STOCK MARKET FUND FLOWS AND RETURN VOLATILITY

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ABSTRACT

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Market fund flows analysis is one of the topics in financial structure in part of investment decision making. Market fund flows has been known as a term of market returns and/ or volatility, as indicator of market movement. Both of them explain not only the market movement but also evaluate the market performance. As a result, the investors would know the investment techniques on the volatility of stock prices.

There are several empirical studies that have studied about the returns and volatility effect to market movement since 1987 due to stock crash. Most of them study about the relation of returns and volatility with trading volume or stock movement. They explain that volume implies to investor investment. Some researches explain more about the investors' behavior that different information reflects to different investment behavior.

This paper studies market flows with the asymmetric information in The Stock Exchange of Thailand (SET) by examining SET data, started 2003-2014. This paper will help the investor to understand the information conveys by the investor, and the impact of information convey with market flows. Thus, when the investors expect the information flow, the investors can expect the impact in market flows.

This paper applies the concepts of past researches that different investors have different information In SET, it had separated investors into three groups that had been foreigner, local and institution until 2009. In 2009, it has changed the way to separate trader groups from three groups to four that has been foreigner, local, institution and proprietary. This paper assumes that due to different investors in the market, they should reflect to stock movement differently.

As a result, this paper evaluates the relation between returns and/or volatility with trading volume for each investor. For overall stock markets, the results show that there is a positive relation in return-volume relation; although, there is a negative relation of volatility-volume.

In addition, this paper differentiates the impact of fund flows for each individual group, including foreign, local and institution investors. The analysis shows that only foreign investor impacts to stock market in both of trading volume-return relation and trading volume-volatility relation. There is a positive relation with market return, but has a negative relation with market volatility.

However, it depends on direction of fund flow. Fund inflow has positive relation in market return while outflow has negatively. On the other hand, in part of trading-market volatility, the larger of cash outflow, the more volatility is the market.

Based on a theory of trading volume, this relation explains that when the buyer's demand increases, the trading volume increases, effecting to stock price increases or return increases. Moreover, when the trading volume increase, the liquidity increases, effecting to volatility decreases.

Furthermore, this paper examines the causality test to understand another way relation between volume and return, and volume and volatility. The results show that there is no relation between both relations. As a result, when return or volatility increase, it does not impact to trading volume.

To prevent the robustness, this paper tests and compares the result with exogenous factors. The results show that the exogenous testing's result has the same results as trader effect's result. Only foreign investor has positive relation between return and trading volume, and a negatively impact on volatility. However, the exogenous factors have relation for all investors. Oil price and exchange rate have positive relation with return, and negative relation with volatility; in contrast with interest rate and rate of loan.

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CHAPTER 1

INTRODUCTION

Asymmetric information is one of the most interesting topics in financial structure. Auronen (2003) explained that different trader has different information, reflecting to different investor behavior. The concept of asymmetric information is the first introduced in Akerlof (1970) as the market of lemon.

Akerlof (1970) has introduced the asymmetric information into financial structure. He compares his concept with stock markets that the stock markets have both of good and bad (or lemon) stocks; however, the insiders who have more information than the outsiders would like to set up the same price for both of them. Thus, the one who has more information should get more advantage than the others.

Moreover, due to globalization, the investors would like to diversify their portfolio. Most of the markets have separated the trader into three main types that are retail (or local), foreign and institution investors. Due to asymmetric information concept, it supports the idea that different trader has different information.

Based on several empirical researches, most of developed markets such as US stock markets show that local investor has more information than foreigner especially in local information. On the other hand, the emerging markets show different result. Foreign trader has more information than local. Foreigner uses both of global and local information for his analysis, because both information shows significantly affect to the markets, agreed by Frankel and Schmukler (2000).

Frankel and Schmukler (2000) explained the information in emerging market. In the emerging market, the global information has reflected to the local markets. Moreover, foreigner can get the local information as fast as the local investors. As a result, foreign trader would trade faster than other investors in emerging markets with more information.

To study the information conveys, several empirical researches suggest that the information effect with the trend of stock price or price movement. According to

Tanthanongsakkun, Treepongharuna, Wee, and Brooks, (2011), they explained that the information conveys for each trader should be trading volume, and the information effect should be referred to the movement of price such as returns and volatility, referring to Li and Wu (2006), Haugen, Talmor, and Torous (1991), and Lockwood and Linn (1990).

Their results showed that both of developed and emerging markets show different results. The emerging markets show that there is a positive relation between return-volume, and a negative relation between volatility-volume. The developed markets show on the reverse results.

This paper would like to help the investors to foresee the expected return to expected volatility after they have the message from the impacted investors, or have the information convey from the impacted investors.

For that reason, this paper will analyze for both of the relation between return and/or volatility and information convey, indicated by trading volume, and trader effect to let the investors focus on the impacted investor. This paper focuses on the investor types with asymmetric information in the Stock Exchange of Thailand (SET) during 2003-2014.

SET has separated investor types into three main groups that are retail (or domestic), foreign, and institution investors by analyzing the correlation between returns-volume, and between volatility-volume.

For the stock returns during 2003-2014, the results show that the returns noticeably fluctuates in 2007 and in 2009 due to the started period of Sub-prime crisis and the period of global economic crisis, respectively.

In the part of volatility, there are several models to calculate volatility such as standard deviation, CAPM, ARCH, GARCH and Parkinson (1980) models. Different market matched with different model.

According to Chang and Wang (2002), they studied the volatility with mutual fund flows relation. In their analysis, they examine volatility by using three methods that are simple summing intraday squared returns, Parkinson (1980) method, and volatility in option market index. They illustrate for Parkinson's (1980) method that it is suitable for volatility calculation in the intraday by using the highest and lowest index prices for analysis.

Since this paper uses daily price data for analysis, including highest and lowest index price, this paper will use Parkinson's (1980) method for analysis the daily volatility.

The results of volatility show that the volatility shows the unusual number during 2007 and 2009 due to the started period of Sub-prime crisis and the period of global economic crisis, correspondingly, the same result as return fluctuate.

Based on the previous studies, in the correlation, the emerging markets show that there is a positive relation between returns-volume, and a negative relation between volatility-volume.

This paper's results show the same as others that in SET, there is a positive relation between returns and volume, and a negative relation between volatility and volume, or accept the hypothesis.

Based on a theory of trading volume, Karpoff (1986) explained that there is a positive relation between return-volume, mainly by demand. The buyer's demand increases, the trading volume increases. As a result, the stock price increases, or the return increases.

In addition, a negative relation between volatility shows that when there is a numerous trading volume, the liquidity in the market is high. As a result, the volatility is lower.

To find the information conveys in this group, this paper will examine the correlation of market return-volume and the correlation of market volatility-volume in each investor group in SET by using the differentiation of returns and volume and the differentiation of volatility and volume.

This paper will set up the hypothesis that the Stock Exchange of Thailand (SET) is one of emerging markets. Foreign traders should have more information than others, based on the previous studies.

The result shows that hypothesis is accepted. Foreign traders have more information than others. Thus, this trader should reflect to stock price or price movement such as returns and volatility, the same result as previous studies.

Moreover, to study more about this price flow, this paper also examines this information convey process into each cash flow, referring to Chang and Wang (2002). It shows different result in the different direction of cash flow. Fund inflow has positive relation in market return while outflow has negatively.

Consequently, the analysis concludes that only foreign investor impacts to SET in both of trading-return relation and trading-volatility relation. There is a positive relation with market return, but has a negative relation with market volatility. However, it depends on direction of fund flow. Fund inflow has positive relation in market return while outflow has negatively.

However, SET has changed the method to separate the trader types in 2009. This paper analyzes the trader effect since 2003 to 2014, which also covers the period that changing trader type separation. Firstly, this paper separated the trader type as three types, including foreigner, local and institution. After 2009, the data will combine the data in institution and proprietary, and represent as institution investors.

To robustness, this paper will analyze the data for four groups that are foreigners, local, institution and proprietary during 2009-2014, and compare the result with the one that separate as three groups.

The results show that while analyze the data into three groups, this paper combines data for institution and proprietary as the same group, and represents as institution, , the results show the same result for both four groups analysis and three group analysis. The four group analysis has a little weaker result than the three-group.

Thus, it can conclude that for both of three and four groups analysis, it shows the same result that there is an information convey, impacting to market movement in SET by foreign investors; however, it depends on the direction of fund flow for both return-volume and volatility-volume relations.

Fund inflow shows the positive relation between return-volume; while, it shows negatively in fund outflow. On the other hand, it shows the negative relation between volatility-volume, but there is a positive one in cash outflow.

Moreover, this paper examines the causality test for both of volume-return, and volume-volatility to understand the relation in another around, based on the previous hypotheses that are there is a positive relation between volume-return, and a negative one for volume-volatility. However, the results show that there is no relation in both of them.

As a result, it can conclude that in the same dataset during 2003-2014, there is a positive relation between return-volume, and a negative relation between volatility-volume. In the other word, when demand to buy increases, the trading volume should

be increased, effecting to the stock price increases or return increases. Moreover, when trading volume increases, the liquidity increases, effecting to volatility decreases.

Moreover, in the trader effect in SET, only foreign investor impacts to SET market, shown the same direction of relation the same as overall market that are there is a positive relation between return-volume, and a negative on between volatility-volume. However, the direction of cash flow explains different relation. Cash inflow shows a positive relation between return-volume, and a negative one between volatility-volume; in contrast with cash outflow.

However, when analyze causality test for both of volume-return and volume-volatility to understand the relation in another way around. It shows differently. There is no relation for both of them. Thus, when the return or volatility increases, it does not effect to the trading volume directly.

To prevent the robustness, this paper tests and compares the result with exogenous factors. There are several researches that explain about the impact of exogenous factors with stock market flows. This paper examines those exogenous factors and trading volume with stock return and volatility.

The results show that the exogenous testing's results have the same results as trader effect's result. Only foreign investor has positive relation between return and trading volume, and negative in volatility.

However, the exogenous factors have relation for all investors. Oil price and exchange rate have positive relation with return; in contrast with interest rate in return. Nevertheless, oil price and exchange rate have negatively significant impact on volatility; unlike interest rate and rate of loan. The rate of loan shows weakly relation for both of them; in contrast with oil price and trading volume, showing strongly relation, agreed with previous studies.

For the cash flow, this paper examine the exogenous testing each cash flow for impacted investors, or foreign investor. The results show the same as trader effect testing. The different direction of cash flow has different relation. Oil price, exchange rate and trading volume have the same direction of relation; in contrast with interest rate and the rate of loan.

Cash inflow has a positively impact on oil price, exchange rate and trading volume with return; unlike interest rate and the rate of loan. However, cash outflow shows oppositely. In volatility, cash inflow has a negatively impact on oil price, exchange rate and trading volume with volatility; in contrast with interest rate and rate of return, opposite of cash outflow.

CHAPTER 2

LITERATURE REVIEW

This section describes about the literature review about the information content in stock markets flows. This paper is considering on the information content in the Stock Exchange of Thailand (SET) by each investor.

Both of information content and fund flow are the important topics in financial structure, agreed with Leland and Pyle (1977) by making the confidence to the investors. Moreover, both of them relate to each other in part of financial investment decision by Harris and Raviv (1991).

There are several studies that explained and studied about asymmetric information between investor types. Asymmetric information is well-known from a Nobel Prize in Economics in 2001, introduced by Akerlof (1970).

Akerlof (1970) was introduced the concept of information asymmetry, known as the market for Lemons. Lemon market in stock market is compared that stock market had both of good and bad, or lemon, stock characteristics; however, the insider would like to set up the price in the high price or the same price as good ones. As a result, the one who has more information would get the advantage to buy in the right price.

Stiglitz (1975) developed the screening concept to reduce the asymmetric information. This concept is applied into stock markets in the part of classification each fund into each characteristic, so all investors would have the same information by this characteristic such as fund rating.

Polborn, Hoy and Sadanand (2006) also explained about the asymmetric information. They introduce the adverse selection or hidden information. This concept illustrates the market behavior that the insider has more information than outsider; however, in case of adverse selection, they hide the information from the outsider to get the advantage of each other, agreed with Rothschild and Stiglitz (1976).

According to the previous studies, the asymmetric information is the important factor in the financial capital structure. Due to globalization, the investment markets are more open for foreigners to diversify their portfolio. Takada (2014) exemplified the stock markets opened widely even in China, which is the world's second-largest economy. Most of the markets have separated the investor types at least three investor types such as domestic, foreign and institution investors. Different trader has different information, reflecting in price movement differently.

Brennan and Cao (1997) related investor types to asymmetric information. They studied the asymmetric information between the trader type in US equity portfolio flows. They found that each investor type has different information. Due to this different information, they show different trading behavior.

They illustrated that the local investors have more information than foreigner especially about domestic market information. Thus, when domestic investors have an information advantage, investors tend to purchase faster than foreigners.

The research of Richards (2004) argued with Brennan and Cao (1997) also studied the investor effect in stock price, especially in foreign investors in six Asian equity markets. He explained that emerging markets reflect to the foreign investors different from developed markets such as US stock markets.

He analyzes a dataset of daily trading of all foreign investors in six Asian emerging equity markets, Jakata Stock Exchange (JSX), Korea Stock Exchange (KSE), Taiwan Stock Exchange (TWSE), Philippine Stock Exchange (PSE), Stock Exchange of Thailand (SET) and Kosdaq Stock Market.

He explained that there is asymmetric information in foreign investors. He illustrated that the foreign investors are arranged as sophistic investors. Foreign investors use the recent returns in global equity markets to forecast the future returns in domestic market. He showed that that the emerging markets reflect to the global information or return, foreign investors use, more than local information, domestic investors use.

As a result, even the domestic investors have more information about the local information; foreign information have more effect to market. Moreover, to support his hypothesis, he analyzed by finding the correlation between returns and foreign inflow by regression.

From analysis, he found that there is a strong positive correlation between returns and foreign inflow. Therefore, he concluded that foreign investors have more information than others by studied more information.

Moreover, Choe, Kho and Stulz (1999) agreed with Richard (2004) about the information asymmetry. They studied about the asymmetric information for each investor in Korean stock market. They found that Korean economy not only depends on local government but also global influence.

As a result, to prove their hypothesis about the asymmetric information in foreign investors, they assumed that the foreigners use the global return for trading in Korean market. They use the stock returns in foreign investors as the representative in asymmetric information in foreigners' part.

Thus, they examined the impact of foreign investors on stock return in Korea from November 30, 1996 to the end of 1997 by using order and trade data. They found that when foreign investors have information, and trade in the market, it reflects into the market flow more than others. Therefore, they concluded that the foreigners have more information than domestic investors.

However, Frankel and Schmukler (2000) argued with that idea. They also studied the asymmetric information in this globalization perspective for each individual investor by using the international funds in US stock market. Their paper separates the investors into two groups that were domestic investors, referring to local and big foreign investors, and foreign investors, referring to small international investors.

They explained that due to globalization, foreigners would like to diversify their portfolio by investing in foreign countries. In their paper, they would like to understand about the asymmetric information in markets for both investors by variance analysis. They explained that the variance is the risk that investor would face. Thus, if there is a higher variance, it means that there is a risker. For that reason, due to higher risk, the investors should not invest their money in.

According to their analysis, they analyzed the investment for both investor types in country fund. They assumed that both investors would like to maximize the expected utility function. However, there is the difference in the future dividends between domestic and foreign investors.

The future dividends for domestics should be:

$$y_{t+1} = y_t + \varepsilon_{t+1}$$

where

ε_{t+1} denotes as the unexpected shock

The future for dividends for foreign investors should be:

$$y_{t+1} = y_t + \varepsilon_{t+1} + l_{t+1}$$

They assumed that the domestic investor should have better information about the local economy. l_{t+1} denotes as the uncertainty that foreign investors face due to asymmetric information. However, they assume that the expected value for both of domestic and foreign investors should be the same:

$$E(y_{t+1}|I_t) = E(y^f_{t+1}|I_t) = y_t$$

After analyze the future dividends with expected value, they assume that the variance should be:

$$Var(y_{t+1}|I_t) = \sigma_\varepsilon^2 + \sigma_l^2 > \sigma_\varepsilon^2$$

According to variance equation, they illustrate that the variance for foreign investors is higher than for domestic investors.

Hence, they conclude that due to the asymmetric information between domestic and foreign investors, the domestic investors have more information especially about local economy, so foreign investors have a higher variance than domestic. In the other word, the foreign investment has a riskier than domestic investment. Thus, the foreign investors invest less than the domestic ones.

Furthermore, their paper studied this variance analysis in three main regions, Europe, Latin America and Pacific Rim. They found that only Mexican and Asian funds show different stories from others. The Mexican and Asian country funds react immediately the same time as local. In the other word, even there is the asymmetric information between domestic and foreign investors; the foreign investors still react in the same time as local.

However, Tanthanongsakkun, et al. (2011) also studied asymmetric information in each trader type in emerging markets such as Asian markets. In their study, they study about the effect of trader type in the Stock Exchange of Thailand (SET) by using data from January 1999 to December 2010. Their database include the date, time, price, volume by each type of traders, retail (or domestic), foreign, proprietary and institution investors.

In part of their analysis, they explained that the informed traders prefer to trade more. However, some investors break down their trade into small volume to avoid information leak to uninformed investors (or retail investors). Thus, they examine the number of trade for each trader rather than the trading volume to explain the information flow.

They observe the number of trade in SET for each investor type, and find that the highest number or more than 80% of trading was retail investors. Thus, they concluded that retail investors have the most often enter in the market; however, they observe that the retail investor's trade is too often like the noise traders. However, the foreign and institution investors enter in the market only when they have information to trade on, or when they are confident in the information.

As a result, they concluded that foreign and institution investors have information more than domestic ones. Moreover, they study more about the trading effect in price movement for each trader. They explained that the number of trade for each investor should affect to the movement of price or volatility of price. As a result, different number of trading in each investor type should refer to the difference of investor effect in price movement or price volatility.

They study the relationship between volatility and trading for each investor. To investigate the daily trading volume, they base on Chan and Fong (2006) approach by using OLS with Monday effect concept. The volume-volatility relation should be as:

$$RV_{it} = \alpha_i + \alpha_{im} M_t + \sum_{j=1}^{12} \rho_{ij} RV_{it-1} + \sum_{k=1}^{4} \delta_{ik} V_{ikt} + \nu_{it}$$

where

M_t denotes as Monday effect, M_t is 1 when trading day is Monday and otherwise is 0

V_t denotes as daily trading volume for investor type k

RV_t denotes as the realized volatility by Anderson and Bollerslev (1998) approach.

$$RV_t(\Delta) = \sum_{j=1}^{1/\Delta} r_{t+j\Delta,\Delta}^2$$

where

$r_{t,\Delta}$ denotes as the return in Δ period

$1/\Delta$ denotes as the number of intradaily period

According to their analysis, they found that there is a significantly positive relation between volume and volatility for retail investors, but shows weak positive relation in foreign and institution investors. They illustrate that those investors should break down volume into the smaller lot to avoid information leak to uninformed trader (or retail investors), based on their previous analysis.

Jaffe and Westerfield (1985) supported that result. They examine the Japanese and Australian daily stock market returns for foreign countries. They showed that there is a seasonal pattern in stock market when there is a foreigner investment into the market. Thus, they concluded that the foreign investor has a strong relationship in the overall stock market.

Based on previous studies, table 2.1 summarizes the investor types with information content.

Table 2.1 Literature Review of the Relation Between Information Content-Market Flow Each Investor Group

Authors	**Data**	**Investor Groups Who Reflected Market**
Frankel and Schmukler (2000)	US Stock market	Local investors > foreigners except Mexican and Asian investors
Brennand and Cao (1997)	US equity market	Local investor >foreigners
Choe, et al. (1999)	Korean stock market	Only foreign investors
Richards (2004)	Six Asian markets	Only foreign investors
Jaffe and Westerfield (1985)	Japanese and Australian markets	Only foreign investors
Suparatana Tanthanangkuskkun, et al. (2011)	The Stock Exchange of Thailand (SET)	Foreign and Institution investors

From table 2.1, it concludes that the different traders have different information for their investment decision making. Trader who has more information should get advantage than others. Moreover, in developed markets such as US market, it shows that local investors have information more than foreign traders especially in local information.

On the other hand, in emerging markets such as Asian markets, most of the papers explain that foreign investors could get information about local information easily, and reflect into the market quicker.

As a result, this paper will analyze for The Stock Exchange of Thailand (or SET) during 2003-2014. SET has separated the investors into three main types that are retail (or domestic), foreign and institution investors. This paper will examine asymmetric information for these three investor types in SET.

Based on previous papers, SET is one of the emerging markets, so the foreign investors should have more information than local. This paper should set the hypothesis about the investor types with information that the foreign investors should have information more than others in SET.

Moreover, there are several studies that explain about the asymmetric information with market flows. Baker and Wurgler (2002) also studied about the asymmetric information. They explained that even the outsiders have less information than insiders; however, they use the signal effect such as debt or equity or dividend signal. Thus, the outside investors effect to the firm's stock price especially with the firm issuing equity, agreed with Krasker (1986); Watts (1973); Gonedes (1978); Miller and Rock (1985) and Korajczyk, et al. (1990a, b).

According to Huang, et al. (2007, 2012), they started with the market flows concept. They explained that since the outsiders affect to the stock price, they should also reflect to the returns and volatility, the indicators for market flows.

They illustrated that market flows mean the movement of price, which return and/or volatility are. Hence, they studied about the market flows by using the mutual fund flows and return from Center for Research in Security Prices (CRSP) mutual fund database, started from 1993 to 2004.

They found that due to the asymmetric information, the outsiders have less information. Therefore, the investors observe the managerial ability and the past performance to make their investment decision. The flows of past performance are an important factor for their decision making.

As a result, they study in the backward way. They observe the returns and volatility, and conclude the information that investors have. They explained that if the volatility is so high, the investor should have less information. Due to less information, they investors are not confident to invest their money in. Thus, the movement of price fluctuated.

Mahajan and Singh (2009) also studied about the market flows and information content. They mentioned the same as Huang, et al. (2007, 2012) that the market flows should be explained by return and volatility due to the movement of price.

In their study, they assumed that the information content should effect to the market flows in part of returns and volatility. Moreover, if the trader has information, they should reflect to the trading volume.

They use the daily data of the Sensitive Index (SENSEX) during the period from October 1996 to March 2006 to examine the relation between return, volume and volatility dynamics of stock. Trading volume is an important factor due to convey information, which effect to stock price.

They explained that the outsiders have information less than the insiders (or asymmetric information concept). Thus, the outsiders use the signal for trading such as the signal in debt or equity or dividend. These signals should be the information from the insiders to outsiders, agreed with several studies of debt or dividend signal (i.e Poitevin (1989), Heinkel (1982) and Spence (1973))

In their analysis, they examined the returns and volatility data with volume for each investor to find the relationship between those factors. They found that there are relationship between returns-volume and volatility-volume. As a result they concluded that the asymmetric information for each investor, indicated by the trading volume, effect to return and volatility in stock market, or stock market flows.

Tantanonsakkun, et al. (2011) also studied about the market flows with information content; however, they had different idea with Mahajan and Singh (2009). They explained that the number of trade should affect more than the trading volume.

