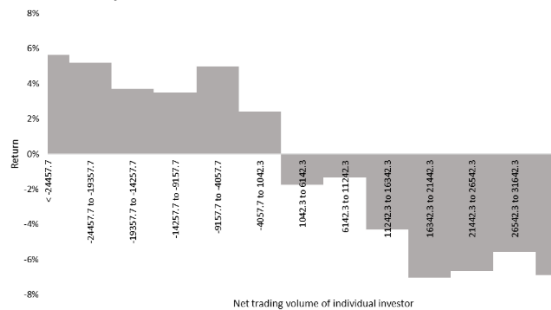
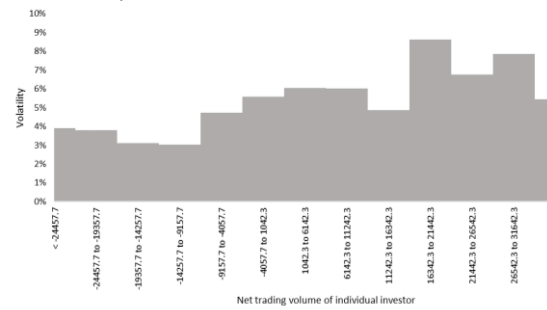


Figure 8: Average Volatility of Individual Investor by Volume



On average, net trading volume of institutional investors are positive. Institutional investors largely buy in the range of average return -10% to -5% and range + 15% to + 20%. Net trading volume is positive in all phases of volatility distribution, with a large net buy volume in the volatility period between + 10% to + 14% and range + 18% to + 20%

On average, net trading volume of proprietary traders have both positive and negative values, which are large net sales during the market return between -10% to -5%. Net trading volume of proprietary traders are distributed well in each volatility period.

When foreign investors take net sell, it causes the market return fall in negative range. When foreign investors take net buy, it causes the market return to be in a positive range. The market volatility will increase when the foreign investors take net sell.

When individual investors take net buy, it causes the market return fall in negative range. When individual investors take net sell, it causes the market return fall

in the positive range. The market volatility of the market will increase when the individual investors take net buy.

Figure 9: Average Volume of Institutional Investor by Return

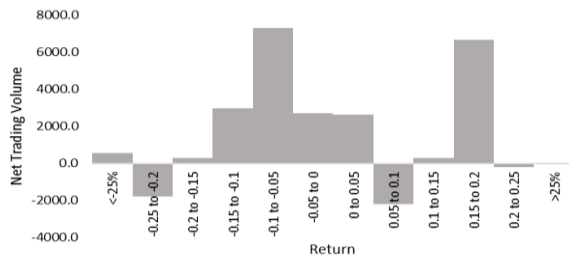


Figure 10: Average Volume of Institutional Investor by Volatility

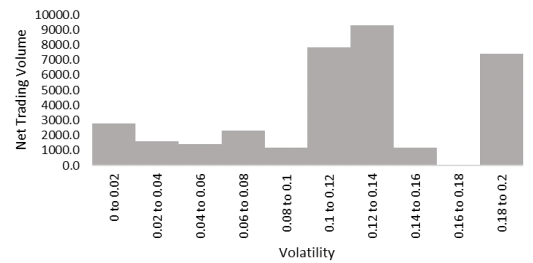


Figure 11: Average Volume of Proprietary Trader by Return

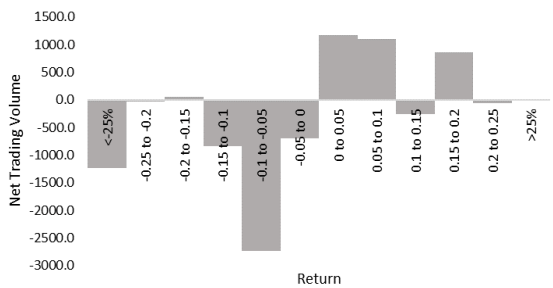


Figure 12: Average Volume of Proprietary Trader by Volatility

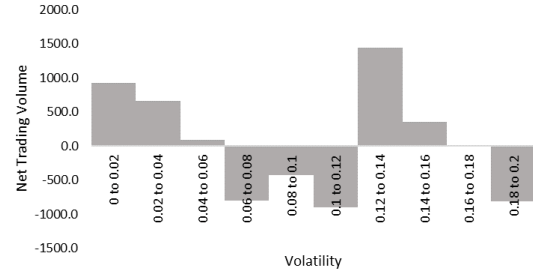


Figure 13: Average Volume of Foreign Investor by Return

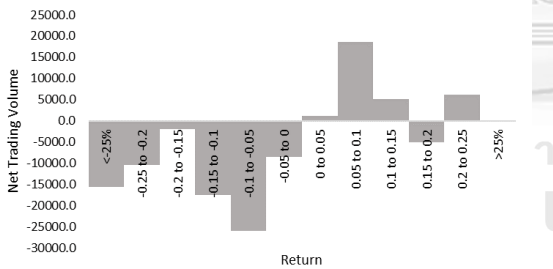


Figure 14: Average Volume of Foreign Investor by Volatility

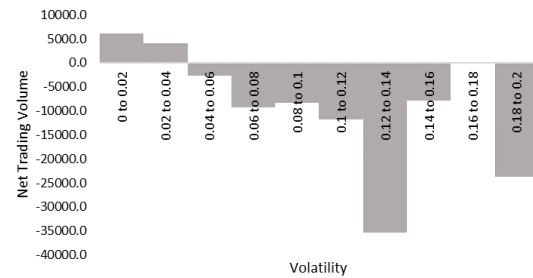


Figure 15: Average Volume of Individual Investor by Return

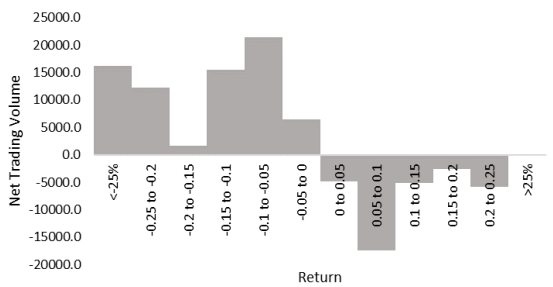


Figure 16: Average Volume of Individual Investor by Volatility

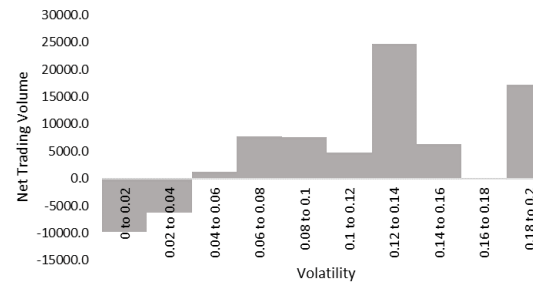


Table 3 Correlation between net trading volume

	<i>Net_volume_Inst</i>	<i>Net_volume_Prop</i>	<i>Net_volume_Foreign</i>	<i>Net_volume_Individual</i>
<i>Net_volume_Inst</i>	1			
<i>Net_volume_Prop</i>	-0.05901	1		
<i>Net_volume_Foreign</i>	-0.6774***	0.2291***	1	
<i>Net_volume_Individual</i>	0.278***	-0.4304***	-0.8827***	1

According to Table3, there are 2 types of investors, institutional and individual investors, mostly trading against the foreign investors. The correlation is quite large - 0.6774 and -0.8827 respectively at 1% significant level. Foreign investors sometimes trade in the same direction as proprietary traders having correlation 0.229 at 1% significant level. Although institutional and individual investors mostly trade against foreign investors, they have small correlation between them only 0.278 at 1% significant level.