In their paper, they examined the investor effect in SET for each investor groups that are retail, foreign, proprietary and institution. They explained that for market flows in SET, it could be explained by returns and volatility, and the information flows should be showed in trading volume.

As a result, they analyzed the volatility in SET by using GARCH model from Bollersev (1986). For returns and trading volume, they extracted the data in SET. They found that there is a strong relationship between trading volume and volatility for all traders. Moreover, in the type of traders, they found that the retail is the main effect to the price volatility while the others had the minimal effect on.

According to their result, they concluded that the foreign and institution investors brake down volume into the smaller lot to avoid information leak to uninformed trader (or retail investors), so the correlation between trading volume and volatility for those investors show as weak.

On the other hand, when observe the number of trading for those investors, it showed that the local investors invest too often like the noise trader; however, the others invest only when they got the information.

Based on these previous studies, most of the researches support the same idea that market fund flows is one of the topics that investors should understand before investing the money into the portfolios. Market fund flows are indicated by some factors in the market such as volatility or returns by Haugen and Baker (1991). Thus, there are several studies that use returns and/or volatility to be as market flows' indicators.

Referring to Busse (1999), he also studied information content in market flows by using return and volatility as market flows' indicator, and the trading volume as information asymmetry's indicator. They explained that the market flows explain about the movement of price in markets, and the information reflects to the price volatility.

In his study, he had different idea with others. Most of the researchers explained in the same way that the information reflects to return and volatility; however, Busse (1999) studied another way around by using CAPM. They explained that the return is sensitive to market volatility, and the volatility introduces with the information asymmetric by conveying the firms' information to public.

Wongswan's (2006) studied about the information effect. He explained about the volatility of price leads to the flow of information to the market the same as Busse (1999). Thus, he studied the volatility to understand how the information conveys, or who had more information. They examined dynamic relationship between return, volume and volatility, by using GARCH (1,1) and EGARCH (1,1) models.

He found that both methods give the same results. Both of them illustrated that there are positive relationship between return-volume and negative relationship between volatility-volume. Thus, he concluded that due to asymmetric information, the investors would get the information by using the relationship between return-volume and volatility-volume to be as information effect.

Moreover, he found another interesting topic that the information not only affects to in-country market but also international market. He studied about the information transmission across international equity. He studied about this information transmission in the evidence from the United States and Japan to Korean and Thai equity markets by observing the daily stock data in Korean and Thai stock markets after announcement.

Referring to Hiemstra and Jones (1994), they also studied about the information effect. They assumed that the information would impact to the stock movement or returns, and the information is referred to the trading volume.

They tested the dynamic relation between daily Dow Jones stock returns and volume by using the percentage changes in New York Stock Exchange trading volume by applying the stochastic process that Clark's (1973) used. They found the nonlinear causality between returns and volume. Thus, they concluded that returns can be explained by volume, reflecting to stock price.

Based on previous studies, there are several studied about the information effect that studied or examined about this effect by using the relation between return-volume, and between volatility- volume.

Roll (1984) agreed with Hiemstra and Jones (1994). He studied the correlation between the trading cost and volume. He used the trading cost in daily and weekly returns of stocks from the New York and American Exchanges, and found that there is a strongly negative relation to volume.

Llorente, Michaely, Saar and Wang (2002) examined the dynamic relation between return and volume of individual stocks by analyzing the relation between daily volume and first-order return autocorrelation for individual stocks listed on the NYSE and AMEX. They found that there is the cross-sectional variation in the relation between volume and return autocorrelation, depending on the type of trader, by using the simple model.

In their study, they assumed that the return can indicate the risk sharing on the private information. According to their result, the relation between return-volume depends on the trader type. The risk sharing trader shows a negative relation. On the other hand, the risk speculative shows a positive relation.

Campbel, Grossman and Wan (1993), agreed with previous studies, investigated the relationship between aggregate stock market trading volume and the serial correlation of daily stock NASDAQ returns by testing the first-order daily return autocorrelation with volume. It showed that it trends to decline with volume. The model showed that a stock price declines on a high-volume day more likely than a stock price declined on a low-volume day with an increase in the expected stock return.

Berk and Green (2004) mentioned that most of investors should learn about the ability of fund managers based on their past performance and allocated money to funds. They develop a simple model of portfolio management to find the relationship between return and funds flow. They found that there is a positive relation between those two.

Ning and Wirjanto (2009) used a copula approach to examine the extreme return–volume relationship in six emerging East-Asian equity markets. A copula approach is a well-known approach to describe the dependence between random variables.

Their result showed that there is significant and asymmetric return–volume dependence at extremes for these markets. They found that there is a strong positive relationship, so extremely high returns trend to be associated with extremely large trading volumes.

Therefore, according to the previous studies, there is a relationship between stock returns-volume. However, most of the previous studies focus on the developed market. However, there is a different result in developed and Asian Market as shown in table 2.2.

Table 2.2 Literature Review of Return-Volume Relation

Authors	**Market**	**Return-volume relation (+/-/0)**
Roll (1984)	NYSE and AMEX	-
Hiemstra and Jones (1994)	Dow Jones Stock	0
Llorente, et al. (2002)	NYSE and AMEX	0

Table 2.2 (Continued)

Authors	**Market**	**Return-volume relation (+/-/0)**
Cambel, et al. (1993)	-	-
Bark and Green (2004)	-	+
Ning and Wirjanto (2009)	Six Asian markets	+

Note: + denotes to positive relationship, - denotes to negative relationship, 0 denotes to not classify the relationship

According to table 2.2, the previous studies show that there is a relation between returns and volume; however, developed and emerging markets as Asian markets have different direction of relationship. Thus, this paper will test the correlation between return-volume in emerging market as the Stock Exchange of Thailand (SET) by based the hypothesis with Asian market as positive relation between return-volume.

Moreover, Goyal (2004) also studied about the stock market flows and returns; however, he raised another issue with his testing. He studied about the link between populations age structure with stock returns. He explained that different age structure also shows different relation. For example, he found that the outflows from the stock market have a positive correlation for people age 65 and over, but have a negative correlation for middle-aged people or 45 to 64.

He used stock return data from S&P500 index. The total outflows from the stock market were calculated by:

$$Net\ Outflow_t = \sum_{i=1}^{N_t} Net\ Outflow_{it}$$

The outflow for each stock *i* was calculated as:

$$Net\ Outflow_{it} = -Market\ Cap_{it} + Market\ Capt_{it-1} * (1 + ret_{it})$$

where

$Market\ Cap_t$ refers to the market capitalization at the end of month t

ret_{it} refers to the return during month t

From his equation, he would like to analyze equation for each generation. He separated population into four generations that are infants, youngs, middles and olds. All of them should be active in the economy except infants, so only infants should not be in the calculation.

Then, he ran the regression for those three generations to find the correlation between outflow and return by above equations. He found that different generation means different income possibilities, including wealth, risk aversion and horizon, so it effects to return differently.

The results showed that the middles (45-64) has a significantly negative correlated while the olds (65 or over) has a negative relation. However, for the young, the result shows not clear to conclude.

According to his study, this paper applied his idea that many empirical studies explained that there is a correlation between market flows and return; however, the direction for the cash flow might have the correlation with return. Thus, this paper will examine the correlation for each cash flow that are cash inflow and cash outflow.

In addition, Karpoff (1987) illustrated about the positive relation between return and volume. He studied the information events affect trading volume by using a theory of trading volume. He assumed that the demand price changes frequently, effecting to trading volume.

He explained that the volume is lower in the costly market; however, it should increase when the information convey. The price changes depending on demand. Based on the theory of trading volume, the volume should increase when the information convey. When the information convey, the demand should be high.

As a result, the demand increased, the volume should increase, directly effect to stock price increased or return increased. In the other word, there is a positive relation between return and volume.

Besides the returns-volume relation, volatility is also another indicator of market flows. There are several studies that studied about the correlation between

volatility and volume in the stock market. Volatility has been well-known since the market crash in 1987 in US. Due to that crisis, there are several studies that studies about volatility.

Refer to Schwert (1989, 1990), he studied more about volatility during market crash in 1987. He observed that most of the investors, all the major networks, brokers, and dealers have all expressed concern over the level of stock market volatility during the market decline in 1987. He found during that the volatile during 1929-1939 is unusual high

Edwards (1988) was another researcher that studied the volatility during that time. He observed and found that more volatility during 1920's due to the uncertainty and financial risks. He explained that during the crisis (the Octorber 1987), stock market crash is unusual in many ways. October 19 is the largest percentage change in market value. Stock volatility jumps dramatically during and after the crash.

However, there are several studies that presented different method to calculate stock volatility. Manaster and Koehler (1982) studied how to calculate European stock option. They suggested that there are many authors tried to figure it out to find the best formula for volatility measurement. Since they studied of European stock options, they suggest using Black and Scholes (1973) model as the ideal model. Since Black-Scholes's model includes maturity of time, it matches with European stock option.

Nevertheless, Baillie and DeGennaro (1990) had different idea with Manaster and Koehler (1982). They used GARCH model to examine mean and variance. They explained the reason that they use Black-Scholes model that they assumed different distribution with Black-Scholes.

In their paper, they assumed market return should be a regression model with moving average disturbances. Thus, the variance equation should be a generalized autoregressive conditional heteroskedasticity (ARCH) model. However, ARCH model can explain only the volatility. Their testing would like to get the relationship between mean and variance process, so they suggest using GARCH model, introduced by Bollersev (1986).

According to their equation, it is a conditional normal distribution, which used a generalized autoregressive conditional heteroskedasticity or ARCH model with

included explanatory variables for estimate the effect of volatility. As a result, they found that there is a positive relation between a stock portfolio's expected returns and risk or variance of the asset price. In the other word, when the price increases, the volatility should decrease.

However, Engle and Victor (1993) had different idea. They observed and studied market volatility for Japanese stock market. They found that due to different market flow and information limitation. Black Scholes's model cannot explain all. They calculated the stock volatility by using stock price over the period and applying in EGARCH model, introduced by Nelson (1991) for analysis. EGARCH model is applied from GARCH model by using exponential into the model. This model is more simplify and more flexible, or to match with more data.

Moreover, in order to examine the market volatility, Chang and Wang (2002) suggested to estimate the volatility based on the parametric econometric models such as generalized autoregressive conditional hetero-skedasticity (GARCH) or stochastic volatility models, or the implied volatility based on option prices and a pricing model such as Black-Scholes, or the historical volatility cased on ex post squared or absolute returns.

They compared the calculated volatility with volatility index from the market. In their study, they used three methods for analysis that are Andersen, et el (2001) developed for a daily volatility estimator by summing intraday squared returns, Parkinson (1980) developed for the extreme value, and volatility index of Chicago Board Options Exchange (CBOE).

There were three methods that were used in their study. The first is the daily volatility, which is called in the paper as "high-frequency volatility", developed by Andersen, et. al (2001). They develop a daily volatility estimator by simply summing intraday squared return. The high-frequency volatility estimator is defined as:

$$\sigma_{High,t} = \sqrt{\sum_{i=1}^{1/\Delta} \left(log \frac{P_{t+i\Delta}}{P_{t+(i-1)\Delta}} \right)^2}$$

where

$\boldsymbol{\sigma}_{\text{High, t}}$ denotes the daily market volatility on day t

Δ denotes the number of 5- minute in one trading day

P_{t+h} denotes the intraday 5- minute S&P 500 index prices on day t

Since Chang and Wang (2002) sampled the data frequency of 5 minutes, it was enough to mostly avoid measurement error and log enough to avoid microstructure biases, referring to Anderson, et. el (2001). As previous discussion, they would like to prevent being sensitive to the particular volatility estimators used. They adopt two more methods. That are Parkinson (1980) and using the volatility on market index.

The second method is Parkinson (1980) method, which is called as "extremely volatility", is defined as:

$$\sigma_{HL,t} = 0.601 \ln(H_t/L_t)$$

where

H_t denotes the highest index prices on day t in the daily S&P 500 prices from Reuters Database

L_t denotes the lowest index prices on day t in the daily S&P 500 prices from Reuters Database

The last method is the volatility of an option on a market index, called as "volatility index ($\boldsymbol{\sigma}_{\text{VIX}}$), coming from the Chicago Board Options Exchange (CBOE). Their results from calculating those volatility methods find that all calculated volatilities have the same result with highly correlated.

However, to shorten their calculation, they use high-frequency volatility as the representative of volatility in their calculation due to highest value, and have the correlation with others.

According to previous studies, there are several methods to examine the volatility. However, it depends on the situation and data. Moreover, most of them consider on the developed markets such as US and/or UK stock market by using the

same direction of method such as GARCH and/or EARCH model. However, in emerging market, it may be suitable for different methods.

Referring to Worthington (2004), he examined the return and volatility among Asian equity market, including both of developed and emerging markets. The developed markets include Hong Kong, Japan and Singapore while the emerging markets include Indonesia, Korea, Malaysia, Philippines, Taiwan and Thailand. He use generalized autoregressive conditional heteroskedasticity (GARCH) model for his analysis.

His results showed that in developed country, volatility can measure as usual. However, in emerging markets, the volatility seems like the value indeterminate. Thus, he concluded that this model is not suitable for emerging markets.

However, Nopphon Tangjitprom (2010) got different result from Worthington's (2004). He examined the holiday effect in Thailand by studying the return and volatility before holiday. He studied the holiday effect in returns and volatility of the Stock Exchange of Thailand (SET). In part of volatility analysis, he used GARCH and EGARCH (1,1) models for analysis. He found that both models can be measureable Thai volatility accordingly.

As a result, the previous researches are shown that each market may match in different volatility measurement method. The researcher should use the one that match with market index. Hence, to match with selected data, this paper will analyze daily volatility by Parkinson (1980) method, examining the highest and lowest price index.

In the part of volatility-volume correlation, the correlation was started by Roll (1984). He used the trading cost in daily and weekly returns of stocks from the New York and American Exchanges to study the correlation between trading cost and firm size.

His results showed that there is a strongly negative relation to firm size. Since trading cost is related to the volatility, volatility is known as the financial instrument in the period of specific time. Due to his result about trading cost and firm size relation, he explained that the volatility of trading cost should affects by volume. In the other word, the volatility is affected by market microstructure.

Poon (1994) examined the relation between daily stock return volatility and stock trading volume. He sampled the options in CBOE from 1982-1985. He found

that the daily stock return volatility is significantly and positively correlated with contemporaneous option volume, but not one-day lagged option volume. These results suggest that contemporaneous option volume may be an important variable in modeling daily stock return volatility and heteroskedasticity.

Girard and Biswas (2007) investigated the relation between volatility and volume in 22 developed markets and 27 emerging markets. They separated results into two main results that are the result of developed market and the result of emerging market.

Compared to developed markets, emerging markets show a greater response to large information shocks and exhibit greater sensitivity to unexpected volume. They found a strongly negative relation between expected volume and volatility in several emerging markets.

Moreover, Gunduz and Hatemi-J (2005) explored the causal relationship between stock prices and volume figures for emerging markets for five East-Asian countries' stock markets in the Czech Republic, Hungary, Poland, Russia, and Turkey. They used Granger causality tests, based on Toda and Yamamoto (1995) procedure. Granger causality test is a well-known method to determine for one factor that forecast to another factor.

According to Gunduz and Hatemi (2005), they found that there is no causal relationship between the variables in the Czech Republic. Both of Hungary and Poland have bidirectional causality between stock price and/or return volatility and volume.

The rest did not show any feedback in the relationship both volume and market turnover. As a result, they concluded that even market in the same area, they showed different result or different market characteristics on the stock price/volume relation.

Pastor and Stambaugh (2010) studied the previous literature about the financial markets to understand the parameter that effect in the market, and to understand the relation of each parameters such as volatility, asset returns, stock price, portfolio choice, mutual fund flows, trading volume, and firm profitability.

They found that to scale in fund performance, the investors should study both of manager ability and degree of decreasing return with volatility. Although manager

ability effect to fund direction, volatility effect to the information, the same as Huan, Wei and Yan (2007, 2012), which would let investors make wrong decision.

Moreover, Brooks (1998) found an interesting issue. He studied a number of statistical models for predicting the daily stock return and volatility. He found that there is another relation that is the relationship between return and/or volatility and volume. His results showed that there is a stronger from volatility to volume than the other way around.

Additionally, Fung and Patterson (1999) examined the dynamic interactions among return volatilities, volume and market depth for five currency futures markets. They found that return volatility gets a strong effect from trading volume and market depth.

Chan and Fong (2000) examined the relation between volatility and volume as Brooks's testing. They examined the roles of the number of trades, size of trades, and order imbalance in explaining the volatility-volume relation for a sample of NYSE and Nasdaq stocks. They found that the order in large trade size categories affects the return more than in smaller size categories.

Wantanabe (2001) examined the relation between price volatility and trading volume for the Nikkei 225 stock index futures traded on the Osaka Securities Exchange (SOE). They also got the same result as previous studies that are a significant positive relation between volatility and volume.

Moreover, in part of relation, Chang and Wang (2002) tested not only the suitable volatility method but also the relation between daily flow and return, and between volatility and flow, including overall flow and inflow-outflow. In the first relation, they calculated a daily relation between equity mutual fund flow and NYSE index return during a time period from February, 1998 to June, 1999. They found that there is a high relation between flow and return.

Then, they tested the relation between the volatility (high-frequency volatility estimator) and flow. They developed the model by controlling for the lagged daily volatilities to reduce positive bias as:

$$\ln(\sigma_{High,t}) = Flow_t + \ln(\sigma_{High,t-1}) + \ln(\sigma_{High,t-2}) + \ln(\sigma_{High,t-3})$$

$$\ln(\sigma_{High,t}) = Flow_t + Dummy + \ln(\sigma_{High,t-1}) + \ln(\sigma_{High,t-2}) + \ln(\sigma_{High,t-3})$$

$$\ln(\sigma_{High,t}) = Flow_t + Dummy + TV_t + \ln(\sigma_{High,t-1}) + \ln(\sigma_{High,t-2}) + \ln(\sigma_{High,t-3})$$

where

$\boldsymbol{\sigma}_{High,t}$ denotes the high-frequency volatility estimator on day t

$Flow_t$ denotes the aggregate net mutual fund flow on day t

Dummy is defined as 1 when the market return on day t is positive and 0 when the market return on day t is negative

TV_t denotes the trading volume on day t

They found that there is a significantly negative relationship between volatility and flow, with t-statistic of -4.75. They implied that increased aggregate fund flow is associated with decreased market volatility. Moreover, they test another perspective of flow by their statement by testing the relationship between volatility and fund flows for both inflow and outflow.

To examine the impact of inflow and outflow on the market volatility respectively, they used the model as following:

$$\ln(\sigma_{High,t}) = Flow_t * D1 + Flow_t * D2 + \ln(\sigma_{High,t-1}) + \ln(\sigma_{High,t-2}) + \ln(\sigma_{High,t-3})$$

$$\ln(\sigma_{High,t}) = Flow_t * D1 + Flow_t * D2 + D3 + \ln(\sigma_{High,t-1}) + \ln(\sigma_{High,t-2}) + \ln(\sigma_{High,t-3})$$

$$\ln(\sigma_{High,t}) = Flow_t * D1 + Flow_t * D2 + D3 + TV_t + \ln(\sigma_{High,t-1}) + \ln(\sigma_{High,t-2}) + \ln(\sigma_{High,t-3})$$

where

D1 = 1 if $flow_t \geq 0$, and D1 = 0 if $flow_t < 0$;

D2 = 0 if $flow_t \geq 0$, and D1 = 0 if $flow_t < 0$;

D3 = 1 if $flow_t \geq 0$, and D1 = 0 if $flow_t < 0$;

They found that fund inflow is negatively related to market volatility while fund outflow is positively related to market volatility. Thus, the larger the cash flows, the less volatility in the market.

Based on the previous studies about the correlation between volatility-volume, the summary of the results is shown in table 2.3.

Table 2.3 Literature Review of the Correlation Between Volatility-Volume

Authors	**Market**	**Volatility-volume relation (+/-/0/N)**
Roll (1984)	-	-
Poon (1994)	Options in CBOE	+
Girand and Biswas (2007)	22 developed markets and 27 emerging markets	-
Gunduz and Hakmi-J (2005)	5 East-Asian markets CRSP	N
Hung, et al. (2007, 2012)	-	-
Brooks (1998)	-	0
Fung and Patterson (1999)	NYSE and Nasdaq Stocks	0
Chang and Fong (2000)	Nikkei	-
Watanab (2001)	-	+

Note: + denotes to positive relation, - denotes to negative relation, 0 denotes to not classify the direction, N denotes to no relation

According to previous studies as shown in table 2.3, Most of the previous studies showed that there is a relation between volatility and volume except only Gunduz and Hakmi (2005). Moreover, most of them explained that there is a negative relation between volatility and volume.

Based on these previous studies, they explained that a negative relation between volatility volume means that when there is a higher trading volume, the liquidity in the market is higher, effect to the lower volatility. As a result, this paper will examine the volatility-volume relation that there is a negative relation between volatility-volume in SET or not.

Consequently, this paper will examine the information content in the Stock Exchange of Thailand (SET). According to previous studies, there are two indicators for market flows that are returns and volatility. Moreover, this paper will specify information flow by trading volume. This paper will examine the correlation between returns and volume, and between volatility and volume.

Based on previous studies, this paper will set up the hypothesis for this testing. Since SET is in the emerging markets, the relation between returns and volume should be positive relation, and the relation between volatility and volume should be negative.

Moreover, this paper will analyze the correlation between information content and market flows for both of overall market and for each individual investor to find the main contribute investors.

However, before 2009, SET separated trader types as three types that are foreign, local and institution, and then, SET changed to separate it into four types by dividend the institution groups into two parts as institution and proprietary. Thus, the trader types changed from three groups into four groups that are foreign, local, institution and proprietary.

This paper will analyzed the data during 2003-2014, so this paper will analyze the trader effect for three groups that are foreign, local and institution, including institution and proprietary (for data during 2009-2014).

However, to robustness, this paper will examine for both of three groups and four groups. Firstly, this paper will analyze for three groups as foreign, local and institution, including institution and proprietary. Then, this paper will analyze as four groups that are foreign, local, institution and proprietary for data during 2009-2014.

According to previous researches, the foreign investors in the emerging markets as SET should have more information than others, and reflect more than others. Therefore, this paper will set up the hypothesis that SET should have asymmetric information by foreign traders.

As a result, this paper will explain the relation between asymmetric information with market flows by assuming that the trading volume is information transmission, and the market flows are return and volatility. The investors may use this relationship to compare with the expected trading volume and the expected trend of market flows. In addition, this paper studies about the information convey. The investors may be based on the information that impacted investors use for predicting the expected trading.

Moreover, there are several empirical studies that are interested in relation between the movement of price and trading volume. However, most of the papers

studied focus on only return-volume or volatility-volume; even, both of them indicated the movement of price. This paper will study for both of them, and understand the reason why the relation as is.

In addition, none of them studied the trader effect after SET changed the separation method or separated the investors into four groups. This paper will study the relation during the previous investor type or before changing the separation method, and after that, and then compare the result to see the bias if have.

Besides, this paper will test for causality in both of return and volatility, which none of the previous studies has been tested. According to Granger (1980), he explained about the causality test that causality test was the testing to consider on the related of the sample data in another term of definition. Based on the previous hypotheses set up, this causality test will set up the hypotheses as there is a positive relation for return, and negative relation for volatility.