Table 4 Economic factors

Economic factors	N	Mean	Sd.	Min	Max
CPI	233	100.1	7.2	89.7	111.1
10-Yr Gov Bond Yield	233	4.0	1.2	1.7	7.9
IP	233	86.8	18.8	49.4	115.0
NEER	233	98.2	7.5	85.6	116.8

Figure 17: CPI during 20 years

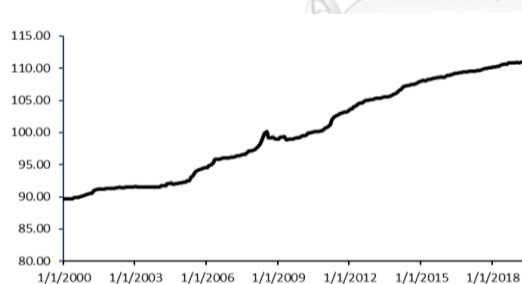


Figure 18: 10-Year Government bond yield



Figure 19: PI during 20 years



Figure 20: NEER during 20 years



CPI has an average of 100 increasing over 20 years with a moderate SD of about 7%. 10-yr government bond yields have been declining during the last 20 years, as shown in the graph, but rising some time with an average value 4% over 20 years. IP has been increasing for 20 years, but there had drastic decline in some periods causing the highest SD to 18.8%. The major trend of NEER is uptrend, but slowly increase.

Table 5 Economic factors change

Economic factors	N	Mean	Sd.	Min	Max
CPI Change	221	1%	1%	-1%	4%
10-Yr Gov Bond Yield Change	221	-2%	24%	-53%	100%
IP Change	221	5%	10%	-32%	60%
NEER Change	221	1%	6%	-16%	21%

Figure 21: CPI change during 20 years

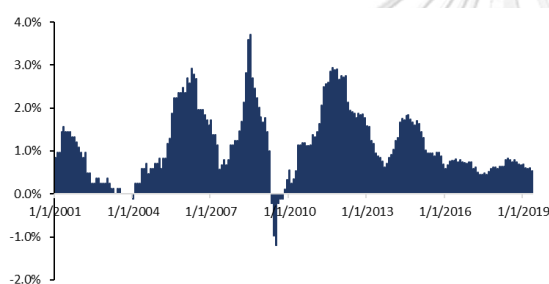


Figure 22: 10Yr Government bond yield change

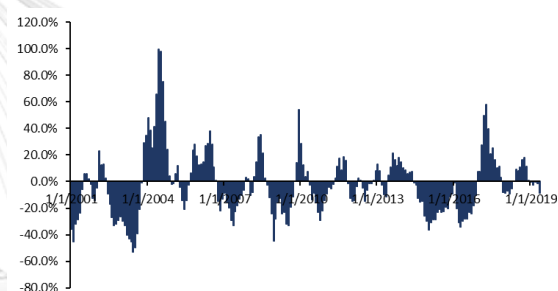


Figure 23: PI change during 20 years

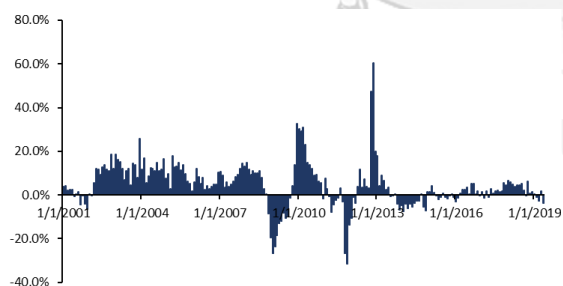
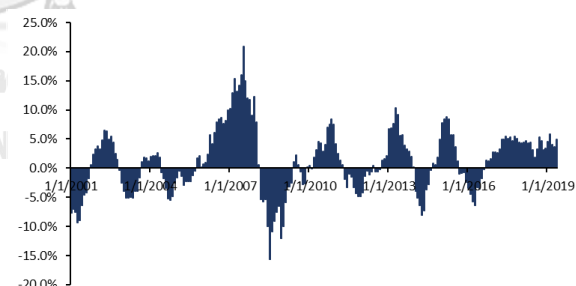


Figure 24: NEER change during 20 years



Most CPI changes have positive values throughout the 20 years but are negative during 2009. 10-yr government bond yields change has been volatile during 20 years, especially in 2003-2004. The range of change is very high from -40% to +80%. IP change has been high volatile during 2009-2013. NEER change also has been volatile during 20 years.

Find optimal lag length

To find the optimal lag length of return and volatility term, I begin with test time series of return and volatility. For return, current return has no significant

relation to the past. For volatility, it has significant since lag term 1. Then I extend the lag term and find the volume of AIC and BIC in different lag length. Finally, I select the lag length that provide the lowest volume of AIC and BIC.

Table 6: Result of estimated AIC and BIC in different lag length of volatility

Volatility	AIC	BIC
Lag1	-976.3	-969.4
Lag2	-974.5	-964.3
Lag3	-973.6	-960.0
Lag4	-972.1	-955.0
Lag5	-972.2	-951.8
Lag6	-971.1	-947.3

One lag length shows the lowest volume of BIC. Therefore, it appropriates to use only 1 lag of volatility to estimate the effect to current volatility.

Table 7: Result of estimated AIC and BIC in different lag length of economic factors

Economic Factors	AIC	BIC
No Lag	4662.073	4679.063
Lag1	4641.175	4671.717
Lag2	4628.069	4672.127
Lag3	4614.266	4671.802

4. Methodology

Independent variables

The independent variables are i) net trading volume of institutional investors ii) net trading volume of proprietary traders iii) net trading volume of foreign investors iv) net trading volume of individual investors

Dependent variable

Dependent variable is market volatility which is estimated by Rogers-Satchell Volatility Formula. This formula is a better representative of market volatility than close to close historical volatility because it incorporates open, low, high and close prices.

Stock return measurement

Stock return is the percentage change of between close price and previous close price.

$$r_t = \frac{c_t}{c_{t-1}} - 1 \quad (1)$$

Volatility measurement

Rogers-Satchell Volatility Formula

Rogers-Satchell - is a volatility estimator that incorporates open, low, high and close prices of a security. As markets are most active during the opening and closing of a trading session, it makes volatility estimation more accurate. A drawback of this measure is that volatility is not robust for opening jumps in prices.

$$\sigma_{RS,t} = \sqrt{\ln\left(\frac{h_t}{c_t}\right) \ln\left(\frac{h_t}{o_t}\right) + \ln\left(\frac{l_t}{c_t}\right) \ln\left(\frac{l_t}{o_t}\right)} \quad (2)$$

Where:

o_t : Open price in month t

h_t : High price in month t

l_t : Low price in month t

c_t : Close price in month t

c_{t-1} : Close price in month t-1

Economic factor changes year-on-year

Economic factor changes are measured the change of economic factor year-on-year

$CPI_{chg,t} = \frac{CPI_t}{CPI_{t-12}} - 1 \quad (3)$	$BondYield_{chg,t} = \frac{BondYield_t}{BondYield_{t-12}} - 1 \quad (4)$
$PI_{chg,t} = \frac{PI_t}{PI_{t-12}} - 1 \quad (5)$	$NEER_{chg,t} = \frac{NEER_t}{NEER_{t-12}} - 1 \quad (6)$

Where:

CPI_{chg} = CPI change year on year

$BondYield_{chg}$ = 10-year government bond yield change year on year

PI_{chg} = Production index change year on year

$NEER_{chg}$ = Nominal effective exchange rate change year on year

CPI_t = CPI in month t

$BondYield_t$ = 10-year government bond yield in month t

PI_t = Production index in month t

$NEER_t$ = Nominal effective exchange rate in month t

CPI_{t-12} = CPI last twelve months

$BondYield_{t-12}$ = 10-year government bond yield last twelve months

PI_{t-12} = Production index last twelve months

$NEER_{t-12}$ = Nominal effective exchange rate last twelve months

In general, investors use economic factors as their investment decisions. Therefore, this research aims to separate effect from economic factors and investment behavior in their investment decisions. I select 4 economic factors that affect investment decisions, which are consumer price index (CPI), 10-year government bond yield, production index (PI) and Nominal effective exchange rate (NEER), then using regression analysis to find the relation to net trading volume by equation (7).