Furthermore, this paper will explore the testing into the economic factors to prevent the robustness. There are numerous researches that study about the influence on market price. They explained that the external factors such as economic factors are the important factors that influence on stock market. As a result, to prevent the robustness, this paper will explore the model by adding the control variables such as those economic factors.

According to Chen, Roll and Ross (1986), they studied about the economic factors that influence on stock market in US stock market. They explained that the stock prices response on external factors, so they use asset-pricing theory and efficient-market theory for their analysis.

They assumed that there are several economic factors that influence on stock return such as industrial production, inflation, risk premia, term structure, capturing by rate of return, market indices, consumption and oil price. However, due to autocorrelation problem, they found that the monthly rate of return does not have correlation problem. As a result, they use monthly data for their analysis in asset pricing model as:

$$R = a + b_{MP}MP + b_{DEI}DEI + b_{UI}UI + b_{UPR}UPR + b_{UTS}UTS + c\,CG + e_t$$

$$R = a + b_{MP}MP + b_{DEI}DEI + b_{UI}UI + b_{UPR}UPR + b_{UTS}UTS + c\,OG + e_t$$

where

R refers to logarithm return

MP refers to monthly growth of industrial production, calculated by $log_e[IP(t)/IP(t-1)]$

DEI refers to change in expected inflation, calculated by $E[I(t-1)/t]-E[I(t)/t-1]$

UI refers to unexpected inflation, calculated by $I(t)-E[I(t)/t-1]$

UPR refers to risk premium, calculated by $Baa(t)-LGB(t)$

Baa refers to bond portfolio return

LGB refers to the return on long-term government bonds

UTS refers to term structure, calculated by $LGB(t)-TB(t-1)$

TB refers to the nominal interest rate

CG refers to real consumption, calculated by dividing the CITIBASE series of seasonally adjusted real consumption, excluding durables by Bureau of Census's monthly population estimates

OG refers to logarithm of producer price index or crude petroleum series

Their results showed that there are weakly significant in expected stock return with industrial production, inflation, risk premium and term structure. They explained that the industrial production effects to the risk premium by changing the yield curve. This changing also effects to the change of inflation, effecting to term structure. However, there is insignificant influence on pricing variables such as oil price, and consumption.

Nevertheless, Sadorsky (1999) argued with Chen, Roll and Ross (1986)'s result. He considered on the external factors such as oil price with stock market movement in US stock market. He studied about the effect of oil prices and oil price volatility in stock return by using autoregression. They found that after 1986, oil price has been the important factor in real stock return than interest rate do. Moreover, they also explored that since oil price becomes the main contribute in stock return, it also effects on the economy.

Cong, Wei, Jiao and Fan (2008) agreed with Sadorsky (1999). They studied about the relationship between oil price and stock market in Chinese stock market by using multivariate vector auto-regression. However, they found that oil price is an

important factor in stock index. The increasing of oil volatility increases the mining index and petrochemical index, which are the main contribution index in stock market. As a result, it raises the stock return. Thus, they concluded that oil price can explain stock return more than interest rate.

Apergis and Miller (2009) studied about the oil price change with stock-market return in eight countries (i.e Australia, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States) by using vector autoregression model. They found that all sample countries show the same result that the oil price changes has effected to the stock market return; however, it shows as the weakly significance.

Park and Ratti (2008) agreed with previous studies. They examined the oil price with market return in US and thirteen European countries during 1986 to 2005. They found that the oil price has a significant impact on real stock return during that time. They illustrated that when Norway, the oil exporter, increase oil price, the stock return has a positive response with that price due to the increasing of short-term interest rate.

They explained that cruel oil is one of the basic factors for economic growth. When the demand of economic growth increases, the oil price has been set up increased. In another part, when the demand of economic growth increases, the investment increases, effect to the stock returns also increases.

Besides the oil price, the economic factors such as exchange rate, interest rate or the return of government bond should be important factors that effect to stock market return, agreed with Chen, Roll and Ross (1986). They explained that those economic factors have weakly significant with stock return.

Griffin and Stulz (2001) examined that importance of exchange rate with stock return. Their results showed that the exchange rate increases, the industrial common stock increases, effecting to the stock return increases. They illustrated that the exchange rate is the important factor of international trading goods, so it effects to the economy.

Tai (2000) examined the reaction of market with interest rate and exchange rate in US stock by developing a multi-factor model. He developed the model by applying the three different models that are nonlinear seeming unrelated regression (NLSUR), pricing kernel approach by Dumas and Solnik (1995), and GARCH model.

He explained that the changes of interest rate and exchange rate directly effect to the bank stock return, both of large bank and regional bank stocks. He concluded that when interest rate changes, bank stock return has been changed.

Kasman, Vardar and Tunc (2011) investigated the effects of interest rate and foreign exchange rate on Turkish stock return by using OLS and GARCH models. Their results showed that both of interest rate and exchange rate have a strongly significant impact on the stock return. The interest rate has a negative significant impact due to the impact of investment opportunity; while, the exchange rate shows differently. It showed a positive in export industry; in contrast with bank industry.

Based on previous studies, the return has been affected on not only trading volume but also external factors such as economic prices such as interest rate, exchange rate, government bond rate, and oil price.

As a result, this paper will explore the dataset to prevent the robustness of return affect. This paper will investigate the impact of economic factors, oil price, and trading volume on SET market return by using the applied model to ensure that after adding the effected factors, the result still shows the same as is or not by each trader.

The exogenous factors that be examined in this paper will be based on the previous studies that are oil price, exchange rate and interest rate, including both of government bond rate and loaning rate. Based on the previous studies, this paper will set up the hypothesis based on their results that are oil price and exchange rate have a positively significant impact on stock return; while, interest rate has a negatively significant impact.

Moreover, this paper will explore this exogenous testing by each trader and by each direction of cash flow to prevent robustness. These hypotheses testing will separate the groups of investors the same as before that are foreign, local (or retail) and institution. The direction of cash flow will be separate as cash inflow (buy price > sell price), and cash outflow (buy price < sell price).

The hypotheses for this testing will be based on the trader effect testing that are only foreign investor effects to the movement of price or stock return in the positive way. However, the different of cash flow shows different of relation. The cash inflow shows the same direction as overall market; in contrast with cash outflow.

Based on these previous studies, there is a relation between exogenous factors and market return. This market return is one of the main indicators of market flows.

However, market volatility is one of them. Thus, these exogenous factors should impact on market volatility. This paper will analyze the exogenous testing for volatility and exogenous factors, the same as stock return.

From the previous studies, the volatility has a negative relation between volatility-volume. Some exogenous factors (i.e oil price or exchange rate) have the same relation with trading volume. The others have reverse relation with trading volume such as interest rate or rate of loan.

As a result, this paper will set up the hypotheses as oil price, exchange rate and trading volume have a negatively significant impact on stock volatility; in contrast with interest rate or rate of loan.

CHAPTER 3

DATA SELECTION AND METHODOLOGY

Most of previous studies are interested in US and/or European market for analysis; however, this paper will focus on the emerging market as Thai stock market. Moreover, this paper will separate the analysis into two parts that are the overall stock market relation and separate those relations into each investor group.

Before 2009, there were three groups of trader in SET that were retail (or domestic), foreign and institution. After that, the Stock Exchange of Thailand (SET) separated institution traders into two groups that are institution and proprietary traders. Thus, nowadays, there are four groups of traders in SET that are retail (or domestic), foreign, institution, and proprietary traders.

Our data come from the daily stock price in the Stock Exchange of Thailand market or SET, started on January 2, 2003- February 28, 2014 or 2,748 observations. The database includes date, price and volume for overall market as daily basis.

For investor group analysis, we collect data from the Stock Exchange of Thailand (SET) daily data by separate the price into three investors that are foreign, local, institution investors. Since two periods of time that traders have been separated, this paper will include both of institution and proprietary traders into one group the same as before 2009.

Thus, in this paper, the traders will present as three groups that are retail (or local), foreign and institution. The data started on January 2, 2003 to February 28, 2014 or 2,748 observations, the same period of overall market analysis. The database includes date, price, including buy and sell price and volume for each trader.

However, to robustness, this paper will analyze for trader effect into both of three groups that are foreign, local and institution, combining the data of institution and proprietary, and four groups that are foreign, local, institution and proprietary for data during 2009-2014, the period that SET already separated the trader types as four groups.

This paper will study about the information covey with stock markets flows. According to several studies, the information reflected to the price movement, indicated to the market flows. The information transmission is implied by trading volume. The market flows are indicated by return and volatility.

This paper will calculate for both of return and volatility analysis by daily basis in the same period of both of overall and investor group analysis, started on January 2, 2003 to February 28, 2014.

To understand the information conveys in the market, this paper will separate the methodologies into two main parts that are the overall market relation between return and/or volatility with volume to understand the information conveys in overall market and the trader effect by considering on the information asymmetry to analyze the influence trader in the market.

Based on the previous studies, their results showed that there is a positive relation between returns and volume, and a negative relation between volatility and volume. Thus, this paper will examine by referring to those the correlation direction. Firstly, this paper will calculate the returns for SET data by using the continuous compound returns, called as logarithm return. The equation should be as:

$$r_{log} = ln\left(\frac{P_{t+1}}{P_t}\right)$$

where

r refers to logarithm returns

P_{t+1} and P_t refer to final price and initial price respectively

According to the previous empirical researches, there are several methods to analyze volatility, based on market behavior. In order to examine the volatility for the Stock Exchange of Thailand, this paper collects data as daily index. As a result, this paper will examine the volatility by using Parkinson's (1980) method, based on Chang and Wang (2002).

Parkinson (1980) estimated the volatility of returns for random walks using the high and low in any particular period. He assumed that prices are observed on a fixed time interval as n = 10, 20, 30, 60, 90, 120, 150, 180 days, which is defined as:

$$\boldsymbol{\sigma}\mathrm{p} = \frac{\sqrt{\sum_{t=1}^{n} \frac{1}{4\ln 2}\left(\ln\frac{P_H}{P_L}\right)^2}}{n}$$

where

P_H and P_L denote respectively the highest and lowest index prices on day t in SET. This paper calls this volatility as “Extremely volatility”.

This paper will separate into two main sections that are the volatility-volume relation and/or the return-volume relation, and examine the direction that the resutls should show the same as previous studies that are the positive return-volume relation and negative volatility-volume relation.

In this second part, this paper applies model from Chang and Wang’s (2002) equation of flow-return and flow-volatility equations to volume-return and volume-volatility equations. The trading volume in this paper implies to the information as previous researches.

The paper uses the differentiated for each factor for each individual investor to find the group that impact to the stock return. This paper separates the investor groups into three groups; even SET separates into four. Since this paper uses data cover 2003-2014, it also covers the period before SET separate into four groups.

Three investor groups in this paper include retail (or local investor), foreign, and institution, including fund and institution. Based on the previous study, there are several empirical studies that are interested in information content in each individual group fund flows.

For Asian market, most of them got the same result that foreign is the main contributor. However, there is another interesting study that study for SET (i.e Tanthanangkuskkun, Treepongkaruna, Wee and Brooks (2011)). They studied only SET, excluded foreign investors. They found that local also reflected the market flows.

Thus, this paper will examine in each individual group to understand that foreign and/or local reflect to SET or not. Moreover, another group (or institution) also reflects to SET or not.

This paper applies this correlation model that uses for overall market for testing in both of volatility-volume relation and/or the return-volume relation by

differentiated the model for each individual group. Moreover, this paper also applies those models in each group of investors and both of inflow and outflow statement to understand more each impact in each cash flow statement.

However, for hypothesis testing, this paper will use t-test model. T-test model is appropriate for normal distribution. As a result, this paper will examine SET data during 2003-2014 that the data is normal distribution or not for both of return and volatility, shown in Appendix A.

According to Chang and Wang (2002), they studied about the volatility and mutual fund flow. They found that the tested data distributed as normal distribution in term of logarithm.

The result of the data testing in Appendix A shows that SET data distributes as normal distribution when taking logarithm in both of return and volatility. However, the relation between logarithm return and volume, and between logarithm volatility and volume show a weak positive relation and a weak negative relation respectively due to autocorrelation.

According to Chang and Wang (2002), this paper applied their model for return-flow, and volatility-flow testing to the paper's equations. They suggested to include the lagged returns and/or lagged volatility to prevent positive bias in the regression. They explained that the regression should be biased and incorrect results, so the controlled variables as lagged factors should eliminate those problems, agreed with Durdin (1970)

Durdin (1970) explained about the time-series regression that autocorrelation problem had been occurred in time-series regression model. He illustrated that the problems showed when the regression was constant, or lagged dependent variable was excluded.

Based on those previous suggestions, the autocorrelation may occur in the time series data. It is one of the types of correlation that use for measuring the value of time series, and checking the value of data depending on their own past values or not. As a result, this paper examines the lag time series for both of return and volatility, shown in Appendix B. The result shows that there is a lag 3 data.

For that reason, to avoid that autocorrelation problem, this paper will add up lagged variables into both of return and volatility equation. However, according to

Chang and Wang's (2002) testing, three-time lagged variables should be enough for market flow testing. Hence, this paper will apply Chang and Wang's equation with adding up three-time lagged variables.

In addition, Chang and Wang (2002) also suggested that the testing equation should add the dummy variable in. They explained that it is an explanatory variable to show the trend of return or volatility in bull and/or markets or for observing the asymmetric effect. However, this dummy variable does not effect to the flow.

Consequence, this paper will replicate this idea of the dummy variable, and add this variable in the equation. The dummy variable is defined as 1 when market return is positive, and 0 when market return is negative. If the relation between dummy variable is positive with return or variable, it means bull market shows higher return or volatility than bear market.

For that reason, this paper will apply Chang and Wang's (2002) model that they examine for finding the correlation between volatility and mutual fund flows, and adding lagged variables and dummy variable in the equation for avoid autocorrelation problem and observing the asymmetric effect respectively.

To ensure that the model fits with dataset, according to Wikipedia (2014), it explained that F-test in ANOVA is illustrated that the F-test has been compared the statistic model with the dataset. Thus, if there is a significant F, it meant the model fit with the dataset.

As a result, this paper will examine F-test to ensure that the applied equation is suitable for examined dataset, and do the hypothesis testing for F-test that the model fits with dataset or not.

Moreover, in the part of relation testing, this paper uses the t-test for analysis in the applied equation, which already be accepted hypothesis testing by F-test, to observe the direction of correlation in each particular investor.

The testing models for the return-volume relation after controlling for lagged returns and volatility-volume relation after controlling for lagged weekly volatilities respectively are shown as:

$$r_t = a + b\, r_{t-1} + c\, r_{t-2} + d\, r_{t-3} + e \ln(v_t) + f\, Dummy + \varepsilon_t$$

where

r_t refers to logarithm stock return at t or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$

$r_{t-1,}$ $r_{t-2,}$ r_{t-3} refers to lagged logarithm return at time t-1, t-2 and t-3 respectively

v_t refers to trading volume at t time

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

$$\ln(\sigma_t) = a + b\ ln(\sigma_{t-1}) + c\ ln(\sigma_{t-2}) + d\ ln(\sigma_{t-3}) + e\ ln(v_t) + f\ Dummy + \varepsilon_t$$

where

$\boldsymbol{\sigma}_t$ refer to stock volatility or periodic volatility at t time

$\boldsymbol{\sigma}_{t-1,}$ $\boldsymbol{\sigma}_{t-2,}$ $\boldsymbol{\sigma}_{t-3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively

v_t refers to trading volume at t time

Dummy is defined as 1 when market return is positive, 0 when market return is negative

ε_t refers to the error term at t time

Moreover, this paper would like to understand about the information convey in each trader. According to Ross (1989), and Mahajan and Singh (2009), volatility can be the indicator of information asymmetry. Thus, this paper will examine the relation between return-volume and volatility-volume relations for each group of investors as the following models.

The following models represent for the relation between returns-volume after controlling for lagged returns and volatility-volume respectively.

The relation between returns-volume is shown as:

$$r_{x,t} = a + b\ r_{x,t-1} + c\ r_{x,t-2} + d\ r_{x,t-3} + e\ ln(G_{x,t}) + f\ Dummy_x + \varepsilon_{x,t}$$

$$r_{x,t} = a + b\ r_{x,t-1} + c\ r_{x,t-2} + d\ r_{x,t-3} + e\ ln\left(\frac{B_{x,t}}{S_{x,t}}\right) + f\ Dummy_x + \varepsilon_{x,t}$$

where

r_t refers to logarithm stock return at t time or Ln (r_t) = Ln $\left(\frac{5t}{5t-1}\right)$ for trader groups, defined as group 1 (foreigners), group 2 (local) and group 3 (institution and propriety)

$r_{t-1,}\, r_{t-2,}\, r_{t-3}$ refers to lagged logarithm return at time t-1, t-2 and t-3 respectively for each trader group

Dummy is defined as 1 when return is positive, and 0 when return is negative

G_t refers to the growth of fund at t time

B_t refers to buy price for overall market at t time

S_t refers to sell price for overall market at t time

ε_t refers to the error term at t time

The relation between volatility-volume is shown as:

$$\ln(\sigma_{x,t}) = a + b\ ln(\sigma_{x,t-1}) + c\ ln(\sigma_{x,t-2}) + d\ ln(\sigma_{x,t-3}) + e\ ln(G_{x,t}) + f\ Dummy_x + \varepsilon_{x,t}$$

$$\ln(\sigma_{x,t}) = a + b\ ln(\sigma_{x,t-1}) + c\ ln(\sigma_{x,t-2}) + d\ ln(\sigma_{x,t-3}) + e\ ln\left(\frac{B_{x,t}}{S_{x,t}}\right) + f\ Dummy_x + \varepsilon_{x,t}$$

where

$\boldsymbol{\sigma}_t$ refer to stock volatility or periodic volatility at t time for trader groups, defined as group 1 (foreigners), group 2 (local) and group 3 (institution and propriety)

$\boldsymbol{\sigma}_{t-1,}\, \boldsymbol{\sigma}_{t-2,}\, \boldsymbol{\sigma}_{t-3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively for each trader group

v_t refers to trading volume at t time

Dummy is defined as 1 when market return is positive, 0 when market return is negative

G_t refers to the growth of fund at t time

B_t refers to buy price for overall market at t time

S_t refers to sell price for overall market at t time

ε_t refers to the error term at t time

Moreover, this paper would like to understand more about these relations, both of returns-volume relation and volatility-volume relation. This paper studies more about the relations for each cash flow to know how effect in each cash flow for each individual trader.

There are two cash flow that are inflow for the cash flow that $B_t > S_t$, and out flow for the cash from that $B_t < S_t$. The equations for the testing, both of returns-volume relation and volatility-volume are shown in the following equations:
The equations of the relation between returns-volume for both inflow and outflow are shown as:

$$r_{x,it} = a + b\, r_{x,it-1} + c\, r_{x,it-2} + d\, r_{x,it-3} + e\, ln\left(\frac{B_{x,it}}{S_{x,it}}\right) + f\, Dummy_x + \varepsilon_{x,it}$$

$$r_{x,ot} = a + b\, r_{x,ot-1} + c\, r_{x,ot-2} + d\, r_{x,ot-3} + e\, ln\left(\frac{B_{x,ot}}{S_{x,ot}}\right) + f\, Dummy_x + \varepsilon_{x,ot}$$

where

r_{it} refers to logarithm stock return at t time or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$in cash inflow ($B_t > S_t$) for group x, defined as group 1 (foreigners), group 2 (local), and group 3 (institution and propriety)

$r_{it-1}, r_{it-2}, r_{it-3}$ refers to lagged logarithm return at time t-1, t-2 and t-3 respectively in cash inflow for each trader group

r_{ot} refers to stock return at t time or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$in cash outflow ($B_t < S_t$) for group x, defined as group 1 (foreigners), group 2 (local), and group 3 (institution and propriety)

$r_{ot-1}, r_{ot-2}, r_{ot-3}$ refers to lagged return at time t-1, t-2 and t-3 respectively in cash outflow for each trader group

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

The equations of the relation between volatility-volume for both inflow and outflow are shown below respectively:

$$\ln(\sigma_{x,it}) = a + b\ ln(\sigma_{x,it-1}) + c\ ln(\sigma_{x,it-2}) + d\ ln(\sigma_{x,it-3}) + e\ ln\left(\frac{B_{x,it}}{S_{x,it}}\right) + f\ Dummy_x + \varepsilon_{x,it}$$

Where

$\boldsymbol{\sigma}_{x,\,it}$ refers to the volatility at t time for cash inflow ($B_t > S_t$) for each trader group (x)

$\boldsymbol{\sigma}_{t\text{-}1}, \boldsymbol{\sigma}_{t\text{-}2}, \boldsymbol{\sigma}_{t\text{-}3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively for each trader group

Dummy is defined as 1 when return is positive, and 0 when return is negative

$B_{x,\,it}$ refers to buy price in cash inflow ($B_t > S_t$) at t time for trader x group

$S_{x,\,it}$ refers to sell price in cash inflow ($B_t > S_t$) at t time for trader x group

$$\ln(\sigma_{x,ot}) = a + b\ ln(\sigma_{x,ot-1}) + c\ ln(\sigma_{x,ot-2}) + d\ ln(\sigma_{x,ot-3}) + e\ ln\left(\frac{B_{x,ot}}{S_{x,ot}}\right) + f\ Dummy_x + \varepsilon_{x,ot}$$

Where

$\boldsymbol{\sigma}_{x,\,ot}$ refers to the volatility at t time for cash outflow ($B_t < S_t$)for each trader group (x)

$\boldsymbol{\sigma}_{t\text{-}1}, \boldsymbol{\sigma}_{t\text{-}2}, \boldsymbol{\sigma}_{t\text{-}3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively for each trader group

Dummy is defined as 1 when return is positive, and 0 when return is negative

$B_{x,\,ot}$ refers to buy price in cash outflow (Bt < St) at t time for trader x group

$S_{x,\,ot}$ refer to sell price in cash outflow (Bt < St) at t time for trader x group

ε_t refers to the error term at t time

This paper uses those models for examining the relationships for both of return-volume and/or volatility-volume for both of overall market flows and each group of investors to find the main contribution group in Thai stock market.

For examine the relation trading volume with price movement, indicated by return. There are several empirical researches about the relation between stock return-volume. According to Chuang and Kuan (2009), they investigated the causal relations

between stock return and volume based on quantile regressions. They found that volume has a positive relation of return on volume, agreed by Salman (2002) and Chung and Kuan (2005).

Salman (2002) examined the risk-return-volume relationship in the Ýstanbul Stock Exchange (ISE) or emerging market for the period 2 January 1992 to 29 May 1998. He found that the changes in volume have a positive effect on returns.

Chung and Kuan (2005) examined the relationship between the stock return and trading volume in Taiwan and U.S. Stock Exchanges using quantile regression. The empirical results showed that the return-volume relations in these two markets are different.

For Taiwan data, there are significant positive return-volume relations across quantiles, showing that a large positive return was usually accompanied by a large trading volume and a large negative return with a small trading volume. However, for U.S. data, return-volume relations exhibit symmetric V-shaped across quantiles, showing that a large return (in either sign) is usually accompanied by a large trading volume, but mostly are in stable.