$$NTV_{i,t} = \beta_{0,i} + NTV_{i,t-1} + \beta_{1,i}CPI_{chg,t} + \beta_{2,i}BondYield_{chg,t} + \beta_{3,i}PI_{chg,t} + \beta_{4,i}NEER_{chg,t} + \beta_{1,i}CPI_{chg,t-1} + \beta_{2,i}BondYield_{chg,t-1} + \beta_{3,i}PI_{chg,t-1} + \beta_{4,i}NEER_{chg,t-1} \quad (7)$$

Where:

$NTV_{i,t}$ = Net trading volume of investor type I in month t

$NTV_{i,t-1}$ = Net trading volume of investor type I in month t-1

$CPI_{chg,t}$ = CPI change year on year

$BondYield_{chg,t}$ = 10-year government bond yield change year on year in month t

$PI_{chg,t}$ = Production index change year on year in month t

$NEER_{chg,t}$ = Nominal effective exchange rate change year on year in month t

$CPI_{chg,t-1}$ = CPI change year on year in month t-1

$BondYield_{chg,t-1}$ = 10-year government bond yield change year on year in month t-1

$PI_{chg,t-1}$ = Production index change year on year in month t-1

$NEER_{chg,t-1}$ = Nominal effective exchange rate change year on year in month t-1

After I get the coefficient from doing regression the equation (7), I use to estimate net volume of each investor type. Then I do regression analysis to find the

effect of estimated net volume from each investor type to market return as equation (8) and effect to market volatility as equation (9).

$$r_t = \alpha_0 + \alpha_1 N\hat{T}V_{inst,t} + \alpha_2 N\hat{T}V_{prop,t} + \alpha_3 N\hat{T}V_{foreign,t} + \alpha_4 N\hat{T}V_{individual,t} + \varepsilon_t \quad (8)$$

$$\sigma_t = \alpha_0 + \alpha_1 |N\hat{T}V_{inst,t}| + \alpha_2 |N\hat{T}V_{prop,t}| + \alpha_3 |N\hat{T}V_{foreign,t}| + \alpha_4 |N\hat{T}V_{individual,t}| + \sigma_{t-1} + \varepsilon_t \quad (9)$$

From regression analysis, I would get the coefficient of each economic factor that affect to net trading volume of each investor type. Then, I deduct the actual net trading value by the estimated value to eliminate the effect from trading decision based on economic factors. I define a new variable as abnormal net trading volume (AbNTV).

$$AbNTV_{i,t} = NTV_{i,t} - N\hat{T}V_{i,t} \quad (10)$$

Where:

$AbNTV_{i,t}$ = Abnormal net trading volume of investor type i in month t

$NTV_{i,t}$ = Net trading volume of investor type i in month t

$N\hat{T}V_{i,t}$ = Estimated net trading volume of investor type i in month t

Abnormal trading volume of each investor type would be used to find the relation to stock return and volatility. I use regression analysis on equation (11) to find the relation to stock return and equation (12) to find the relation to stock volatility. Abnormal net trading volumes in equation (12) are the absolute value because only magnitude of trading volume can affect the volatility.

$$r_t = \alpha_0 + \alpha_1 AbNTV_{inst,t} + \alpha_2 AbNTV_{prop,t} + \alpha_3 AbNTV_{foreign,t} + \alpha_4 AbNTV_{individual,t} + \varepsilon_t \quad (11)$$

$$\sigma_t = \alpha_0 + \alpha_1 |AbNTV_{inst,t}| + \alpha_2 |AbNTV_{prop,t}| + \alpha_3 |AbNTV_{foreign,t}| + \alpha_4 |AbNTV_{individual,t}| + \sigma_{t-1} + \varepsilon_t \quad (12)$$

5. Empirical result

Table 8: Coefficient of economic factors that affect to net trading volume

Independent Variables	Dependent Variables			
	NTV_{inst}	NTV_{prop}	$NTV_{foreign}$	$NTV_{individual}$
$NTV_{i,t-1}$	0.28384 (4.29)***	-0.21668 (-3.26)***	0.22064 (3.38)***	0.00485 (0.07)
$CPI_{Chg,t}$	-209,854 (-0.77)	72,940 (0.74)	151,808 (0.25)	-96,376 (-0.19)
$BondYield_{Chg,t}$	12,865 (2.16)**	-3,504 (-1.71)*	-28,035 (-2.15)**	18,567 (1.63)*
$PI_{Chg,t}$	1,905 (0.20)	-1,596 (-0.48)	-18,090 (-0.85)	17,652 (0.98)
$NEER_{Chg,t}$	-66,836 (-2.03)**	22,107 (1.95)*	264,433 (3.63)***	-252,288 (-4.07)***
$CPI_{Chg,t-1}$	145,703 (0.53)	-96,531 (-1.02)	-137,574 (-0.23)	183,686 (0.36)
$BondYield_{Chg,t-1}$	-9,369 (-1.58)	3,647 (1.79)*	21,873 (1.68)*	-15,494 (-1.41)
$PI_{Chg,t-1}$	-5,746 (-0.60)	153 (0.05)	26,852 (1.27)	-20,611 (-1.15)
$NEER_{Chg,t-1}$	82,673 (2.54)**	-26,232 (-2.34)**	-275,828 (-3.83)***	242,494 (3.97)***
$\beta_{0,i}$	2,474 (2.06)**	588 (1.47)	-1,937 (-0.76)	-1,453 (-0.67)

This table show the result of linear regression from equation (7):

$$NTV_{i,t} = \beta_{0,i} + NTV_{i,t-1} + \beta_{1,i}CPI_{Chg,t} + \beta_{2,i}BondYield_{Chg,t} + \beta_{3,i}PI_{Chg,t} + \beta_{4,i}NEER_{Chg,t} + \beta_{1,i}CPI_{Chg,t-1} + \beta_{2,i}BondYield_{Chg,t-1} + \beta_{3,i}PI_{Chg,t-1} + \beta_{4,i}NEER_{Chg,t-1}$$

The dependent variable is net trading volume of investor type i in monthly basis. Standard errors are showed in parentheses *, ** and *** denote significance at 10% , 5% and 1% level respectively

Net trading volume of 3 investor types; institutional investor, proprietary traders and foreign investors, are affected from their lag 1. Only 2 economic factors, 10yr government bond yield and NEER affect to trading volume. Decreasing of bond yield imply that cost of capital is decreased, then result in increasing market return. Increasing of NEER imply that THB appreciates that hurts Thailand GDP because Thailand is net exporter country. THB appreciation result in decreasing market return.

Net trading volume of institutional investors has positive relation 0.28384 with its lag 1 at 1% significant level, has positive relation 12,865 with 10yr government bond yield at 5% significant level, has negative relation 66,836 with NEER at 5% significant level and has positive relation 82,673 with NEER lag 1 at 5% significant level.

Net trading volume of proprietary trader has negative relation 0.21668 with its lag 1 at 1% significant level, has negative relation 3,504 with 10yr government bond yield at 10% significant level, has positive relation 22,107 with NEER at 10% significant level, has positive relation 3,647 with 10yr Government bond yield lag 1 at 10% significant level and has negative relation 26,232 with NEER lag 1 at 5% significant level.

Net trading volume of foreign investor has positive relation 0.22064 with its lag 1 at 1% significant level, has negative relation 28,035 with 10yr government bond yield at 5% significant level, has positive relation 264,433 with NEER at 1% significant level, has positive relation 21,873 with 10yr Government bond lag 1 at 1% significant level and has positive relation 275,828 with NEER lag 1 at 1% significant level.