From the previous studies, it can conclude that most of the emerging markets show the same result that there is a positive relation between return-volume. As a result, this paper will set up the hypothesis testing for return and volume relation that SET should show the same result as other emerging market that there is a positive relation between return-volume.

In part of relation between volatility-volume, there are also numerous researches that study about this relationship. Salman (2002) examined the risk-return-volume relationship in emerging market during 2 January 1992 to 29 May 1998. He found that there is a reverse effect in volatility-volume relation, agreed by Mahajan and Singh (2009).

According to Mahajan and Singh (2009), they examined the empirical relationship between return, volume and volatility of stock market by using daily data of the Sensitive Index (SENSEX) during the period from October 1996 to March 2006. Their results showed that there is a positive relationship between volume and return while there is a negative correlation between volume and return volatility.

Moreover, according to Tanthanongsakkun, Treepongkaruna, Wee and Brooks (2011), they tested the volatility by using bi-power variance method for SET during

1999-2010. However, they mentioned that their results have different from the previous studies. They found that there is a positive relation between volatility and volume. However, they also mentioned about their volatility result that there is an error found out.

According to previous studies, emerging markets showed that there is a negative relation between volatility-volume. Therefore, this paper sets up the hypothesis as there is a negative volatility-volume relation in SET.

Moreover, this paper also examines the relation for both of return-volume, and volatility-volume. The cash inflow in this paper will represent the cash flow that buy price is higher than sell price. On the other hand, cash outflow represents the cash flow that sell price is higher than buy price.

As a result, to be matched with the hypothesis of return-volume, the hypotheses for inflow and outflow should be there is a positive relation between returns-volume for cash inflow, and there is a negative relation between returns-volume for cash outflow.

For volatility-volume relation, referring to Chang and Wang (2002)'s study, they test the volatility-volume relation. They found that there is a negative relation between volatility and volume in cash inflow; in contrast with the cash outflow.

For that reason, this paper sets up the hypothesis for the volatility-volume relation by referring the previous study's result. There is a negative relation between volatility and volume in cash inflow while there is a positive relation between volatility and volume in cash outflow.

Consequently, the hypotheses for this paper will be there is a positive return-volume relation, especially in cash inflow; however, there is a negative one in cash outflow. However, there is a negative volatility-volume relation, especially in cash inflow in contrast with cash outflow. This paper will examine those hypotheses testing for each trader to find the main impacted trader in market flows.

Moreover, this paper will test for causality test for volume-return and volume-volatility relation to check the relation in another way around. According to these hypotheses testing, the equation for causality test in the volume-return, and the volume-volatility will be:

$$\ln(v_t) = a + b\ln(v_{t-1}) + c\ln(v_{t-2}) + d\ln(v_{t-3}) + e\, r_t + f\ Dummy + \varepsilon_t$$

$$\ln(v_t) = a + b\ln(v_{t-1}) + c\ln(v_{t-2}) + d\ln(v_{t-3}) + e\ln(\sigma_t) + f\ Dummy + \varepsilon_t$$

where

v_t refers to trading volume at time t

$v_{t-1}, v_{t-2}, v_{t-3}$ refers to lagged trading volume at time t-1, t-2 and t-3 respectively

r_t refers to logarithm stock return at time t

σ_t refers to volatility at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

However, there is none of the previous papers that test for these ones before. The hypotheses will be set up, based on the previous ones that are there is a positive relation between volume-return, but there is a negative relation between volume-volatility.

For that reason, this paper will examine the hypotheses testing. Firstly, this paper will examine for F-test to ensure that the model is suitable for each dataset. Then, examine for t-test to find the relation between return-volume and volatility-volume for overall market. The hypotheses for this testing will be based on previous researches that are there is a positive relation between return-volume, and a negative one for volatility-volume.

After that, this paper will examine for trader effect in SET, which testing into two steps that are for three-group, and four-group of investors to prevent the robustness. Each of them will test the dataset in during 2003-2014 for three investor groups that are foreign, local and institution, including data of institution and proprietary, and in during 2009-2014 for four investor groups, the same as existing SET traders that are foreign, local, institution and proprietary.

The hypotheses for this testing will be based on previous studies that are only foreign have a positive relation between return-volume, and a negative relation between volatility-volume.

Moreover, this paper will add up by testing in each cash flow for impacted investor. Cash inflow represents for cash flow that buy price is higher than sell price,

and cash outflow represents oppositely. As a result, the hypotheses for this cash flow testing will be as there is a positive relation between return-volume; in contrast with cash outflow. There is a negative relation between volatility-volume; in contrast with cash outflow.

In addition, this paper will do the causality test for volume-return and volume-volatility to find the relation in another way around for each relation. The hypotheses for this testing will be based on the previous relation test in previous step that are there is a positive relation between volume-return, and a negative one for volume-volatility.

To prevent the robustness, based on previous studies, not only trading volume but also exogenous factors such as economic factors or oil price effect to the stock-market return. This paper will examine those factors in applied model to ensure that getting the same result. The applied model for exogenous testing should be:

$$r_t = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f \ln(v_t) + g\ Dummy + \varepsilon_t$$

where

r_t refers to logarithm return at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

v_t refers to trading volume at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

According to this model, this paper will examine the hypotheses testing for each trader to testing the robustness preventive. The hypotheses will be set up based

on the previous studies that not only trading volume but also exogenous factors that effect on stock return. As previous discussion, the trading volume, oil price and exchange rate have a positively significant impact on stock-market return; while, the rate of return for both of government bond and loan have a negatively significant impact.

Moreover, this paper will examine this exogenous testing by each trader and by each direction of cash flow for the impacted investor to prevent the robustness, and compare the result with the trader effect testing. These hypotheses testing will separate the groups of investors the same as before that are foreign, local (or retail) and institution. The direction of cash flow will be separate as cash inflow (buy price > sell price), and cash outflow (buy price < sell price). The hypotheses testing's model will be as:

$$r_{x,t} = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_{x,t}) + g\,Dummy_x + \varepsilon_t$$

where

$r_{x,t}$ refers to logarithm return for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

$V_{x,t}$ refers to trading volume for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

The hypotheses for this testing will be based on the trader effect testing that are only foreign investor effects to the movement of price or stock return in the positive way. However, the different of cash flow shows different of relation. The cash inflow shows the same direction as overall market; in contrast with cash outflow.

As a result, the hypotheses for this testing will be oil price, exchange rate and trading volume have a positive relation with return; while, interest rate has negatively significance. Moreover, based on the previous testing, only foreign investor shows a significant impact on return.

Based on these previous studies, the market return and volatility are the main indicators of market flows. According the previous researches, the exogenous factors such as oil price, exchange rate, interest rate and/or rate of loan have relation with market return. Thus, these exogenous factors should impact on market volatility.

This paper will analyze the exogenous testing for volatility and exogenous factors, the same as stock return. From the previous studies, the volatility has a negative relation with trading volume. Some exogenous factors (i.e oil price or exchange rate) have the same relation with trading volume. The others have reverse relation with trading volume such as interest rate or rate of loan.

As a result, this paper will set up the hypotheses as oil price, exchange rate and trading volume have a negatively significant impact on stock volatility; in contrast with interest rate or rate of loan. The model for this testing will applied from the one that testing for return as:

$$\ln(\sigma_t) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_t) + g\,Dummy + \varepsilon_t$$

where

$\boldsymbol{\sigma_t}$ refers to volatility at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

v_t refers to trading volume at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

Moreover, the same as exogenous testing in return, this paper will examine the relation between exogenous testing and trading volume with volatility for each trader, and by each direction of cash flow, and compare the result with trader effect to prevent the robustness. The model will be as:

$$\ln(\sigma_{x,t}) = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{x,t}) + g\ Dummy + \varepsilon_t$$

where

$\sigma_{x,t}$ refers to volatility for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

$V_{x,t}$ refers to trading volume for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

The hypotheses for this testing will be based on the trader effect's testing that are oil price, exchange rate and trading volume have a negatively significant impact on volatility; unlike interest rate and rate of loan.

Consequently, this paper will examine the impact on stock market flows, indicated by stock return and volatility, mainly on asymmetric information. There are several studies on the asymmetric information, effecting to market flows especially on return and volatility. Most of those researches assumed that the information transmission implied by trading volume. Thus, the trading volume effects to both of return and volatility. Their results showed that return has a positively significant impact on trading volume; while, volatility has a negatively impact.

This paper will examine the correlation between return and volatility, and trading volume to understand the impact of stock market flows by asymmetric information by each trader. Nevertheless, this paper is different from the previous one. This paper will examine the causality test to understand the correlation whether return and volatility also impact on trading volume or not. Moreover, this paper will compare a result for the group of traders. Since SET has changed the trader-separation method, this paper will compare the analysis of dataset, which separate in previous method and existing method.

In addition, there are numerous studies that explore the impact on market flows. They explained that exogenous factors such as economic factors (i.e the rate of return of government bond or the rate of return of loan) and oil price also impact on market flows. Most of them illustrated that oil price and exchange rate have a positively significant impact on return; in contrast with interest rate. As a result, this paper will examine and compare the result between the model with and without exogenous factors to prevent the robustness.

CHAPTER 4

ANALYSIS OF RESULTS

4.1 Returns and Volatility Results

For the overall stock market, this paper would like to examine the relation between returns and/or volatility with volume for overall stock market by using data during January 2003 to February 2014 from the Stock Exchange of Thailand. Firstly, this paper examines daily SET returns in the period of January 2003-February 2014 or 2,748 observations by using logarithm return, shown in Figure 4.1.

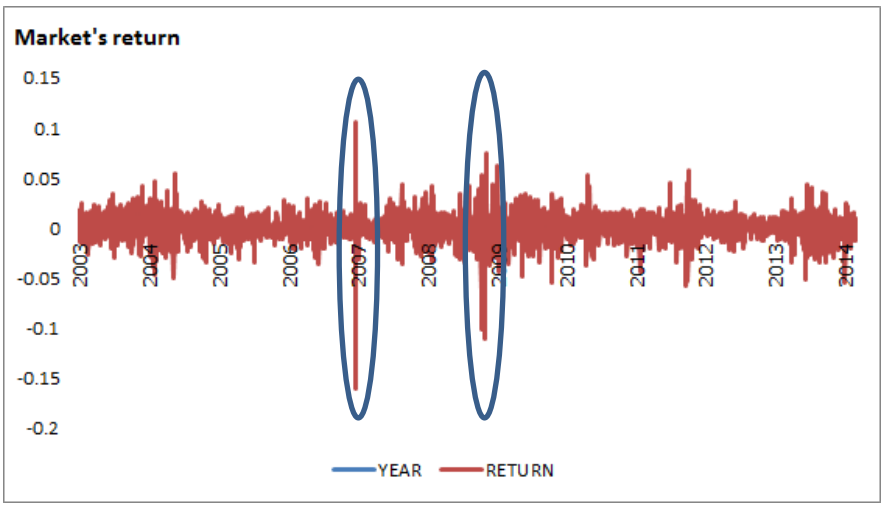

Figure 4.1 Time Series of Daily Returns of SET

Figure 4.1 shows the time series of daily returns of SET, covering the period from January 2, 2003 through February 28, 2014, for a total of 2,748 observations. The returns obviously fluctuates, in 2007, the highest return is around 0.12 to the lowest return is approximately -0.17 vs average 0.001, or the started period of Sub-prime crisis, and in 2009 or during global economic crisis, started in Q3 2008 to 2009. Dooley and Hutchison's (2009) studied the stock return in emerging market during Sub-prime crisis, started in 2007 to summer in 2008. They explained that emerging

markets respond very strongly to the deteriorating situation in the U.S. financial system and real economy.

Their regression "event study," focusing on 15 types of news, indicated that the real economic news emanating from the US had statistically and economically large impacts on 14 emerging markets and several news events uniformly move markets.

Moreover, Dooley and Hutchison's (2009) studied the stock return in emerging market during Sub-prime crisis, started in 2007 to summer in 2008. They explained that emerging markets responded very strongly to the deteriorating situation in the U.S. financial system and real economy. Their regression "event study," focusing on 15 types of news, indicated that the real economic news emanating from the US had statistically and economically large impacts on 14 emerging markets and several news events uniformly moved markets.

In order of volatility, the paper analyzes the volatility as daily basis by using highest and lowest price index for calculation, called as Parkinson's (1980) method, representing in this paper as σp. Parkinson (1980) developed the model to find volatility by calculating the extreme value as highest and lowest price in the fix period of time, shown in figure 4.2**.**

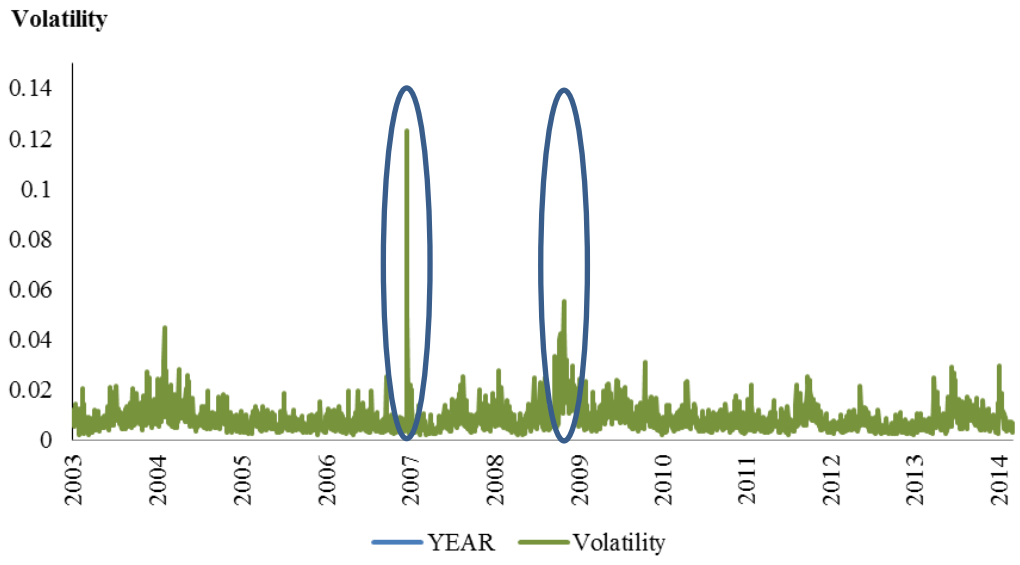

Figure 4.2 Parkinson (1980) Volatility

Figure 4.2 shows the volatility of daily SET data by using Parkinson (1980) method, which analyzing the highest and lowest price of the period of time. Parkinson method examines the highest and lowest price index for each day in SET, covering the period from January 2, 2003 through February 28, 2014. It is shown the same trend as the result in return that the volatility gets the unusual number during 2007 and 2009 due to sub-prime crisis and global economic crisis, respectively.

Based on previous studies, both of return and volatility indicated the price movement. According to the results from both of return and volatility, shown in figure 4.1 and figure 4.2, they support those idea that there are peak in price movement during 2007 and 2009 due to economic crisis during those time periods.

However, this paper would like to study about the information convey that reflect to the SET price index. According to Ross (1989), and Mahajan and Singh (2009), volatility can be the indicator of information asymmetry, referring to trading volume, so they studied about the relationship between trading volume and volatility.

As a result, based on previous researches, this paper assumes that the trading volume will refer to the information convey, and the price movement that reflected by asymmetric information will be represented by return and volatility. Thus, this paper will study about the return-trading volume relation and volatility-trading volume relation for understanding the information convey for each trader type to find the main impact investor, or which investor that has more information than others.

4.2 Trader Effect Result

According to Ross (1989) and Mahajan and Singh (2009), volatility can be the indicator of information asymmetry. Thus, this paper will examine the relation between return-volume and volatility-volume relations for each group of investors to find the main contribute investor and to find which trader group that has more information than others.

This paper separates into two main parts that are the relation of overall stock market testing and the relation in each group of investor, respectively. The objectives of testing the overall stock market are to understand the relation in the overall market first, and to ensure that the main contributor has the same trend of relation with

overall market or not. Otherwise, the relation in each group of investor is to test of trader effect directly. This testing is to find the main contributor and the main group that has information asymmetry, or to know asymmetric information between traders.

4.2.1 Overall Market Relation Result

Based on the previous studies, the correlation between return-volume and volatility-volume reflect to the overall stock market's performance. However, the results show that there are the positive relation between return-volume and negative relation between volatility-volume. In the other word, when volume increases, return increases, but volatility decreases.

As a result, this paper will examine the trader effect for overall market by analyzing the positive return-volume relation and the negative volatility-volume relation. In the trader effect calculation, firstly, we will test the overall stock market for both relations by using differentiate of return-volume and volatility-volume to understand the overall markets relation by the following models respectively:

$$r_t = a + b\, r_{t-1} + c\, r_{t-2} + d\, r_{t-3} + e \ln(v_t) + f\, Dummy + \varepsilon_t$$

where

r_t refers to stock return at t or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$

$r_{t-1}, r_{t-2}, r_{t-3}$ refers to lagged return at time t-1, t-2 and t-3 respectively

v_t refers to trading volume at t time

Dummy is defined as 1 when return is positive, and 0 when return is negative

$$\ln(\sigma_t) = a + b\, ln(\sigma_{t-1}) + c\, ln(\sigma_{t-2}) + d\, ln(\sigma_{t-3}) + e\, ln(v_t) + Dummy + \varepsilon_t$$

where

$\boldsymbol{\sigma}_t$ refer to stock volatility or periodic volatility at t time

$\boldsymbol{\sigma}_{t-1}, \boldsymbol{\sigma}_{t-2}, \boldsymbol{\sigma}_{t-3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively

v_t refers to trading volume at t time

Dummy is defined as 1 when market return is positive, or else is 0

According to previous studies, most of the studied with emerging market has the same result that there was a positive relation between returns-volume; even, the developed market has the reverse result. As a result, this paper will examine the relation between returns and volume for the Stock Exchange of Thailand with the hypothesis as there is a positive relation between return-volume for Thai stock market as the following test. The result of the return-volume relation is shown in table 4.1:

Hypothesis I There is a positive relation between return-volume for Thai stock market

$$r_t = a + b\, r_{t-1} + c\, r_{t-2} + d\, r_{t-3} + e \ln(v_t) + f\, Dummy + \varepsilon_t$$

Time period: January 2003-February 2014 (2,727 observations)

Table 4.1 Regression of Return-Volume Relation

Regression Statistic	
R Square	75.17%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.4012	0.0802	1647.3730	0.0000
Residual	2,721	0.1325	0.0000		
Total	2,726	0.5338			

	Coefficients	t Stat	P-value
Intercept	-0.0046	-1.1224	0.2618
Ln (v)	0.0925*	49.0001	0.0000
Dummy	0.0137*	51.0197	0.0000
r_{t-1}	0.4868*	40.7358	0.0000
r_{t-2}	0.0257	1.8740	0.0610
r_{t-3}	-0.01785	-1.8634	0.0625

Note: *Significant at 0.05 level, two-tailed test

Table 4.1 indicates that the model fits with the dataset, shown in hypothesis accepted in F-Test. There is a positive correlation between return-volume or accepts the hypothesis, which is the same result as previous studies and Chan, Firth and Oliver (2001). They tested the dynamic relation between returns, volume, and volatility of stock indexes from 1973 to 2000. The results show a positive correlation between trading volume and return.

In part of dummy variable, the result is shown that there is a positive correlation between dummy and return. Thus, it is indicated when stock flow is up, the returns also show the same trend as market stock flows.

Another interesting relation is the relation between volatility-volume. This paper will find the relation between volatility, based on frequency volatility, and volume by setting the hypothesis to be the same as previous studies that there is a negative relation between volatility of returns and volume as shown in the following table, table 4.2:

Hypothesis II There is a negative relation between volatility-volume for Thai stock market

$$\ln(\sigma_t) = a + b\ ln(\sigma_{t-1}) + c\ ln(\sigma_{t-2}) + d\ ln(\sigma_{t-3}) + e\ ln(v_t) + f\ Dummy + \varepsilon_t$$

Time period: January 2003-February 2014 (2,727 observations)

Table 4.2 Regression of Volatility-Volume Relation

Regression Statistics	
R Square	34.27%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	243.5019	48.7004	283.8910	0.0000
Residual	2,721	466.9484	0.1715		
Total	2,726	710.4504			

Table 4.2 (Continued)

	Coefficients	t Stat	P-value
Intercept	-0.7277	-2.7064	0.0068
Ln (v)	-0.4325*	-3.8744	0.0007
Dummy	0.4370*	2.7475	0.0006
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.3673*	19.2906	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.2076*	10.4615	0.0000
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.1213*	6.3708	0.0000

Note: *Significant at 0.05 level, two-tailed test

Table 4.2 illustrates that the hypothesis in F-test is accepted or the model fits with the dataset. Moreover, there is a negative relation between volatility-volume, or the results show that accept the hypothesis. According to Li and Wu (2006), they agreed with the result that volatility is negatively related to trading volume. Moreover, there is a positive correlation between returns and volatility or the bull market has higher volatility than bear market.

According hypothesis testing, it is shown that Thai stock market, period of 2003- February 28, 2014, there is a positive relation between return and volume, but a negative relation between volatility and volume. Thus, when the return increases or price changes, volume increases. However, when the volume increases, the volatility will be decreased.

4.2.2 Trader Relation Result

According to Ross (1989), and Mahajan and Singh (2009), they mention about volatility as a main indicator of information asymmetry. Thus, this paper will examine the relation between return-volume and volatility-volume relations for each group of investors to find the main contribute investor and to find which trader group that has more information than others.

To calculate the relation of returns-volume and the relation of volatility-volume for each trader, this paper will test the relation as the relation of return-buy/sell price and volatility-buy/sell price for each trader respectively. Since this

paper testing period covers period of 2003-2014, it covers both of the periods that SET changes the method to separate the investors. In 2009, SET changed to separated trader groups from 3 groups to 4 groups by divided the institution into two groups that were institution and proprietary trader.

To prevent the robustness, this paper will analyze both of three-group analysis and four-group analysis. Firstly, this paper will examine for three-group analysis, and then, four-group analysis, and compare the result. However, due to the same market, this paper will set up the hypotheses to be the same for both analyses.

For three-group analysis, this analysis will separate the trader as three main groups of investors that are foreigner, local and institution. Institution in this paper will be the same as previous group before 2009 separation that are combine between institution and proprietary trader into the same group.

For four-group analysis, it will analyze in only the period of 2009-2014, which SET already change the trader-group separation into four groups that are foreign, local, institution and proprietary, and compare the result with three-group analysis.

For group analysis, this paper differentiates the equation of the returns and the growth of fund to find the impact of fund flows for the testing, presenting the following models for analysis:

$$r_{x,t} = a + b\, r_{x,t-1} + c\, r_{x,t-2} + d\, r_{x,t-3} + e\, ln\left(G_{x,t}\right) + f\, Dummy_x + \varepsilon_{x,t}$$

$$r_{x,t} = a + b\, r_{x,t-1} + c\, r_{x,t-2} + d\, r_{x,t-3} + e\, ln\left(\frac{B_{x,t}}{S_{x,t}}\right) + f\, Dummy_x + \varepsilon_{x,t}$$

where

r_t refers to logarithm stock return at t time or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$ for trader groups, defined as group 1 (foreigners), group 2 (local), group 3 (institution), and group 4 (proprietary)

$r_{t-1,}\, r_{t-2,}\, r_{t-3}$ refers to lagged logarithm return at time t-1, t-2 and t-3 respectively for each trader group

Dummy is defined as 1 when market return is positive, or else is 0

G_t refers to the growth of fund at t time

B_t refers to buy price for overall market at t time

S_t refers to sell price for overall market at t time

According to Boyer and Zheng (2009), they analyzed the relation between aggregate stock market returns and cash flows in each individual investor groups in US stock market during 1952-2004.

They found that quarterly flows are autocorrelated for each of the different investor groups. However, they found that there is an obviously positive contemporaneous relation between stock market returns and flows for foreign Investors only.

Moreover, based on the previous studies, some of the researches especially Asian market found the same result that foreign investor is the main contributor, and another found that local investor also reflects to the stock market such as SET.

Thus, this paper will examine that both of foreign and local investors reflect to SET or not. In addition, for another investor or institution, this paper will assume to test that the institution investor also reflects to SET or not.

As a result, this paper will examine the hypothesis testing for foreign trader by setting the hypothesis, based on the previous studied that there is a positive relationship between returns and flows for foreign investors. The result of the testing is shown in table 4.3.

Hypothesis III There is a positive relationship between returns and flows for foreign investors.

$$r_{1,t} = a + b\, r_{1,t-1} + c\, r_{1,t-2} + d\, r_{1,t-3} + e\, ln\left(\frac{B_{1,t}}{S_{1,t}}\right) + f\, Dummy_1 + \varepsilon_{1,t}$$

Time period: January 2, 2003-February 28, 2014 (2,727observations)

Table 4.3 Regression of Return-Buy/Sell Price for Foreigner

Regression Statistics	
R Square	75.24%
Observations	2,727

Table 4.3 (Continued)

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.4016	0.0803	1,653.3320	0.0000
Residual	2,721	0.13219	0.0000		
Total	2,726	0.5338			

	Coefficients	t Stat	P-value
Intercept	-0.0066*	-35.3525	0.0000
Ln (B/S)	0.0143*	2.7641	0.0005
Dummy	0.0136*	50.5411	0.0000
r_{t-1}	0.4867*	40.7819	0.0000
r_{t-2}	0.0294*	2.1417	0.0323
r_{t-3}	-0.0133	-1.3746	0.1694

Note: *Significant at 0.05 level, two-tailed test

The F-Test in table 4.3 presents that the hypothesis is accepted, or in the other word, the model fits with the dataset. In addition, table 4.3 also illustrated that there is a positive relation between returns and buy-sell price, agreeed with several empirical research (ie. Choe, Kho and Stulz (1999), Richards (2004)).

Choe, Kho and Stulz (1999) examined the impact of foreign investors on stock returns in Korea from November 30, 1996 to the end of 1997 using order and trade data. They found strong evidence of positive feedback trading and herding by foreign investors. In addition, the dummy also indicates that the bull market has higher return than bear market.

Richards (2004) analyzed daily trading of all foreign investors in six Asian emerging equity markets. He found that foreigners' flows into several markets show positive feedback trading with respect to global, as well as domestic, equity returns. The nature of this trading suggested that it is due to behavioral factors or foreigners extracting information from recent returns, rather than portfolio rebalancing effects.

Moreover, this paper would like to understand more about the relation in the part of cash flow, which is different from the previous study. This paper includes the cash flow testing for both of inflow and outflow by following models:

$$r_{x,it} = a + b\, r_{x,it-1} + c\, r_{x,it-2} + d\, r_{x,it-3} + e\, ln\left(\frac{B_{x,it}}{S_{x,it}}\right) + f\, Dummy_x + \varepsilon_{x,it}$$

$$r_{x,ot} = a + b\, r_{x,ot-1} + c\, r_{x,ot-2} + d\, r_{x,ot-3} + e\, ln\left(\frac{B_{x,ot}}{S_{x,ot}}\right) + f\, Dummy_x + \varepsilon_{x,ot}$$

where

r_{it} refers to stock return at t time or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$in cash inflow ($B_t > S_t$) for group x, defined as group 1 (foreigners), group 2 (local), and group 3 (institution and propriety)

$r_{it-1}, r_{it-2}, r_{it-3}$ refers to lagged return at time t-1, t-2 and t-3 respectively in cash inflow for each trader group

B_{it} refers to buy price in cash inflow ($B_t > S_t$) at t time

S_{it} refers to sell price in cash inflow ($B_t > S_t$) at t time

r_{ot} refers to stock return at t time or Ln (r_t) = Ln $\left(\frac{St}{St-1}\right)$in cash outflow ($B_t < S_t$) for group x, defined as group 1 (foreigners), group 2 (local), and group 3 (institution and propriety)

$r_{ot-1}, r_{ot-2}, r_{ot-3}$ refers to lagged return at time t-1, t-2 and t-3 respectively in cash outflow for each trader group

Dummy is defined as 1 when market return is positive, or else is 0

B_{ot} refers to buy price in cash outflow ($B_t < S_t$) at t time

S_{ot} refers to sell price in cash outflow ($B_t < S_t$) at t time

ε_t refers to the error term at t time

According to the previous calculation, the overall flows for foreign investors show that there is a positive relationship between market returns and flows. However, in part of cash flow evaluation, cash inflow in this paper will represent the cash flow that buy price is higher than sell price. On the other hand, cash outflow represents the cash flow that sell price is higher than buy price.

As a result, to be matched with the result of overall relation of returns-volume for foreign trader, the hypotheses for inflow and outflow should be there is a positive relation between returns-volume for cash inflow, and there is a negative relation between returns-volume for cash outflow. The results for each hypothesis testing are shown in table 4.4 and table 4.5 respectively.

Hypothesis IV There is a positive relation between return-buy/sell price in cash inflow for foreign investors.

$$r_{1,it} = a + b\, r_{1,it-1} + c\, r_{1,it-2} + d\, r_{1,it-3} + e\, ln\left(\frac{B_{1,it}}{S_{1,it}}\right) + f\, Dummy_1 + \varepsilon_{1,it}$$

Time period: January 2, 2003-February 28, 2014 (1,383 observations)

Table 4.4 Regression of Return-Buy/Sell Price for Foreigner in Cash Inflow

Regression Statistics	
R Square	72.57%
Observations	1,383

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.3960	0.0792	728.7184	0.0000
Residual	1,377	0.1497	0.0001		
Total	1,382	0.5457			

	Coefficients	t Stat	P-value
Intercept	-0.0082*	-5.7966	0.0000
Ln (B/S)	0.1417*	13.3640	0.0009
Dummy	0.0174*	30.9137	0.0000
r_{t-1}	0.4859*	26.9374	0.0000
r_{t-2}	0.0322	1.5523	0.1208
r_{t-3}	-0.0271	-1.9133	0.0559

Note: *Significant at 0.05 level, two-tailed test

Hypothesis V There is a negative relation between return-buy/sell price in cash outflow for foreign investors.

$$r_{1,ot} = a + b\, r_{1,ot-1} + c\, r_{1,ot-2} + d\, r_{1,ot-3} + e\, ln\left(\frac{B_{1,ot}}{S_{1,ot}}\right) + f\, Dummy_1 + \varepsilon_{1,ot}$$

Time period: January 2, 2003-February 28, 2014 (1,340 observations)

Table 4.5 Regression of Return-Buy/Sell Price for Foreigner in Cash Outflow

Regression Statistics	
R Square	72.78%
Observations	1,340

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.4505	0.0901	713.3098	0.0000
Residual	1,334	0.1685	0.0001		
Total	1,339	0.6190			

	Coefficients	t Stat	P-value
Intercept	-0.0106*	-5.6971	0.0000
Ln (B/S)	-0.0004*	-1.6187	0.0009
Dummy	0.0204*	33.0899	0.0000
r_{t-1}	0.5004*	28.2719	0.0000
r_{t-2}	0.0035	0.1737	0.8622
r_{t-3}	-0.0129	-0.8985	0.3691

Note: *Significant at 0.05 level, two-tailed test

Table 4.4 and table 4.5 show that the applied model is suitable for the dataset, as shown in F-test analysis. Moreover, the relation depends on the direction of flow with different relationship. Fund inflow is positive related to market return; in contrast with fund outflow, or accept the hypotheses. However, both of them provide the positive correlation or bull market has higher return than bear market.

Then, this paper tests for the other traders that are retail (or local) and institution traders by setting the hypotheses for both of them that there are positive relation between returns-volume for both traders. The hypotheses testings' results are shown in table 4.6 and table 4.7 respectively.

Hypothesis VI There is a positive relation between return-buy/sell price for local investors.

$$r_{2,t} = a + b\, r_{2,t-1} + c\, r_{2,t-2} + d\, r_{2,t-3} + e\, ln\left(\frac{B_{2,t}}{S_{2,t}}\right) + f\, Dummy_2 + \varepsilon_{2,t}$$

Time period: January 2, 2003-February 28, 2014 (2,727 observations)

Table 4.6 Regression of Return-Buy/Sell Price for Local Investor

Regression Statistics	
R Square	75.34%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.4022	0.0804	1,662.8490	0.0000
Residual	2,721	0.1316	0.0000		
Total	2,726	0.5338			

	Coefficients	t Stat	P-value
Intercept	-0.0019	-1.7204	0.0855
Ln (B/S)	0.0045	1.4110	0.1069
Dummy	0.0135*	49.6310	0.0000
r_{t-1}	0.4717	38.0704	0.0000
r_{t-2}	0.0224	1.6407	0.1010
r_{t-3}	-0.0192	-2.0161	0.0439

Note: *Significant at 0.05 level, two-tailed test

Hypothesis VII There is a positive relation between return-buy/sell price for institution investors.

$$r_{3,t} = a + b\, r_{3,t-1} + c\, r_{3,t-2} + d\, r_{3,t-3} + e\, ln\left(\frac{B_{3,t}}{S_{3,t}}\right) + f\, Dummy_3 + \varepsilon_{3,t}$$

Time period: January 2, 2003-February 28, 2014 (2,727 observations)

Table 4.7 Regression of Return-Buy/Sell Price for Institution Investor

Regression Statistics	
R Square	75.34%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.4022	0.0804	1,662.8810	0.0000
Residual	2,721	0.1316	0.0000		
Total	2,726	0.5338			

	Coefficients	t Stat	P-value
Intercept	-0.0065*	-34.9649	0.0000
Ln (B/S)	0.0016	1.4415	0.1047
Dummy	0.0135*	49.9937	0.0000
r_{t-1}	0.4756*	39.0486	0.0000
r_{t-2}	0.0263	1.9281	0.0539
r_{t-3}	-0.0125	-1.2950	0.1954

Note: *Significant at 0.05 level, two-tailed test

Table 4.6 and table 4.7 present the result of return-buy/sell price for local and institution investors. F-test shows that the applied equation fits with dataset. Moreover, t-test shows that both of them reject the hypotheses that both of them have positive relation between return and flows. In the other word, there is no impact to

return for both investors. However, both of them still show that there is a positive correlation or bull market has higher return than bear market.

An interesting finding for this analysis is that there is only correlation between investor group and market return from foreign investor as positive correlated, depending on the direction of flow: fund inflow is positive, but outflow is negative.

Another analysis is the relation between volatility and buy-sell price, this paper uses this following model for analysis:

$$\ln(\sigma_{x,t}) = a + b\ ln(\sigma_{x,t-1}) + c\ ln(\sigma_{x,t-2}) + d\ ln(\sigma_{x,t-3}) + e\ ln(G_{x,t}) + f\ Dummy_x + \varepsilon_{x,t}$$

$$\ln(\sigma_{x,t}) = a + b\ ln(\sigma_{x,t-1}) + c\ ln(\sigma_{x,t-2}) + d\ ln(\sigma_{x,t-3}) + e\ ln\left(\frac{B_{x,t}}{S_{x,t}}\right) + f\ Dummy_x + \varepsilon_{x,t}$$

where

σ_t refer to stock volatility or periodic volatility at t time for trader groups, defined as group 1 (foreigners), group 2 (local) and group 3 (institution and propriety)

σ_{t-1}, σ_{t-2}, σ_{t-3} refers to lagged volatility at time t-1, t-2 and t-3 respectively for each trader group

v_t refers to trading volume at t time

Dummy is defined as 1 when market return is positive, or else is 0

G_t refers to the growth of fund at t time

B_t refers to buy price for overall market at t time

S_t refers to sell price for overall market at t time

ε_t refers to the error term at t time

According to Ross (1989), and Mahajan and Singh (2009), they exemplified the main indicator of information asymmetry for the funds should be volatility. Thus, this paper will examine the relation between volatility-volume relations for each group of investors to find the trader group that has more information than others.

For analysis in each group, we separates as three groups that are foreigner, local and institution as group 1, group 2, group 3, respectively. Firstly, the paper will examine the model by F-test to ensure that the equation fits with dataset. This paper

will set up the hypothesis for this F-test that is whether the applied equation fits with dataset or not.

Then, the paper will analyze the relation for each investor, started from foreigner by t-test to understand the information convey in stock market. The paper will examine by studying the relation of price movement (i.e return and volatility).

According to the previous studies, there are several empirical researches that were interested in volatility-volume relation (i.e Lensink and Morrissey (2006), Chang and Wang (2002)). Lensink and Morrissey (2006) studied the volatility of trading flow for foreign investor. They found that volatility has a negative impact on growth.

Thus, for the relation between volatility-volume for foreign trader, this paper sets up the hypothesis to be ally with the previous studies' results that is there is a negative relation between volatility-volume as shown in table 4.8.

Hypothesis VIII There is a negative relation between volatility-buy/sell price for foreign investors.

$$\ln(\sigma_{1,t}) = a + b\ ln(\sigma_{1,t-1}) + c\ ln(\sigma_{1,t-2}) + d\ ln(\sigma_{1,t-3}) + e\ ln\left(\frac{B_{1,t}}{S_{1,t}}\right) + f\ Dummy_1 + \varepsilon_{1,t}$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.8 Regression of Volatility-Buy/Sell Price for Foreigner

Regression Statistics	
R Square	34.94%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	247.3752	49.4750	95.5968	0.0000
Residual	2,721	1,408.7407	0.5175		
Total	2,726	1,656.1159			

Table 4.8 (Continued)

	Coefficients	t Stat	P-value
Intercept	0.2855*	8.0611	0.0000
Ln (B/S)	-0.4105*	-8.8199	0.0000
Dummy	0.0356*	2.8508	0.0020
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2693*	14.1600	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0833*	4.2419	0.0000
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0454*	2.4035	0.0163

Note: *Significant at 0.05 level, two-tailed test

Table 4.8 illustrates that the equation fits with dataset or accepts the hypothesis of F-test, which is the applied equation fits with dataset or not. In addition, the result shows that there is a negative relation for foreign trader, agreed with previous studies or accepts the hypothesis of t-test. Moreover, the dummy variable shows that the bull market has higher volatility than bear market.

In addition, this paper expands the idea of relation into the cash flow statement by applying from Chang and Wang (2002)'s study. Chang and Wang (2002)'s study examined the daily relation between aggregate flow into U.S equity funds and market volatility. They found the impact of fund inflow and outflow on the market volatility.

The fund inflow is negatively correlated with market volatility while fund outflow is positively correlated with market volatility. In the other word, they explained that the larger is the aggregate cash flow out of the funds, the more volatile is the market.

As a result, this paper will examine the relation by cash flow statement, inflow and outflow. The cash inflow will be represented for the buy price is higher than sell price. In contrast of outflow, it is represented for the buy price is lower than sell price. The testing equation models for both of cash inflow and outflow will be shown as the following:

$$\ln(\sigma_{x,it}) = a + ln(\sigma_{x,it-1}) + ln(\sigma_{x,it-2}) + ln(\sigma_{x,it-3}) + b\ ln\left(\frac{B_{x,it}}{S_{x,it}}\right) + Dummy_x + \varepsilon_{x,it}$$

Where

$\boldsymbol{\sigma}_{x,\,it}$ refers to the volatility at t time for cash inflow ($B_t > S_t$) for each trader group (x)

$\boldsymbol{\sigma}_{t\text{-}1}, \boldsymbol{\sigma}_{t\text{-}2}, \boldsymbol{\sigma}_{t\text{-}3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively for each trader group

$B_{x,\,it}$ refers to buy price in cash inflow ($B_t > S_t$) at t time for trader x group

$S_{x,\,it}$ refers to sell price in cash inflow ($B_t > S_t$) at t time for trader x group

ε_t refers to the error term at t time

$$\ln(\sigma_{x,ot}) = a + ln(\sigma_{x,ot-1}) + ln(\sigma_{x,ot-2}) + ln(\sigma_{x,ot-3}) + b\ ln\left(\frac{B_{x,ot}}{S_{x,ot}}\right) + Dummy_x + \varepsilon_{x,ot}$$

Where

$\boldsymbol{\sigma}_{x,\,ot}$ refers to the volatility at t time for cash outflow ($B_t < S_t$)for each trader group (x)

$\boldsymbol{\sigma}_{t\text{-}1}, \boldsymbol{\sigma}_{t\text{-}2}, \boldsymbol{\sigma}_{t\text{-}3}$ refers to lagged volatility at time t-1, t-2 and t-3 respectively for each trader group

$B_{x,\,ot}$ refers to buy price in cash outflow (Bt < St) at t time for trader x group

$S_{x,\,ot}$ refer to sell price in cash outflow (Bt < St) at t time for trader x group

Firstly, this paper will test the relation between volatility and volume for each cash flow, started by foreign investors. Refer to Chang and Wang (2002)'s study, the hypothesis will be set up by referring the previous study's result. Thus, the hypotheses for these relations' testing should be as there is a negative relation between volatility and volume in cash inflow while there is a positive relation between volatility and volume in cash outflow. The results of the testing are shown in table 4.9 and table 4.10 respectively.

Hypothesis IX There is a negative relation between volatility-buy/sell price in cash inflow for foreign investors.

$$\ln(\sigma_{1,it}) = a + b\ ln(\sigma_{1,it-1}) + c\ ln(\sigma_{1,it-2}) + d\ ln(\sigma_{1,it-3}) + e\ ln\left(\frac{B_{1,it}}{S_{1,it}}\right) + f\ Dummy_1 + \varepsilon_{1,it}$$

Time period: January 2, 2003-February 28, 2014 or 1,383 observations, analyze in cash inflow

Table 4.9 Regression of Volatility-Buy/Sell Price for Foreign Investor in Cash Inflow

Regression Statistics	
R Square	43.55%
Observations	1,383

ANOVA

	df	SS	MS	F	Significance F
Regression	5	17.6684	3.5337	12.5389	0.0000
Residual	1,377	388.0615	0.2818		
Total	1,382	405.7299			

	Coefficients	t Stat	P-value
Intercept	0.4882*	6.2882	0.0000
Ln (B/S)	-0.2108*	-3.9260	0.0000
Dummy	0.2226	7.6778	0.0000
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.1455*	5.0929	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0617*	2.5554	0.0107
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0150	0.6487	0.5166

Note: *Significant at 0.05 level, two-tailed test

Hypothesis X There is a positive relation between volatility-buy/sell price in cash outflow for foreign investors.

$$\ln(\sigma_{1,ot}) = a + b\ ln(\sigma_{1,ot-1}) + c\ ln(\sigma_{1,ot-2}) + d\ ln(\sigma_{1,ot-3}) + e\ ln\left(\frac{B_{1,ot}}{S_{1,ot}}\right) + f\ Dummy_1 + \varepsilon_{1,ot}$$

Time period: January 2, 2003-February 28, 2014 or 1,344 observations, analyze in cash outflow

Table 4.10 Regression of Volatility-Buy/Sell Price for Foreign Investor in Cash Outflow

Regression Statistics	
R Square	46.07%
Observations	1,344

ANOVA

	df	SS	MS	F	Significance F
Regression	5	194.1080	38.8216	51.2424	0.0000
Residual	1,338	1,013.6773	0.7576		
Total	1,343	1,207.7853			

	Coefficients	t Stat	P-value
Intercept	-0.4384	-2.8880	0.0039
Ln (B/S)	0.8303*	4.9837	0.0000
Dummy	0.0812*	3.6989	0.0009
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2908*	10.6392	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0850	2.8541	0.0044
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0600	2.0871	0.0371

Note: *Significant at 0.05 level, two-tailed test

Table 4.9 and table 4.10 are shown the impact of foreign investor to stock market, including cash inflow and outflow. Firstly, the results show that the equation appropriate for the dataset or accepts the hypothesis of F-test.

Furthermore, the results also show that we accept both hypotheses for cash inflow and cash outflow that there is a negative relationship between trading and volatility; nevertheless, there is a positive relation between trading and volatility, agreed with previous study as Chang and Wang (2002). Moreover, the testing also illustrates that the bull market has higher volatility than bear market.

As a result, it can conclude that there is a negative relationship between trading and volatility in foreign investor. However, the relation between volatility and flow depends on the direction of flow. Fund inflow is negative related to market volatility while fund outflow is positive relation.

In addition, this paper will examine the same testing for both of the rest trades that are retail (or local) and institution investors as following tables, table 4.11 and table 4.12 respectively.

Hypothesis XI There is a negative relation between volatility-buy/sell price for local investors.

$$\ln(\sigma_{2,t}) = a + b\ ln(\sigma_{2,t-1}) + c\ ln(\sigma_{2,t-2}) + d\ ln(\sigma_{1,t-3}) + e\ ln\left(\frac{B_{2,t}}{S_{2,t}}\right) + f\ Dummy_2 + \varepsilon_{2,t}$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.11 Regression of Volatility-Buy/Sell Price for Local Investor

Regression Statistics	
R Square	61.01%
Observations	2,727

Table 4.11 (Continued)

ANOVA

	df	SS	MS	F	Significance F
Regression	5	42.5318	8.5064	47.9718	0.0000
Residual	2,721	482.4871	0.1773		
Total	2,726	525.0189			

	Coefficients	t Stat	P-value
Intercept	0.7983*	13.8608	0.0000
Ln (B/S)	-0.1975	-0.3848	0.1222
Dummy	0.0266	1.6250	0.0010
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2203*	11.5551	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0599*	3.0731	0.0021
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0843*	4.4230	0.0000

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XII There is a negative relation between volatility-buy/sell price for institution investor.

$$\ln(\sigma_{3,t}) = a + b\ ln(\sigma_{3,t-1}) + c\ ln(\sigma_{3,t-2}) + d\ ln(\sigma_{3,t-3}) + e\ ln\left(\frac{B_{3,t}}{S_{3,t}}\right) + f\ Dummy_3 + \varepsilon_{3,t}$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.12 Regression of Volatility-Volume for Institution Investor

Regression Statistics	
R Square	50.12%
Observations	2,727

Table 4.12 (Continued)

ANOVA

	df	SS	MS	F	Significance F
Regression	5	204.5938	40.9188	61.2704	0.0000
Residual	2,721	1,817.1894	0.6678		
Total	2,726	2,021.7832			

	Coefficients	t Stat	P-value
Intercept	0.2156*	5.0588	0.0000
Ln (B/S)	-0.2938	-0.7224	0.6513
Dummy	0.0754*	2.3846	0.0017
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2182*	11.4273	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0475*	2.4394	0.0148
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0985*	5.1755	0.0000

Note: *Significant at 0.05 level, two-tailed test

Table 4.11 and table 4.12 are illustrated that the results of hypotheses testing for both of F-test and t-test for local and institution investors. Firstly, the results of F-test show to accept the hypothesis, or the statistic model is suitable for dataset.

However, the results of t-test show to reject hypothesis XI and hypothesis XII. In the other word, there is no correlation between trading and volatility for both of local and institution investor. Though, both of them show the same result that bull market has higher volatility than bear market.

According to Ross (1989), and Mahajan and Singh (2009), volatility can be the indicator of information asymmetry. Thus, this paper will examine the relation between return-volume and volatility-volume relations for each group of investors, shown in twelve hypotheses.

Each hypothesis examines the relation between returns and/or volatility with trading volume. Hypothesis III-VII examine the relation between returns with trading volume, and hypothesis VIII-XII examine the relation between volatility with trading volume.

Hypothesis III, VI and VII set up that there is a positive relation between returns and trading volume for each trader, and hypothesis VIII, XI and XII set up that there is a negative relation between volatility and trading volume, based on the relation in the previous testing in 4.1. The relation in SET shows that there is a positive relation between returns and trading; however, there is negatively in volatility.

The results in hypothesis testing in each trader show that only foreign investors have correlation for both returns and volatility with trading volume. According to this relation, this paper examines the relation in cash flow for impacted investor.

The results show that for returns relation, there is a positive relation in cash inflow, but there is a negative one in cash outflow, shown in hypothesis testing IV and V. On the other hand, it shows opposite sign in volatility relation. There is a negative relation in cash inflow, and positive relation in cash outflow, shown in hypothesis IX and X.

As a result, it can conclude that for three-group analysis, the impact of investor groups, including foreigner, local and institution, to stock market. Both of local and institution investors do not impact to market volatility. Only foreign investor has positive relation between trading and market volatility, depending on the flow direction. Fund inflow is negatively correlated while fund outflow is positively. Moreover, the testing also shows that there are higher returns and volatility in bull market than bear market.

However, SET has changed the trader group separation since 2009 from three trader types to four trader types that are foreign, local, institution and proprietary. Thus, to robustness, this paper will examine four-group analysis during 2009-2014, and compare the result.

Four-group analysis will examine the same as three-group analysis. Firstly, the paper will examine F-test by setting the hypothesis that the applied equation is suitable for dataset or not to ensure that the applied equation is also suitable for four-group dataset.

Then, the paper will examine regression by t-test to understand the information convey in four investors. Due to the same market, this four-group

analysis will set up the same hypotheses as three-group analysis that are foreign investor has a positive correlation between return-volume in SET, and assume that local, institution and proprietary have a positive correlation in SET. On the other hand, there is a negative relation between volatility-volume in SET.

Hypothesis XIII There is a positive relation between return-buy/sell price for foreign investor

$$r_{1,t} = a + b\, r_{1,t-1} + c\, r_{1,t-2} + d\, r_{1,t-3} + e\, ln\left(\frac{B_{1,t}}{S_{1,t}}\right) + f\, Dummy_1 + \varepsilon_{1,t}$$

Time period: January 2, 2009-February 28, 2014 (1,256 observations)

Table 4.13 Regression of Return-Volume for Foreign Investor in Four-Group Analysis

Regression Statistics	
R Square	75.65%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.1589	0.0318	921.1898	0.0000
Residual	1,250	0.0431	0.0000		
Total	1,255	0.2020			

	Coefficients	t Stat	P-value
Intercept	-0.0064*	-35.3525	0.0000
Ln (B/S)	0.00162*	2.4686	0.0014
Dummy	0.0132*	39.3443	0.0000
r_{t-1}	0.5059*	31.3252	0.0000
r_{t-2}	0.0047	0.2464	0.8054
r_{t-3}	-0.0058	-0.4351	0.6636

Note: *Significant at 0.05 level, two-tailed test

Table 4.13 illustrates that both of regressions (F-test and t-test) accept the hypotheses. In the other word, the applied equation matches with dataset of four-group dataset, the same result as three-group analysis.

In addition, there is a positive relation between returns and buy-sell price in four-group analysis during 2009-2014, the same result as the three-group analysis during 2003-2014. Or in the other word, foreign investor has the information convey in SET during 2009-2014, which reflect to the price movement in term of return as positive correlation. In addition, the bull market has higher return than bear market, the same result as three-group analysis during 2003-2014.

The same as three-group analysis, this paper will examine the impacted investor into the cash flow to understand the correlation in each direction. According to three-group analysis, the impacted investors will show different correlation in each cash flow. As a result, the next hypothesis testing will do the testing for each cash flow for four-group analysis.

The hypotheses will be set up by based on the previous test or three-group analysis. In three-group analysis during 2003-2014, the results show that there is a positive relation between return-volume in cash inflow, but it shows negative relation in cash outflow, shown in table 4.14 and 4.15 respectively.

Hypothesis XIV There is a positive relation between return-buy/sell price in cash inflow for foreign investors.

$$r_{1,it} = a + b\, r_{1,it-1} + c\, r_{1,it-2} + d\, r_{1,it-3} + e\, ln\left(\frac{B_{1,it}}{S_{1,it}}\right) + f\, Dummy_1 + \varepsilon_{1,it}$$

Time period: January 2, 2009-February 28, 2014 (640 observations)

Table 4.14 Regression of Return-Buy/Sell Price for Foreigner in Cash Inflow in Four-Group Analysis

Regression Statistics	
R Square	72.16%
Observations	640

Table 4.14 (Continued)

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.0716	0.0143	428.3457	0.0000
Residual	634	0.0212	0.0000		
Total	639	0.0928			

	Coefficients	t Stat	P-value
Intercept	-0.0065*	-15.2959	0.0000
Ln (B/S)	0.0001*	7.6658	0.0004
Dummy	0.0129*	27.714	0.0000
r_{t-1}	0.5055*	23.1534	0.0000
r_{t-2}	0.0104	0.3891	0.6973
r_{t-3}	-0.0120	-0.6491	0.5165

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XV There is a negative relation between return-buy/sell price in cash outflow for foreign investors.

$$r_{1,ot} = a + b\, r_{1,ot-1} + c\, r_{1,ot-2} + d\, r_{1,ot-3} + e\, ln\left(\frac{B_{1,ot}}{S_{1,ot}}\right) + f\, Dummy_1 + \varepsilon_{1,ot}$$

Time period: January 2, 2009-February 28, 2014 (616 observations)

Table 4.15 Regression of Return-Buy/Sell Price for Foreigner in Cash Outflow in Four-Group Analysis

Regression Statistics	
R Square	72.61%
Observations	616

Table 4.15 (Continued)

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.0837	0.0167	450.5174	0.0000
Residual	610	0.0228	0.0000		
Total	615	0.1064			

	Coefficients	t Stat	P-value
Intercept	-0.0064*	-14.2400	0.0000
Ln (B/S)	-0.0011	-8.1296	0.0004
Dummy	0.0134*	27.6152	0.0000
r_{t-1}	0.4980*	20.5931	0.0000
r_{t-2}	-0.0033	-0.1217	0.9032
r_{t-3}	0.0049	0.2564	0.7977

Note: *Significant at 0.05 level, two-tailed test

Table 4.14 and table 4.15 show that the applied model is suitable for dataset, or accept the hypotheses of F-test, the same as three-group analysis. Furthermore, the hypothesis testing for different direction of cash flow, cash inflow and cash outflow respectively.

The results show that the different direction of cash flow show different relationship between return and volume in foreign investor during 2009-2014, the same result as three-group analysis; even, the analysis takes place in different period. Fund inflow shows positive relation; in contrast with fund outflow. However, both of them show that bull market has higher return than bear market.

For local investor, this paper will set up the hypothesis the same as three-group analysis, which is based on the previous studies that is there is a positive relation between return and volume, shown in table 4.16. However, the three-group analysis's result shows that there is no relation for local investors.

Hypothesis XVI There is a positive relation between return-buy/sell price for local investors.

$$r_{2,t} = a + b\, r_{2,t-1} + c\, r_{2,t-2} + d\, r_{2,t-3} + e\, ln\left(\frac{B_{2,t}}{S_{2,t}}\right) + f\, Dummy_2 + \varepsilon_{2,t}$$

Time period: January 2, 2009-February 28, 2014 (1,256 observations)

Table 4.16 Regression of Return-Buy/Sell Price for Local Investor in Four-Group Analysis

Regression Statistics	
R Square	75.80%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.1592	0.0318	929.5057	0.0000
Residual	1,250	0.0428	0.0000		
Total	1,255	0.2020			

	Coefficients	t Stat	P-value
Intercept	-0.0004	-0.2845	0.7760
Ln (B/S)	0.0057	0.3875	0.1122
Dummy	0.0130*	38.4134	0.0000
r_{t-1}	0.4855*	28.1970	0.0000
r_{t-2}	-0.0065	-0.3490	0.7271
r_{t-3}	-0.0124	-0.9542	0.3401

Note: *Significant at 0.05 level, two-tailed test

Table 4.16 represents that the equation matches with local dataset during 2009-2014 with four-group analysis. It shows the same result as previous F-hypothesis testing in three-group analysis.

In addition, the table 4.16 also shows that there is no relation between return and volume for local investor during 2009-2014, the same result as three-group analysis, or reject the hypothesis. However, it still shows that the bull market has higher return than the bear market.

According to four-group analysis, this paper will test for two other groups in SET that are institution and proprietary. Based on three-group analysis, that analysis covers the period of 2003 to 2014, combining institution and proprietary data by represented as institution. The result of three-group analysis shows that there is no relation between return and volume for institution investors, including both of institution and proprietary.

However, this four-group analysis will set up the hypothesis for both of institution and proprietary the same as three-group analysis for institution. The hypotheses testing for both of them in four-group analysis are shown in table 4.17 and 4.18 respectively.

Hypothesis XVII There is a positive relation between return-buy/sell price for institution investor.

$$r_{3,t} = a + b\, r_{3,t-1} + c\, r_{3,t-2} + d\, r_{3,t-3} + e\, ln\left(\frac{B_{3,t}}{S_{3,t}}\right) + f\, Dummy_3 + \varepsilon_{3,t}$$

Time period: January 2, 2009-February 28, 2014 (1,256 observations)

Table 4.17 Regression of Return-Buy/Sell Price for Institution Investor in Four-Group Analysis

Regression Statistics	
R Square	73.79%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.2383	0.0477	373.2707	0.0000
Residual	1,250	0.0847	0.0001		
Total	1,255	0.3229			

Table 4.17 (Continued)

	Coefficients	t Stat	P-value
Intercept	-0.0153*	-5.5383	0.0000
Ln (B/S)	0.0040	1.1872	0.2356
Dummy	0.0193*	18.5552	0.0000
r_{t-1}	0.5042*	19.3866	0.0000
r_{t-2}	-0.0389	-1.3432	0.1797
r_{t-3}	0.0342	1.6997	0.0897

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XVIII There is a positive relation between return-buy/sell price for proprietary investor.

$$r_{4,t} = a + b\, r_{4,t-1} + c\, r_{4,t-2} + d\, r_{4,t-3} + e\, ln\left(\frac{B_{4,t}}{S_{4,t}}\right) + f\, Dummy_4 + \varepsilon_{4,t}$$

Time period: January 2, 2009 – February 28, 2014 (1,256 observations)

Table 4.18 Regression of Return-Buy/Sell Price for Proprietary Investor in Four-Group Analysis

Regression Statistics	
R Square	75.68%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	0.2233	0.0447	413.9629	0.0000
Residual	1,250	0.0717	0.0001		
Total	1,255	0.2950			

Table 4.18 (Continued)

	Coefficients	t Stat	P-value
Intercept	-0.0004	-0.1488	0.8817
Ln (B/S)	0.0031	1.0734	0.2835
Dummy	0.0146*	14.8943	0.0000
r_{t-1}	0.6147*	23.8644	0.0000
r_{t-2}	0.0466	1.7588	0.0791
r_{t-3}	-0.0539	1.7588	0.0791

Note: *Significant at 0.05 level, two-tailed test

Table 4.17 and table 4.18 present the result of return-buy/sell price for institution and proprietary investors in four-group analysis during 2009-2014. Both of them accept the hypotheses of F-test. In the other word, the equation matches with both of institution and proprietary investors' dataset, the same results with three-group analyses (represent in institution analysis).

However, both of them reject the hypotheses, or it means that there is no there is no impact to return for both investors, the same result as institution investor testing, combining both of institution and proprietary investors in the same group, in three-group analysis. However, both of them still show that bull market has higher return than bear market.

According to four-group analysis, the hypotheses testing in hypothesis XIII-XVIII are testing about the relationship between return and volume for four group investors that SET has separate since 2009 that are foreign, local (or retail), institution and proprietary.

In the first part, this paper covers period of 2003 to 2014, so this paper combines institution and proprietary data in to one group, and represents as institution. To robustness, this paper tests the hypotheses testing for the period of 2009-2014 by testing for four groups of investors to check the results that are shown in table 13 to table 18 (or hypothesis 13-hypothesis 18).

The results of four-group analysis show that only foreign investor reflects to SET. The different direction of cash flow shows different reaction. The cash inflow has a positive correlation between return and volume; in contrast with cash outflow. The other investors have no impact to SET. Moreover, when compare these results with the results of three-group analysis. They show the same results and conclusion for the testing of correlation between return and volume by trader.

However, this paper will test to prevent the robustness for another correlation that is the correlation between volatility and volume, the same as return-volume relation. The next testing will separate the investors into four groups the same as SET that are foreign, local, institution, and proprietary during the period of 2009-2014.

Started from foreign, based on previous studies, most of the researches showed that there was a negative relation between volatility-volume in emerging market. Thus, the hypothesis will be set up for this testing the same as those results, shown in table 4.19.

Hypothesis XIX There is a negative relation between volatility-buy/sell price for foreign investors.

$$\ln(\sigma_{1,t}) = a + b\ ln(\sigma_{1,t-1}) + c\ ln(\sigma_{1,t-2}) + d\ ln(\sigma_{1,t-3}) + e\ ln\left(\frac{B_{1,t}}{S_{1,t}}\right) + f\ Dummy_1 + \varepsilon_{1,t}$$

Time period: January 2, 2003-February 28, 2014 or 1,256 observations

Table 4.19 Regression of Volatility-Buy/Sell Price for Foreigner in Four-Group Analysis

Regression Statistics	
R Square	31.13%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	69.7044	13.9409	31.9111	0.0000
Residual	1,250	547.8297	0.4369		
Total	1,255	617.5340			

Table 4.19 (Continued)

	Coefficients	t Stat	P-value
Intercept	0.2322*	4.5693	0.0000
Ln (B/S)	-0.4040*	-6.2091	0.0000
Dummy	0.0357*	9.4922	0.0003
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2696*	9.6983	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0133	0.4592	0.6461
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0404	1.4565	0.1455

Note: *Significant at 0.05 level, two-tailed test

Table 4.19 illustrated that the equation is appropriate for the foreign dataset or accepts F-test hypothesis, the same result as three-group analysis. In addition, there is a negative relation between volatility and volume for foreign trader or accept the hypothesis, the same result as three-group analysis (during 2003-2014). Moreover, it also shows that the bull market has higher volatility than bear market.

The same as three-group analysis, this paper will examine the impacted investor into different cash flow to understand the correlation in each cash flow. According to return-volume relation, the different cash flow shows different correlation.

Based on the result of three-group analysis, the next testing will set up the hypotheses as there is a negative relation in cash inflow and a positive one in cash outflow, shown the analyses in table 20 and table 21 respectively.

Hypothesis XX There is a negative relation between volatility-buy/sell price in cash inflow for foreign investors.

$$\ln(\sigma_{1,it}) = a + b\ ln(\sigma_{1,it-1}) + c\ ln(\sigma_{1,it-2}) + d\ ln(\sigma_{1,it-3}) + e\ ln\left(\frac{B_{1,it}}{S_{1,it}}\right) + f\ Dummy_1 + \varepsilon_{1,it}$$

Time period: January 2, 2009-February 28, 2014 or 640 observations, analyze in cash inflow

Table 4.20 Regression of Volatility-Buy/Sell Price for Foreign Investor in Cash Inflow in Four-Group Analysis

Regression Statistics	
R Square	43.76%
Observations	640

ANOVA

	df	SS	MS	F	Significance F
Regression	5	7.4054	1.4811	4.4301	0.0006
Residual	634	211.9619	0.3443		
Total	639	219.3673			

	Coefficients	t Stat	P-value
Intercept	0.2817*	4.0174	0.0000
Ln (B/S)	-0.4789*	-1.4024	0.0002
Dummy	0.0034*	7.3428	0.0009
Ln ($\boldsymbol{\sigma}_{t-1}$)	-0.0160	-0.1244	0.9011
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0844	1.9102	0.0566
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0349	0.9443	0.3454

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXI There is a positive relation between volatility-buy/sell price in cash outflow for foreign investors.

$$\ln(\sigma_{1,ot}) = a + b\ ln(\sigma_{1,ot-1}) + c\ ln(\sigma_{1,ot-2}) + d\ ln(\sigma_{1,ot-3}) + e\ ln\left(\frac{B_{1,ot}}{S_{1,ot}}\right) + f\ Dummy_1 + \varepsilon_{1,ot}$$

Time period: January 2, 2009-February 28, 2014 or 616 observations, analyze in cash outflow

Table 4.21 Regression of Volatility-Buy/Sell Price for Foreign Investor in Cash Outflow in Four-Group Analysis

Regression Statistics	
R Square	45.51%
Observations	616

ANOVA

	df	SS	MS	F	Significance F
Regression	5	217.6500	43.5300	152.9684	0.0000
Residual	610	174.4405	0.2846		
Total	615	392.0906			

	Coefficients	t Stat	P-value
Intercept	0.5733*	10.1102	0.0000
Ln (B/S)	3.0073*	24.5982	0.0000
Dummy	0.0045*	1.0384	0.0009
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.1143*	4.0419	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	-0.0337	-1.1710	0.2420
Ln ($\boldsymbol{\sigma}_{t-3}$)	-0.0454	-1.5085	0.1319

Note: *Significant at 0.05 level, two-tailed test

Table 4.20 and table 4.21 are shown the impact of foreign investor to stock market in different direction of cash flow that are cash inflow and outflow. Firstly, the results show that the applied equation matches with dataset for both of two directions of cash flow, or accept F-test hypothesis, or the same result as three-group analysis.

In part of relationship, there is a negative relationship between trading and volatility in cash inflow; nevertheless, there is a positive relation between trading and volatility in cash outflow, agreed with previous study as Chang and Wang (2002) and the result of three-group analysis.

Moreover, this paper will examine the relation between volatility and volume for other investors that are local (or retail), institution and proprietary, represented in the equation as group 2, group 3 and group 4 respectively, shown in table 4.22, table 4.23 and table 4.24 respectively.

Hypothesis XXII There is a negative relation between volatility-buy/sell price for local investors.

$$\ln(\sigma_{2,t}) = a + b\ ln(\sigma_{2,t-1}) + c\ ln(\sigma_{2,t-2}) + d\ ln(\sigma_{1,t-3}) + e\ ln\left(\frac{B_{2,t}}{S_{2,t}}\right) + f\ Dummy_2 + \varepsilon_{2,t}$$

Time period: January 2, 2009-February 28, 2014 or 1,256 observations

Table 4.22 Regression of Volatility-Buy/Sell Price for Local Investor in Four-Group Analysis

Regression Statistics	
R Square	62.50%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	10.1446	2.0289	11.0961	0.0000
Residual	1,250	228.5616	0.1828		
Total	1,255	238.7062			

	Coefficients	t Stat	P-value
Intercept	0.6044*	6.9709	0.0000
Ln (B/S)	-0.0202	-0.2529	0.8004
Dummy	0.0582*	2.4070	0.0016
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.1464*	5.2004	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0619*	2.1834	0.0292
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0772	2.7363	0.0063

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXIII There is a negative relation between volatility-buy/sell price for institution investor.

$$\ln(\sigma_{3,t}) = a + b\ ln(\sigma_{3,t-1}) + c\ ln(\sigma_{3,t-2}) + d\ ln(\sigma_{3,t-3}) + e\ ln\left(\frac{B_{3,t}}{S_{3,t}}\right) + f\ Dummy_3 + \varepsilon_{3,t}$$

Time period: January 2, 2009-February 28, 2014 or 1,256 observations

Table 4.23 Regression of Volatility-Volume for Institution Investor in Four-Group Analysis

Regression Statistics	
R Square	51.05%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	100.2540	20.0508	23.5622	0.0000
Residual	1,250	806.7240	0.8510		
Total	1,255	906.9780			

	Coefficients	t Stat	P-value
Intercept	0.1607*	2.0737	0.0086
Ln (B/S)	-0.0316	-0.3230	0.7468
Dummy	0.1643*	2.6863	0.0007
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2377*	7.5115	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0575	1.6380	0.1018
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.1668*	4.7971	0.0000

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXIV There is a negative relation between volatility-buy/sell price for proprietary investor.

$$\ln(\sigma_{4,t}) = a + b\ ln(\sigma_{4,t-1}) + c\ ln(\sigma_{4,t-2}) + d\ ln(\sigma_{4,t-3}) + e\ ln\left(\frac{B_{4,t}}{S_{4,t}}\right) + f\ Dummy_4 + \varepsilon_{4,t}$$

Time period: January 2, 2009-February 28, 2014 or 1,256 observations

Table 4.24 Regression of Volatility-Volume for Proprietary Investor in Four-Group Analysis

Regression Statistics	
R Square	40.23%
Observations	1,256

ANOVA

	df	SS	MS	F	Significance F
Regression	5	37.1451	7.4290	15.4414	0.0000
Residual	1,250	319.9395	0.4811		
Total	1,255	357.0846			

	Coefficients	t Stat	P-value
Intercept	0.4407*	2.8161	0.0050
Ln (B/S)	-0.1558	-0.8716	0.3838
Dummy	0.0842*	1.5658	0.0012
Ln ($\boldsymbol{\sigma}_{t-1}$)	0.2878*	7.6088	0.0000
Ln ($\boldsymbol{\sigma}_{t-2}$)	0.0524	1.4156	0.1574
Ln ($\boldsymbol{\sigma}_{t-3}$)	0.0273	0.7713	0.4408

Note: *Significant at 0.05 level, two-tailed test

Table 4.22, table 4.23 and table 4.24 are illustrated that the results of local institution, and proprietary investors in SET during 2009-2014, or called as dataset in four-group analysis in this paper, show that the equation matches with dataset for four-group analysis for those investors, or accept hypotheses of F-test, the same results as three-group analysis.

Furthermore, the results show that there is no relation for those investors in volatility-volume relation or reject hypothesis XXII, hypothesis XXIII and hypothesis XXIV, the same results as three-group analysis for those investors, local and institution investors. However, all of them show the same result that bull market has higher volatility than bear market.

As a result, this paper examines the relation between return and volume and between volatility and volume to understand the information conveys that impact to the stock market or price movement. Based on previous studies, this paper assumes that the information convey can be indicated by trading volume, and the price movement should be indicated by both of return and volatility.

This paper would like to understand how the information convey in SET and how to reflect in SET for each investor during 2003-2014. However, SET has separated trader groups as three groups that are foreign, local and institution investors until 2009. After 2009, SET has separated investor groups that are foreign, local, institution and proprietary investors.

For that reason, to prevent the robustness, this paper examines the trader effect in SET for two periods of time and compares the result. The first analysis is called three-group analysis, which separates the investor groups into three investors that are foreign, local and institution investors during 2003-2014. The institution investor combines the data of institution and proprietary investors for analysis.

In addition, this paper applies model from Chang and Wang's (2002) model, and adding lagged and dummy variables into the model due to autocorrelation problem, suggested by previous studies, and proved by Appendix A and B. As a result, to ensure that the applied equation fits with dataset, this paper analyzes the F-test by setting up the hypothesis that whether the equation fits with dataset or not.

Firstly, the paper will examine for F-test analysis. If the result shows that the equation is suitable for the dataset, the paper will do the next analysis or to examine

the relation testing between return-volume and volatility-volume. The paper analyzes the same step for both three-group analysis and four-group analysis.

After the testing, the results show that both of three-group analysis and four-group analysis provide the same result in both of F-test and t-test or relation testing. For F-hypothesis testing, it means that the applied equation is appropriate for dataset both of three-group data and four-group data.

In the part of relation analysis, the results of the three-group analysis show that only foreign investor reflects to SET during 2003-2014; however, the different direction of cash flow shows different results. There is a positive relation between return and volume.

Based on a theory of trading volume by Karpoff (1986) with the result from SET, it can explain that the demand effects to the volume directly in part of stock price. Based on the theory of trading volume, demand increases, the volume should increase, directly effect to stock price increases. As a result, it can explain the result in SET that when demand of stocks increases, the trading volume increases, effecting to return increase. In the other word, there is a positive relation between return and volume.

Moreover, it shows a positive relation in cash inflow; in contrast with cash outflow, supporting by the theory of trading volume. The theory of trading volume explained that the demand of buyer should effect to the volume. The demand increases, the volume increases, effecting to the stock price increases or return increases.

For volatility-volume relation, it shows a negative relation in volatility-volume. In the other word, the higher trading volume, the higher liquidity in the market, effects to the lower volatility. In addition, there is a negative relation in cash inflow; conversely with cash outflow, shown in hypotheses testing III-XII. Since the cash inflow shows the higher buyer or volume increase, there is a higher liquidity in the market. Thus, it shows the lower volatility.

Then, this paper analyzes the trader effect in SET for the data that SET already separated trader groups as four groups that are foreign, local, institution and proprietary investors, or the periods of 2009-2014, called as four-group analysis. After that, this paper will compare the results with three-group analysis to ensure that the data is without bias.

The results of four-group analysis show that according to the assumption, the trading volume is the information convey, and the price movement is indicated by return and volatility. Only foreign investor impacts to the price movement or only foreign investor has more information than others, and reflects into the stock market, the same results as three-group analysis. The results show a little weaker.

In addition, different direction of cash flow shows different relation. Cash inflow has a positive relation of return-volume, and a negative relation of volatility-volume; however, cash outflow shows oppositely, the same results as three-group analysis, shown in hypotheses testing in table 13 to table 24.

Consequently, the foreigner should have more information than others, which supported by previous works (i.e Choe, Kho and Stulz (1999); Richards (2004); Jaffe & Westerfield (1985); Tanthanongsakkun, Treepongkaruna, Wee and Brooks (2011); Frankel & Schmukler (2000)).

Moreover, there is an important event that also proves the result. On December, 18, 2006, Bank of Thailand announced the policy to reduce currency speculation by changing foreign exchange regulation. Every financial institution should deduct 30% of all foreign exchange for a year. As a result, foreign investors sold their stock price on the next day or December, 19, 2006, shown in figure 4.4.

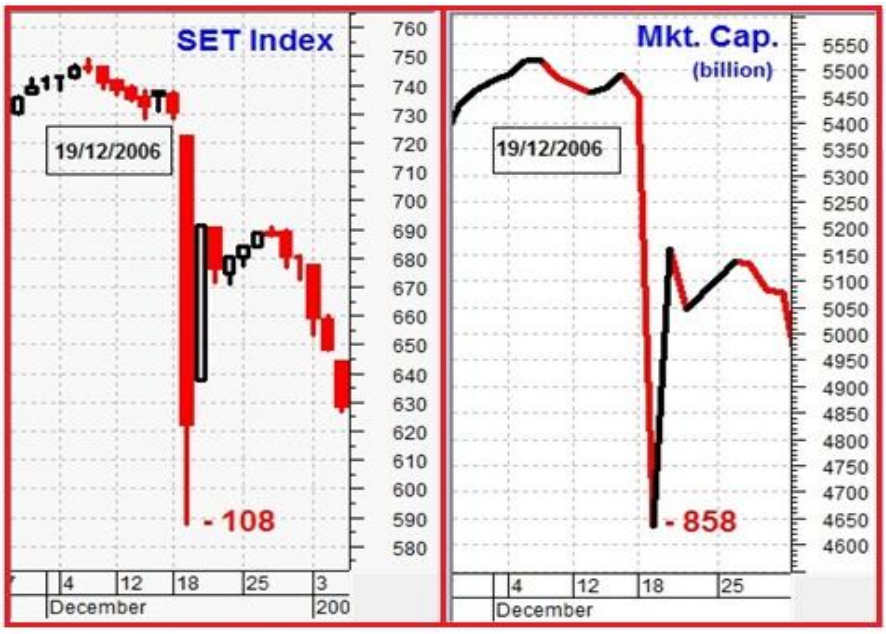

Figure 4.3 SET Index and Market Capital on December 19, 2006 (Indexthai, 2010)

Figure 4.4 is shown that on December 19, 2006, SET index was dropped significantly as 108.41 points or 14.84% or market capital lost around 800,000 million Baht, which is the lowest ever. On that day, foreign investors sold stock around 25,121.58 million Baht. According to this situation, Thai government announced to stop the policy immediately.

According to both of the testing results and real example event, it has no doubt that the foreign investors impact to Thai stock market the most. Moreover, it also supports that if they get the information sooner, their investment should reflect to SET index.

4.3 Causality Test

According to the previous testing, there is a positive relation between return-volume, and a negative relation between volatility-volume. Based on previous studies, they explained the definition for these relations that when the demand increases, the trading volume increases, so the stock price increases or return increases. Moreover, when the trading volume increase, the liquidity increases, effecting to the volatility decreases.

As a result, this paper will test causality test to understand the relation between those in another way around. Granger (1980) explained about the causality test that it is a test to find the related in the sample data. In this paper, the sample data should be the same dataset as previous testing that are SET data during 2003-2014. However, the testing equation for both of volume-return and volume-volatilaity should be:

$$\ln(v_t) = a + b\ln(v_{t-1}) + c\ln(v_{t-2}) + d\ln(v_{t-3}) + e\, r_t + f\, Dummy + \varepsilon_t$$

$$\ln(v_t) = a + b\, ln(v_{t-1}) + c\, ln(v_{t-2}) + d\, ln(v_{t-3}) + e\, ln(\sigma_t) + f\, Dummy + \varepsilon_t$$

where

v_t refers to trading volume at time t

$v_{t-1}, v_{t-2}, v_{t-3}$ refers to lagged trading volume at time t-1, t-2 and t-3 respectively

r_t refers to logarithm stock return at time t

σ_t refers to volatility at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

The hypotheses for this testing will be the same as the result of the previous testing that are there is a positive relation between volume-return, and a negative relation between volatility-return. The testing for both of them are shown in table 4.25 and table 4.26 or the hypotheses XXV and XXVI.

Hypothesis XXV There is a positive relation between volume-return

$$\ln(v_t) = a + b\ln(v_{t-1}) + cln(v_{t-2}) + dln(v_{t-3}) + e\,r_t + f\,Dummy + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.25 Regression of Causality Test for Volume-Return

Regression Statistics	
R Square	66.63%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	916.5319	183.3064	1,085.3745	0.0000
Residual	2,721	459.0367	0.1689		
Total	2,726	1,375.5688			

	Coefficients	t Stat	P-value
Intercept	2.6936*	10.3421	0.0000
Ln (r_t)	2.4891	3.8241	0.0642
Dummy	-0.0555	-3.3898	0.0696
Ln (v_{t-1})	0.4844*	25.6845	0.0000
Ln (v_{t-2})	0.2081*	10.0796	0.0000
Ln (v_{t-3})	0.1842*	9.7924	0.0000

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXV There is a negative relation between volume-volatility

$$\ln(v_t) = a + b\,ln(v_{t-1}) + c\,ln(v_{t-2}) + d\,ln(v_{t-3}) + e\,ln(\sigma_t) + f\,Dummy + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.26 Regression of Causality Test for Volume-Volatility

Regression Statistics	
R Square	66.58%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	5	915.9198	183.1840	1,083.2054	0.0000
Residual	2,721	459.6488	0.1691		
Total	2,726	1,375.5686			

	Coefficients	t Stat	P-value
Intercept	2.4199*	8.8676	0.0000
Ln ($\boldsymbol{\sigma}_t$)	-0.0515	-3.3144	0.0931
Dummy	-0.0230	-1.4547	0.1459
Ln (v_{t-1})	0.4826*	25.5073	0.0000
Ln (v_{t-2})	0.2079*	10.0630	0.0000
Ln (v_{t-3})	0.1865*	9.8829	0.0000

Note: *Significant at 0.05 level, two-tailed test

According to table 4.25 and 4.26, they show significant F in F-test. In the other word, the models are suitable for dataset. However, t-test for both of them shows the same result that there is no relation between volume-return, and volume-volatility, or reject hypotheses XXV and XXVI. As a result, when return or volatility increases, it does not effect to trading volume.

Consequently, it can conclude from those hypotheses testing that there is only one way relation between return and volume, and volatility and volume. There is a positive relation between return-volume, and a negative relation between volatility-volume.

As a result, when the demand increases, the trading volume increases, effecting to return increases. Moreover, when the trading volume increases, the liquidity in the market increase, effecting to volatility decreases. However, in another way, there is no relation. As a result, if return or volatility increase, it does not effect to trading volume.

4.4 Exogenous Factors Testing

Based on the previous testing, trading volume is the important factor that impact on market flows, indicated by market return and volatility. The previous studies explained this relation that when the buyer demand increases, the trading volume increases, effecting to return increases. Moreover, when the trading volume increases, the liquidity increases, effecting to volatility decreases.

However, there are several empirical studies that explained about the impact on market flows that exogenous factors such as economic factors and oil price impact on the market flows. Oil price and exchange rate have a positively significant impact on market flows; in contrast with the rate of return of government bond or loan.

As a result, this paper will examine the impact of these exogenous factors and trading volume on market flows. Based on previous studies, the well-known exogenous factors that impact on the market flows are the economic factors such as the rate of return of government bond and loan, exchange rate, and oil price. Their results showed that oil price and exchange rate have a positively significant impact on market return; in contrast with the rate of return of government bond and loan.

This paper will examine the exogenous testing between market return, exogenous factors, and trading volume to prevent the robustness by using arbitrage pricing theory (APT). According to Jobson (1982), he explained about the arbitrage pricing theory that arbitrage pricing theory applies for linear regression model to calculate the return with linearly independent portfolios. Thus, the testing model for this exogenous testing will be:

$$r_t = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f \ln(v_t) + g\ Dummy + \varepsilon_t$$

where

r_t refers to logarithm return at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

v_t refers to trading volume at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

The hypotheses for this testing will be based on the previous studies. In the exogenous factors, oil price and exchange rate have a positively significant impact on market return; however, the rate of return, including government bond and loan has a negatively significant impact. The hypothesis of trading volume will be based on the previous testing that there is a positive relation between return-volume. These hypotheses testing are shown in table 4.27.

Hypothesis XXVII Oil price, exchange rate and trading volume have a positively significant impact on return; while, the rate of return has a negatively impact

$$r_t = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f \ln(v_t) + g\ Dummy + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.27 Regression of Exogenous Testing with Market Return

Regression Statistics	
R Square	75.52%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	0.1061	0.0177	134.7801	0.0000
Residual	2,720	0.3097	0.0002		
Total	2,726	0.4178			

	Coefficients	t Stat	P-value
Intercept	-0.0119	-0.1095	0.9128
Ln (v_t)	0.0024*	2.3697	0.0010
Dummy	0.0145*	25.5995	0.0000
ER	0.0654*	4.6535	0.0023
LR	-0.0308*	-1.6676	0.0418
BR	-0.1482*	-1.2996	0.0019
OP	0.0390*	1.4697	0.0014

Note: *Significant at 0.05 level, two-tailed test

From table 4.27, the result shows that it accepts the hypothesis. In the other word, there is a positive significance in the relation between oil price, exchange rate and trading volume, and return; in contrast with the rate of return for both of loan and government bond, agreed with previous researches (i.e Sadorsky (1999); Cong, Wei, Jiao and Fan (2008); Apergis and Miller (2009); Park and Ratti (2008); Griffin and Stulz (2001), Tai (2000); Kasman, Vardar and Tunc (2011)).

Based on previous studies, it can illustrate that oil price is a basic factor. Thus, when oil price increases, it effects to the stock price. The exchange rate effects directly to export industry. For the trading volume, the result agrees with the previous

result that when the trading volume increases, return increases. The buyer demand increases, the trading volume increases, effecting to return increases.

On the other hand, the rate of return impacts on the investment decision. If the loan rate increases, or the rate of government bond increases, most of the investors might slow down their investment.

In addition, this paper will examine this exogenous testing by each trader, and by each direction of cash flow for impacted investor to prevent robustness the results. Based on the previous testing, this paper will test by each trader as three groups that are foreign, local (or retail), and institution. Moreover, this paper will separate by two cash flow that are cash inflow, buy price is higher than low price, cash outflow, buy price is lower than low price. The equation for this testing will be as:

$$r_{x,t} = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_{x,t}) + g\,Dummy_x + \varepsilon_t$$

where

$r_{x,t}$ refers to logarithm return for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

$V_{x,t}$ refers to trading volume for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

ε_t refers to the error term at t time

The hypotheses for this testing will be based on the trader effect testing that are only foreign investor effects to the movement of price or stock return in the positive way. However, the different of cash flow shows different of relation. The cash inflow shows the same direction as overall market; in contrast with cash outflow.

As a result, the hypotheses for this testing will be only foreign investor has a significant impact. Oil price, exchange rate and trading volume have a positive relation with return; while, interest rate has negatively significance. The result of foreign investor is shown in table 4.28.

Hypothesis XXVIII Oil price, exchange rate and trading volume have a positively significant impact on return; while, the rate of return has a negatively impact

$$r_{1,t} = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{1,t}) + g\ Dummy_1 + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.28 Regression of Exogenous Testing with Market Return for Foreign Investor

Regression Statistics	
R Square	76.59%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	0.0084	0.0014	8.7915	0.0000
Residual	2,720	0.1183	0.0002		
Total	2,726	0.1267			

Table 4.28 (Continued)

	Coefficients	t Stat	P-value
Intercept	0.0761	0.4001	0.6892
Ln (B/S)	0.0122*	6.1250	0.0000
Dummy	0.0022*	1.9926	0.0047
ER	0.0290*	1.0722	0.0023
LR	-0.0654*	1.0631	0.0472
BR	-0.0959*	2.8282	0.0010
OP	0.0014	1.8888	0.0009

Note: *Significant at 0.05 level, two-tailed test

Table 4.28 shows that it accepts the hypothesis, or foreign investor has a positively relation between oil price, exchange rate, and trading volume and return; in contrast with interest rate, the same result as trader effect that foreign investor has a positive relation between return and volume. According to this testing, even there are exogenous factors, the result still shows the same as before that there is a positive relation between return and volume.

Then, this paper will examine the direction of relation in different direction of cash flow, shown in table 4.29 and table 4.30. According to previous testing (or in trader effect testing), the different cash flow shows different relation. Cash inflow has the same direction of relation of overall market; in contrast with cash outflow. Thus, the hypotheses for this testing will be based on this previous testing.

Hypothesis XXIX Oil price, exchange rate and trading volume have a positively significant impact on return; while, the rate of return has a negatively impact

$$r_{1,t} = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{1,t}) + g\ Dummy_1 + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 1,383 observations

Table 4.29 Regression of Exogenous Testing with Market Return for Foreign Investor in Cash Inflow

Regression Statistics	
R Square	77.03%
Observations	1,383

ANOVA

	df	SS	MS	F	Significance F
Regression	6	0.0452	0.0075	46.1523	0.0000
Residual	1,376	0.1219	0.0002		
Total	1,382	0.1671			

	Coefficients	t Stat	P-value
Intercept	-0.2293	-1.1865	0.2359
Ln (B/S)	0.0139*	7.2343	0.0000
Dummy	0.0167*	14.9168	0.0000
ER	0.0191*	1.7075	0.0009
LR	-0.0655*	1.6535	0.0486
BR	-0.4798*	1.3949	0.0016
OP	0.1125*	4.4502	0.0000

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXX Oil price, exchange rate and trading volume have a positively significant impact on return; while, the rate of return has a negatively impact

$$r_{1,t} = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{1,t}) + g\ Dummy_1 + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 1,344 observations

Table 4.30 Regression of Exogenous Testing with Market Return for Foreign Investor in Cash Outflow

Regression Statistics	
R Square	78.42%
Observations	1,344

ANOVA

	df	SS	MS	F	Significance F
Regression	6	0.0660	0.0110	46.0540	0.0000
Residual	1,337	0.1662	0.0003		
Total	1,343	0.2322			

	Coefficients	t Stat	P-value
Intercept	-0.3082	-0.9799	0.3275
Ln (B/S)	0.0286*	5.4876	0.0000
Dummy	0.0198*	14.1653	0.0000
ER	0.0343*	1.0004	0.0032
LR	-0.0653*	-0.9653	0.0044
BR	-0.4267*	1.0740	0.0026
OP	0.1047*	7.9310	0.0000

Note: *Significant at 0.05 level, two-tailed test

The results of table 4.29 and table 4.30 show the same result as the trader effect testing that the different direction of cash flow shows different relation. Cash inflow has the same relation with overall market; in contrast with cash outflow. Oil price, exchange rate and trading volume have positively significant impact on stock return; unlike interest rate.

Next, this paper will examine for local and institution to compare the result with trader effect testing, shown in table 4.31 and table 4.32. In trader effect testing, it shows that there is no relation between return and trading volume for both of them.

Hypothesis XXXI Oil price, exchange rate and trading volume have a positively significant impact on return; while, the rate of return has a negatively impact

$$r_{2,t} = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{2,t}) + g\ Dummy_2 + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.31 Regression of Exogenous Testing with Market Return for Local Investor

Regression Statistics	
R Square	75.03%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	0.1872	0.0312	322.2937	0.0000
Residual	2,720	0.2285	0.0001		
Total	2,726	0.4158			

	Coefficients	t Stat	P-value
Intercept	0.1170*	2.3698	0.0179
Ln (B/S)	0.0383	0.2645	0.3592
Dummy	0.0123*	24.9943	0.0000
ER	0.0026*	3.4693	0.0007
LR	-0.0063*	1.6535	0.0480
BR	-0.1643*	-1.6688	0.0475
OP	0.0381*	1.6616	0.0352

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXXII Oil price, exchange rate and trading volume have a positively significant impact on return; while, the rate of return has a negatively impact

$$r_{3,t} = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{3,t}) + g\ Dummy_3 + \varepsilon_t$$

Time period: January 2, 2003-February 28, 2014 or 2,727 observations

Table 4.32 Regression of Exogenous Testing with Market Return for Institution Investor

Regression Statistics	
R Square	75.34%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	93.6147	15.6025	31.5940	0.0000
Residual	2,720	1,165.6650	0.5926		
Total	2,726	1,259.2799			

	Coefficients	t Stat	P-value
Intercept	-10.1234*	-2.8685	0.0042
Ln (B/S)	0.6133	0.1044	0.0723
Dummy	0.0139	4.0095	0.0068
ER	2.2100*	4.1794	0.0000
LR	-0.6554*	-1.6535	0.0485
BR	-0.8558*	-1.2135	0.0423
OP	2.1369*	1.3001	0.0323

Note: *Significant at 0.05 level, two-tailed test

The results for both of them agree with the results of trader effect testing. There is no relation between return and trading volume. However, the exogenous factors still show the significant relation. Oil price and exchange rate has a positively significant impact on stock return; in contrast with interest rate.

However, from table 4.27 to table 4.32, it shows that exogenous factors have impacted on stock return. Oil price and exchange rate has a positive relation with return; unlike interest rate and the loaning rate. The loaning rate shows weakly negative impact on return. Moreover, those factors do not effect to the relation between return and volume. The trading volume still shows positively significant impact on stock return; although, oil price shows a strongly significant impact on stock return, agreed with Basher and Sadorsky (2006).

Basher and Sadorsky (2006) studied about the impact of oil price change of emerging stock market returns. They found that there is strong evidence in oil price risk impacts on stock price returns in emerging markets. Moreover, they analyzed this impact for each investor. Their results showed that this impact also shows in for individual and institutional investors; even, those investors' investments do not impact on stock return directly.

Based on these previous studies, the market return and volatility are the main indicators of market flows. According the previous researches, the exogenous factors such as oil price, exchange rate, interest rate and/or rate of loan have relation with market return. Thus, this paper will assume that these exogenous factors should impact on market volatility.

This paper will analyze the exogenous testing for volatility and exogenous factors such as oil price exchange rate, interest rate, and the rate of loan, the same as stock return.

According to the previous testing's results, the volatility has a negative relation with trading volume. Some exogenous factors (i.e oil price or exchange rate) have the same relation with trading volume. The others have reverse relation with trading volume such as interest rate or rate of loan. The model for this testing will applied from the one that testing for return as:

$$\ln(\sigma_t) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_t) + g\,Dummy + \varepsilon_t$$

where

σ_t refers to volatility at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

v_t refers to trading volume at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

As a result, this testing will set up the hypotheses as oil price, exchange rate and trading volume have a negatively significant impact on stock volatility; in contrast with interest rate or rate of loan. The result is shown in table 4.33.

Hypothesis XXXIII Oil price, exchange rate and trading volume have a negatively significant impact on volatility; in contrast with interest rate and the rate of loan

$$\ln(\sigma_t) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_t) + g\,Dummy + \varepsilon_t$$

Time period: January 2, 2009-February 28, 2014 or 2,727 observations

Table 4.33 Regression of Exogenous Testing with Volatility

Regression Statistics	
R Square	42.50%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	9.8846	1.6474	7.2464	0.0000
Residual	2,720	536.6229	0.2728		
Total	2,726	546.5076			

	Coefficients	t Stat	P-value
Intercept	7.6091*	3.2018	0.0014
Ln (B/S)	-0.0511*	-2.4365	0.0149
Dummy	0.0398*	1.6909	0.0410
ER	-0.0635*	3.6524	0.0013
LR	0.7025*	1.7184	0.0473
BR	24.9390*	5.2617	0.0000
OP	-5.7816*	-5.2417	0.0000

Note: *Significant at 0.05 level, two-tailed test

Table 4.33 shows that oil price, exchange rate and trading volume have a negatively impact on volatility; in contrast with interest rate and rate of loan. The trading volume relation with volatility has the same result as overall market's result. However, the exogenous factors have stronger relation, especially in oil price.

Moreover, the same as exogenous testing in return, this paper will examine the relation between exogenous testing and trading volume with volatility for each trader, and by each direction of cash flow, and compare the result with trader effect to prevent the robustness. The model will be as:

$$\ln(\sigma_{x,t}) = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{x,t}) + g\ Dummy + \varepsilon_t$$

where

$\sigma_{x,t}$ refers to volatility for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

ER_t refers to exchange rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/Thai/Statistics/FinancialMarkets/ExchangeRate/_layouts/Application/ExchangeRate/ExchangeRateAgo.aspx#)

LR_t refers to loaning rate at time t (obtained from Bank of Thailand: http://www.bot.or.th/thai/statistics/financialmarkets/interestrate/_layouts/application/interest_rate/IN_Rate.aspx)

BR_t refers to interest rate of T-bill 3M at time t, calculated by average government bond yield (source: Thaibma)

OP_t refers to logarithm oil price at time t (obtained from crude oil historical data: http://www.investing.com/commodities/crude-oil-historical-data)

$V_{x,t}$ refers to trading volume for x group (group 1: foreign group, group 2: local group and group 3: institution) at time t

Dummy is defined as 1 when return is positive, and 0 when return is negative

ε_t refers to the error term at t time

The hypotheses for this testing will be based on the trader effect's testing that are oil price, exchange rate and trading volume have a negatively significant impact on volatility; unlike interest rate and rate of loan. Firstly, this paper will test for foreign investor is shown in table 4.34.

Hypothesis XXXIV Oil price, exchange rate and trading volume have a negatively significant impact on volatility; in contrast with interest rate and the rate of loan

$$\ln(\sigma_{1,t}) = a + b\ ER_t + c\ LR_t + d\ BR_t + e\ OP_t + f\ \ln(v_{1,t}) + g\ Dummy_1 + \varepsilon_t$$

Time period: January 2, 2009-February 28, 2014 or 2,727 observations

Table 4.34 Regression of Exogenous Testing with Volatility for Foreign Investor

Regression Statistics	
R Square	76.10%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	95.8329	15.9721	32.4043	0.0000
Residual	2,720	1,163.4470	0.5915		
Total	2,726	1,259.2799			

	Coefficients	t Stat	P-value
Intercept	-9.8529*	-2.7924	0.0053
Ln (B/S)	-0.6257*	-10.5996	0.0000
Dummy	0.0689*	1.9777	0.0481
ER	-2.1834*	-4.1328	0.0000
LR	0.0065*	1.6535	0.0495
BR	8.0173*	1.1374	0.0489
OP	-2.0070*	-4.2216	0.0000

Note: *Significant at 0.05 level, two-tailed test

According to table 4.34, it illustrates that it accepts the hypothesis. In the other word, oil price, exchange rate and trading volume have a negatively significant impact on volatility; in contrast with interest rate and the rate of loan.

In addition, this paper will examine the direction of relation in different direction of cash flow. Based on previous testing, the different direction of cash flow shows different relation. Cash inflow has a negatively relation with volatility-volume; unlike cash outflow. Thus, the testing for cash inflow will set up the hypothesis that oil price, exchange rate and trading volume have negatively impact on volatility; in contrast with interest rate and rate of loan, shown in table 4.35. The hypothesis for cash outflow will set up oppositely, shown in table 4.36.

Hypothesis XXXV Oil price, exchange rate and trading volume have a negatively significant impact on volatility; in contrast with interest rate and the rate of loan

$$\ln(\sigma_{1,t}) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_{1,t}) + g\,Dummy_1 + \varepsilon_t$$

Time period: January 2, 2009-February 28, 2014 or 1,383 observations

Table 4.35 Regression of Exogenous Testing with Volatility for Foreign Investor in Cash Inflow

Regression Statistics	
R Square	52.63%
Observations	1,383

ANOVA

	df	SS	MS	F	Significance F
Regression	6	11.0685	1.8447	6.9217	0.0000
Residual	1,376	199.2463	0.3198		
Total	1,382	210.3147			

	Coefficients	t Stat	P-value
Intercept	7.7293	0.9894	0.3229
Ln (B/S)	-0.0324*	-4.1581	0.0000
Dummy	0.0175*	3.8697	0.0000
ER	-0.0218*	-9.9655	0.0000
LR	0.0056*	1.6554	0.0485
BR	1.9882*	1.4295	0.0453
OP	-4.9756*	2.5862	0.0004

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXXVI Oil price, exchange rate and trading volume have a positively significant impact on volatility; in contrast with interest rate and the rate of loan

$$\ln(\sigma_{1,t}) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_{1,t}) + g\,Dummy_1 + \varepsilon_t$$

Time period: January 2, 2009-February 28, 2014 or 1,344 observations

Table 4.36 Regression of Exogenous Testing with Volatility for Foreign Investor in Cash Outflow

Regression Statistics	
R Square	53.54%
Observations	1,344

ANOVA

	df	SS	MS	F	Significance F
Regression	6	12.9043	2.1507	4.0252	0.0006
Residual	1,337	371.8821	0.6412		
Total	1,343	384.7864			

	Coefficients	t Stat	P-value
Intercept	-32.6039*	-2.1917	0.0288
Ln (B/S)	0.7889*	-3.2012	0.0014
Dummy	0.0041*	1.6147	0.0095
ER	0.1222*	-7.557	0.0000
LR	-0.0016*	1.6554	0.0457
BR	-64.0824*	2.3483	0.0192
OP	14.3938*	-4.3051	0.0000

Note: *Significant at 0.05 level, two-tailed test

Table 4.35 and table 4.36 shows that both of them accept the hypotheses. Cash inflow has a negatively impact on oil price, exchange rate and trading volume; in contrast with interest rate and the rate of loan, oppositely with cash outflow. Exchange rate and trading volume show strongly impact. The others show weakly impact.

Moreover, this paper will examine for local (or retail) and institution investors. The results show in table 4.37 and table 4.38. The hypotheses will be set up the same as previous ones.

Hypothesis XXXVII Oil price, exchange rate and trading volume have a negatively significant impact on volatility; in contrast with interest rate and the rate of loan

$$\ln(\sigma_{2,t}) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_{2,t}) + g\,Dummy_2 + \varepsilon_t$$

Time period: January 2, 2009-February 28, 2014 or 2,727 observations

Table 4.37 Regression of Exogenous Testing with Volatility for Local Investor

Regression Statistics	
R Square	60.72%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	11.3215	1.8869	8.3221	0.0000
Residual	2,720	535.1860	0.2721		
Total	2,726	546.5076			

Table 4.37 (Continued)

	Coefficients	t Stat	P-value
Intercept	5.5256*	2.3122	0.0209
Ln (B/S)	-0.2351	0.3352	0.0818
Dummy	0.0253*	1.0629	0.0288
ER	-0.1043*	-4.9228	0.0000
LR	0.0052*	1.5623	0.0485
BR	22.4357*	4.7089	0.0000
OP	-5.1911*	-4.6745	0.0000

Note: *Significant at 0.05 level, two-tailed test

Hypothesis XXXVIII Oil price, exchange rate and trading volume have a negatively significant impact on volatility; in contrast with interest rate and the rate of loan

$$\ln(\sigma_{3,t}) = a + b\,ER_t + c\,LR_t + d\,BR_t + e\,OP_t + f\,\ln(v_{3,t}) + g\,Dummy_3 + \varepsilon_t$$

Time period: January 2, 2009-February 28, 2014 or 2,727 observations

Table 4.38 Regression of Exogenous Testing with Volatility for Institution Investor

Regression Statistics	
R Square	55.84%
Observations	2,727

ANOVA

	df	SS	MS	F	Significance F
Regression	6	30.5160	5.0860	23.2659	0.0000
Residual	2,720	515.9916	0.2623		
Total	2,726	546.5076			

Table 4.38 (Continued)

	Coefficients	t Stat	P-value
Intercept	3.1299	1.3330	0.1827
Ln (B/S)	-0.3600	-0.9210	0.0811
Dummy	0.0383*	2.6589	0.0097
ER	-0.2012*	-5.7193	0.0000
LR	0.0435*	1.6350	0.0495
BR	18.1546*	3.8693	0.0001
OP	-4.1361*	-3.7822	0.0001

Note: *Significant at 0.05 level, two-tailed test

Table 4.37 and table 4.38 illustrate that the trading volume for both investors do not impact on market volatility. However, the exogenous factors still impact on. Oil price and exchange rate have negatively significant impact on volatility; in contrast with interest rate and rate of loan. Only rate of loan shows weakly impact on.

According to the exogenous testing for return, this paper examines for both of overall market, show in hypothesis XXVII, and by each trader, shown in hypotheses testing XXVIII-XXXII.

The results show that only foreign investor has a significant impact on stock market in trading volume, the same result as trader effect testing. However, the exogenous factors show the significant impact for all investors. Oil price has a strongly positive significance; in contrast with rate of loan.

Moreover, oil price, exchange rate and trading volume have a positively significant impact on stock return; unlike interest rate and rate of return. Based on previous researches, they explained these relations that when the oil price and exchange rate are the main basic factors in economy, including oil industry and export industry, the stock increases, effecting to the return increases. The trading volume depends on demand. When a buyer demand increases, the trading volume increases, effecting to the return increases. Comparing with interest rate or rate of loan, when both of them increase, the investors might slow down their investment, effecting to return to be decreased.

In addition, this paper examines the exogenous testing for impacted investors by cash flow, shown in hypotheses XXIV-XXX. The results show that the different direction of cash flow has different relation, the same as trader effect result. Oil price, exchange rate and trading volume have the same relation, or have a positive relation with return; unlike interest rate and rate of loan in cash inflow, oppositely with cash outflow.

Furthermore, this paper analyzes this exogenous testing for volatility. This paper analyzes in hypotheses XXXIII-XXXVIII. The results show that oil price, exchange rate and trading volume have the same direction of relation, or negatively relation with volatility; in contrast with interest rate and rate of loan.

Based on the previous papers, they explained about this topic that the basic factors such as oil price and exchange rate increase, the trading volume increases, effecting to the liquidity increases. Thus, the volatility decreases. Only foreign investor has effect to the volatility, the same result as trader effect testing.

Cash flow testing for this exogenous testing in volatility shows that cash inflow has a negatively impact on oil price, exchange rate and trading volume; unlike interest rate and rate of loan. However, the cash outflow shows oppositely.

Consequently, this exogenous testing has been tested to prevent the robustness. There are several empirical studied about the impact of market flows with exogenous factors. As a result, this paper applies model with these exogenous factors such as oil price, exchange rate, interest rate and rate of loan. The results show that even adding those factors, the results show the same as previous test. Only foreign investor has impact on the market flows.

CHAPTER 5

CONCLUSION

The impact of stock market has become interesting since the stock crash of October 1987. This paper presents and studies the market flows in Thai stock market, started January 2, 2003 to February 28, 2014. Based on previous studies, different information shows different investment behavior, effecting to price movement. This paper will help to understand how information transmission impacts the price movement. This paper assumes that each investor has different information, which effect price movement differently.

Moreover, according to the previous studies, return and volatility are well-known indicators for price movement. This paper has examined the return and volatility to understand the stock market flows.

The stock return in those period has fluctuated especially in 2007 or the started period of Sub-prime crisis, and in 2009 or during global economic crisis, started in Q3 2008 to 2009.

The same trend as return, the market volatility has been shown the high volatility during the same period of time. This paper analyzes the intraday volatility by using highest and lowest price index or called Parkinson (1980) volatility.

In addition, some papers indicated that the trading volume implies the information flows, effecting to the investment behaviors. As a result, this paper examines the relation between return-volume, and between volatility-volume to understand the impact of information flows with market flows.

As a result, it will help the investors to understand the expected return and expected volatility when they get the information convey from the impacted investors or expect the trading volume from the impacted investors by following the relationship between the movement of price, including return and volatility, and trading volume.

In return-volume relation, there are numerous researches that studied about the trend of return-volume. The results showed that in emerging market, there is a positive return-volume relation; although, the volatility-volume relation shows different direction, or a negative volatility-volume relation, the same results as the previous studies.

This paper examines the relation between return-volume in SET during 2003-2014. The result shows that there is a positive relation. Based on a theory of trading volume by Karpoff (1986), it can explain that the buyer's demand increases, effecting to the trading volume increases. As a result, the return should increase.

However, the relation between volatility-volume shows differently. The result shows that there is a negative relation. Based on previous studies explanation, this paper's result shows that the higher trading volume, the higher liquidity in the market, effects to the lower volatility.

For that reason, this paper examines the hypothesis testing for each trader in SET, based on previous studies for both relationships. SET has separated trader groups into three groups that are foreign, local (or retail) and institution investors until 2009. In 2009, SET changed how to separate investor groups, and dividend the investor groups into four groups instead that are foreign, local (or retail), institution and proprietary investors.

Since this paper examines data starts from 2003 to 2014, trader effect testing in this paper will analyze for three investor groups, called as three-group analysis, that are foreign, local (or retail), institution investors. The institution investor will combine the data of institution and proprietary data for the data during 2009-2014.

However, to prevent the robustness, this paper will test for three-group analysis and four-group analysis. This four-group analysis will examine the data during 2009-2014 by separating the data as SET that are foreign, retail (or local), institution and proprietary investors. This paper will compare the results for both analyses to ensure that there is no bias.

The hypotheses will be based on the previous researches that there is a positive return-volume relation, and a negative volatility-volume relation. Each hypothesis examines the relation between returns and/or volatility with trading volume.

For the three-group analysis, hypotheses III-VII examine the relation between return with trading volume, and hypotheses VIII-XII examine the relation between volatility with trading volume.

From the hypotheses testing, the results show that there is a positive relation between returns and trading; however, there is negatively in volatility. In the other word, when volume will increase, return increases while volatility decreases.

Moreover, only foreign investor has correlation for both returns and volatility with trading volume. The other investors reject the hypothesis. In the other word, the other investors do not effect to the market flows.

According to this relation, this paper examines the relation in cash flow for impacted investor or foreign investors. This paper differentiates the impact of fund inflow and outflow. This paper sets up the hypotheses for cash flow testing that there is a positive relation in cash inflow; however, there is a negative one in cash outflow.

The results for relation in cash flow are shown in hypothesis testing IV and V that there is a negative relation in cash inflow, and positive relation in cash outflow, shown in hypothesis IX and X.

Four-group analysis represents into hypotheses testing XIII-XXIV. Hypotheses XIII-XIX examine the relation between return and trading volume, and hypotheses XX-XXIV examine the relation between volatility and trading volume. The results show that only foreign investor has a positive correlation between return and volume, and a negative between volatility and volume, the same result as three-group analysis. The results show a little weaker relationship.

Moreover, different direction of cash flow shows different direction of correlation. Cash inflow has a positive relation between return-volume, and a negative relation between volatility-volume. On the other hand, cash outflow has a negative relation between return-volume, and a positive relation between volatility-volume, the same results as three-group analysis.

Consequently, in SET, started in 2003-Feb 2014, only foreign investor has positive relation between trading-volume, and negative relation between trading-market volatility. However, depending on direction flow, fund inflow in trading-volume is positively correlated while outflow is negatively. Trading-volatility in fund inflow has negative correlated while outflow is positively.

Moreover, this paper examines the causality test to understand the relation in another way around between volume and return, and between volume and volatility in hypotheses XXV and XXVI.

However, the results show that there is no relation between both of them. In the other word, when return or volatility increases, it does not effect to trading volume.

As a result, in SET, there is only one way relation between return and volume, and volatility and volume. There is a positive relation in return-volume relation, and a negative relation in volatility-volume relation. In the other word, when the demand increases, the trading volume increase, effecting to price increases or return increases. Moreover, when the trading volume increases, the liquidity increases, effecting to volatility increases.

Nevertheless, the direction of cash flow shows different direction of relation. Cash inflow shows a positive return-volume relation, and a negative volatility-volume relation; in contrast with cash outflow. Since cash inflow represents for the cash flow that buy price is higher than sell price, the return increases when trading volume increases due to the increasing in buyer's demand.

Furthermore, this paper examines in part of another way for both relations. The results show that return and volatility do not effect to trading volume. Thus, when return or volatility increases, it does not effect to trading volume.

To prevent the robustness, there are numerous empirical researches that studied about the exogenous factors impact on stock market flows. This paper examines the impact on these exogenous factors and trading volume with market flows, indicated by return and volatility, shown in hypotheses XXVII-XXXVIII. This paper examines for both of overall market, shown in hypotheses XXVII, and by trader, shown in hypotheses XXVIII-XXXII for return and hypotheses XXXIV-XXXVIII for volatility.

The results show that only foreign investor has a positive relation between return and trading volume, and there is a negative relation between volatility and trading volume, agreed with the trader effect testing's results.

Nevertheless, the exogenous factors have relation for all investors. Oil price and exchange rate have a positively impact on stock return; in contrast with interest rate and rate of loan, oppositely direction with volatility.

Moreover, the same as trader effect's result, the different direction of cash flow shows different relation. Cash inflow shows the same direction of relation with overall market; unlike cash outflow. Cash inflow shows a positively significant impact on oil price, exchange rate and trading volume; unlike interest rate and rate of loan. Cash outflow shows oppositely.

However, there are some topics that can study further from this paper such as which information that foreign investors have more than others, or population age structure also effects to SET like in US stock market, based on previous study or not.

BIBLIOGRAPHY

Akerlof, G. 1970. The Market for Lemons: Quality Uncertainty and the Mechanism. **The Quarterly Journal of Economics.** 83, (3): 488-500.

Albright, S.; Winston, W. and Zappe, C. 2009. **Data Analysis and Decision Making with Microsoft Excel.** 3rd ed. Mason, Ohio: South-Western Cengage Learning.

Andersen, T. G. and Bollerslev, T. 1998. Deutsche Mark-dollar Volatility: Intraday Activity Patterns, Macroeconomic Announcements, and Longer Run Dependencies. **The Journal of Finance**. 53: 219-265.

Andersen, T. G.; Bollerslev, T.; Diebold, F. X. and Labys, P. 2001. The Distribution of Realized Exchange Rate Volatility. **Journal of The American Statistical Association.** 96: 42-55.

Apergis, N. and Miller, M. S. 2009. July Do Structural Oil-market Shocks Affect Stock Prices? **Energy Economics.** 31, (4): 569-575.

Auronen, L. 2003. **Asymmetric Information: Theory and Applications.** Retrieved June 8, 2009, from http://riem.swufe.edu.cn/new/techupload/course/20071191742254245.pdf

Baillie, T. R. and DegGennaro, P. R. 1990. Stock Returns and Volatility. **Journal of Financial and Quantitative Analysis.** 25, 2 (June): 203-214.

Baker, M. and Wurgler, J. 2002. February), Market Timing and Capital Structure, **The Journal of Finance.** 17, (1): 1-31.

Basher, A. S. and Sadorsky, P. 2006. Oil Price Risk and Emerging Stock Market. **Global Finance Journal.** 17, 2 (December): 224-251.

Berk, J. B. and Green, R. C. 2004. Mutual Fund Flows and Performance in Rational Markets. **Journal of Political Economy.** 112: 1269-1295.

Black, F. and Sholes, M. 1973. The Pricing of Options and Corporate Liabilities. **The Journal of Political Economy.** 81, (3): 637-654.

Bollerslev, T. 1986. Generalized Autoregressive Conditional Heteroskedasticity. **Journal of Economics.** 31: 307-327.

Boyer, B. and Zheng, L. 2009. Investor Flows and Stock Market Returns. **Journal of Empirical Finance.** 16, 1 (January): 87-100.

Brennan, M. and Kraus, A. 1987. Efficient Financing under Symmetric Information. **Journal of Finance.** 42: 1225-1243.

Brennan, M. J. and Cao, H. H. 1997. International Portfolio Investment Flows. **The Journal of Finance.** 52, 5 (December): 1851-1880.

Brooks, C. 1998. Predicting Stock Index Volatility: Can Market Volume Help?. **Journal of Forecasting.** 17, 1 (January): 59-80.

Busse, A. J. 1999. Winter, Volatility Timing in Mutual Funds: Evidence from Daily Returns. **The Review of Financial Studies.** 12, (5): 1009-1041.

Campbell, Y. J.; Grossman, J. S. and Wan, J. 1993. Trading Volume and Serial Correlation in Stock Returns. **The Quarterly Journal of Economics.** 108, (4): 905-939.

Carhart, M. M. 1997. On Persistence In Mutual Fund Performance. **Journal of Finance.** 52: 57-82.

Chan, G. M.; Firth, M. and Oliver, M. R. 2001. The Dynamic Relation between Stock Returns, Trading Volume, and Volatility. **Financial Review.** 36, 3 (August): 153-174.

Chan, K. and Fung, W. M. 1998. Trade size, Order Imbalance, and the Volatility-volume Relation. **Journal of Financial Economics.** 57, 1 (January): 59-80.

Chan, K. and Fong, W. M. 2000. Trade Size, Order Imbalance, and the Volatility-volume Relation. **Journal of Financial Economics.** 57, 2 (August): 247-273.

Chang, C. C. and Fong, W. M. 2006. Realized Volatility and Transactions. **Journal of Banking & Finance.** 30: 2063-2085.

Chang, C. C. and Kuan, M. C. 2009. Causality in Quintiles and Dynamic Stock Return-volume Relations. **Journal of Banking & Finance.** 33, (7): 1351-1360.

Chang, C. E. and Wang, Y. 2002. **A Study of Mutual Fund Flow and Market** Return Volatility. Conference Submission, May 17, 2002.

Chen, N. F.; Roll, R. and Ross, A. S. 1986. Economic Forces and the Stock Market. **The Journal of Business.** 59, 3 (July): 383-403.

Choe, H.; Kho, C. B. and Stulz, R. M. 1999. Do Foreign Investors Destabilize Stock Markets? The Korea Experience in 1995. **Journal of Financial Economics.** 54, 2 (October): 227-264.

Chung, C. C. and Kuan, C. M. 2005. A Quintile Regression Analaysis of Return-Volume Relation: Evidence from the Taiwan and U.S. Stock Exchange. **Academic Economic.** 33: 379-404.

Chung, C. C. and Kuan, C. M. 2009. Causality in Quintiles and Dynamic Stock Return-volume Relations. **Journal of Banking & Finance.** 33, 7 (July): 1351-1360.

Clark, K. P. 1973. A Subordinated Stochastic Process Model with Finite Variance for Speculative Prices. **Econometrica.** 41 (January): 135-155.

Cong, R. G.; Wei, M. Y.; Jiao, L. J. and Fan, Y. 2008. Relationships between Oil Price Shocks and Stock Market: An Empirical Analysis from China. **Energy Policy.** 36, 9 (September): 3544-3553.

Dimson, E. 1979. Risk Measurement when Shares are Subject to Infrequent Trading. **Journal of Financial Economics.** 7: 197-226.

Dooley, M. and Hutchison, M. 2009. Transmission of the U.S. Subprime Crisis to Emerging Markets: Evidence on the Decoupling- recouping Hypothesis. **Journal of International Money and Finance.** 28, 8 (December): 331-1349.

Dumas, B. and