Net trading volume of individual investor has positive relation 18,567 with 10yr Government bond lag 1 at 1% significant level, has negative relation 252,288 with NEER at 1% significant level and has positive relation 242,494 with NEER lag 1 at 1% significant level.

Although four types of investor make investment decision based on change of economic factors, the effect are inconclusive that which type of investor will have positive or negative relation to market return, for example, institutional investor are affected from bond yield positively which cause the negative market return and also affected from NEER negatively which cause the positive market return.

Table 9: Coefficient of estimated net trading volume that affect to market return

Dependent Variable	Independent Variables				
	$N\hat{T}V_{inst}$	$N\hat{T}V_{prop}$	$N\hat{T}V_{foreign}$	$N\hat{T}V_{individual}$	α_0
Return	-1.62×10^{-7}	9.05×10^{-6}	1.17×10^{-6}	1.87×10^{-6}	0.02146
	(-0.09)	(2.06)**	(0.87)	(1.46)	(1.85)*

This table show the result of linear regression from equation (8):

$$r_t = \alpha_0 + \alpha_1 N\hat{T}V_{inst,t} + \alpha_2 N\hat{T}V_{prop,t} + \alpha_3 N\hat{T}V_{foreign,t} + \alpha_4 N\hat{T}V_{individual,t} + \varepsilon_t$$

The dependent variable is return in month t. Standard errors are showed in parentheses *,** and *** denote significance at 10% , 5% and 1% level respectively

Although all four types of investors use economic factors in investment decision. Only proprietary traders are able to make the most profit from economic factors, with positive relation to market return 9.05×10^{-6} at 5% because they are very active trader. When it has announcement of economic factor change, they will trade based on the information in a very short-term. However, other types of investor have insignificant relation to market return because they are not active as proprietary traders. Therefore, they cannot capture the opportunity to take abnormal profit from economic factors change.

Table 10: Coefficient of estimated net trading volume that affect to market volatility

Dependent Variable	Independent Variables					
	$ N\hat{T}V_{inst} $	$ N\hat{T}V_{prop} $	$ N\hat{T}V_{foreign} $	$ N\hat{T}V_{ind} $	σ_{t-1}	α_0
Volatility	-5.54×10^{-8}	-3.29×10^{-7}	1.73×10^{-7}	-1.19×10^{-7}	0.368092	0.002206
	(-0.47)	(-0.46)	(2.46)**	(-1.45)	(7.42)***	(2.03)**

This table show the result of linear regression from equation (9):

$$\sigma_t = \alpha_0 + \alpha_1 |N\hat{T}V_{inst,t}| + \alpha_2 |N\hat{T}V_{prop,t}| + \alpha_3 |N\hat{T}V_{foreign,t}| + \alpha_4 |N\hat{T}V_{individual,t}| + \sigma_{t-1} + \varepsilon_t$$

The dependent variable is return in month t. Standard errors are showed in parentheses *,** and *** denote significance at 10% , 5% and 1% level respectively

Linear regression results for equation (9) are shown in Table 10. The results reject null hypothesis H5.1, H6.1, H8.1, but accept H7.1. Based on economic factors, only net trading volume of foreign investors have positive relation to market volatility 1.73×10^{-7} at 5% significant level because their analysis skills can determine the direction of market movement. When their skills combine with their large trading volume, it results in

their trading volume can drive the market movement. However, other types of investor have insignificant relation to market volatility. Institutional investor and proprietary traders may have analysis skill, but their trading volume is not large enough to drive the market. Individual investors have large trading volume, but they may lack of analysis skill that result in uncertain direction of trading volume.

Table 11: Coefficient of abnormal net trading volume that affect to market return

Dependent Variable	Independent Variables				
	$AbNTV_{inst}$	$AbNTV_{prop}$	$AbNTV_{foreign}$	$AbNTV_{individual}$	α_0
Return	1.46×10^{-6} (1.55)	-2.91×10^{-8} (0.02)	8.10×10^{-7} (0.73)	-5.66×10^{-7} (-0.50)	0.02496 (6.17)

This table show the result of linear regression from equation (11):

$$r_t = \alpha_0 + \alpha_1 AbNTV_{inst,t} + \alpha_2 AbNTV_{prop,t} + \alpha_3 AbNTV_{foreign,t} + \alpha_4 AbNTV_{individual,t} + \varepsilon_t$$

The dependent variable is return in month t. Standard errors are showed in parentheses *,** and *** denote significance at 10% , 5% and 1% level respectively

Linear regression results for equation (11) are shown in Table 11. The results reject null hypothesis H1.2, H2.2, H3.2, H4.2. Based on investor behavior, no type of investor affects to market volatility. There are many investor behaviors found from the previous research such as herding behavior, disposition effect, risk averse and risk taker. Therefore, one type of investor may include many behaviors that result in their investor behavior cannot be showed prominently.

Table 12: Coefficient of abnormal net trading volume that affect to market volatility

Dependent Variable	Independent Variables					
	$ AbNTV_{inst} $	$ AbNTV_{prop} $	$ AbNTV_{foreign} $	$ AbNTV_{individual} $	σ_{t-1}	α_0
Volatility	8.80×10^{-8} (1.23)	-1.67×10^{-7} (-1.03)	6.44×10^{-9} (0.14)	4.14×10^{-8} (0.75)	0.36699 (8.10)***	0.0009657 (1.07)***

This table show the result of linear regression from equation (12):

$$\sigma_t = \alpha_0 + \alpha_1 |AbNTV_{inst,t}| + \alpha_2 |AbNTV_{prop,t}| + \alpha_3 |AbNTV_{foreign,t}| + \alpha_4 |AbNTV_{individual,t}| + \sigma_{t-1} + \varepsilon_t$$

The dependent variable is return in month t. Standard errors are showed in parentheses *,** and *** denote significance at 10% , 5% and 1% level respectively

Linear regression results for equation (12) are shown in Table 12. The results reject null hypothesis H5.2, H6.2, H7.2, H8.2. Based on investor behavior, no type of investor affects to market volatility. There are many investor behaviors found from the previous research such as herding behavior, disposition effect, risk averse and risk taker. Therefore, one type of investor may include many behaviors that result in their investor behavior cannot be showed prominently.

6. Conclusion

This research studies the impact of trading volumes from each investor group on the return of the stock market return and volatility of the Thai stock market. It is considered in terms of economic factor and trading behavior of investor that affect to trading volume. It can be addressed as the following four main questions 1) Effect of trading volume due to economic factors to market return. 2) Effect of trading volume due to economic factors to market volatility. 3) Effect of trading volume from investor behavior to market return. 4) Effect of trading volume from investor behavior to market volatility.

The overall empirical results from linear regression between 2000 – 2018. Net trading volume of four investor types have been affected from two economic factors; 10yr government bond yield and nominal effective exchange rate. With effect from economic factors, net trading volume of proprietary traders have significant relation to market return because they are very active trader. When it has announcement of economic factor change, they will trade based on the information in a very short-term. However, only net trading volume of foreign investors have positive relation to market volatility because their analysis skills can determine the direction of market movement. When their skills combine with their large trading volume, it results in their trading volume can drive the market movement. Based on investor behavior, no type of investor affects to market return and volatility because there are many investor behaviors such as herding behavior, disposition effect, risk averse and risk taker. Therefore, one type of investor may include many behaviors that result in their investor behavior cannot be showed prominently.

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จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

VITA

NAME Tossapon Wilaiprapakorn
DATE OF BIRTH 17 July 1993
PLACE OF BIRTH Bangkok
INSTITUTIONS ATTENDED Master of Science in Finance
HOME ADDRESS 939/428 Donmeungvilla2 , Soi Permsin16
Klongthanon Saimai Bangkok 10220



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY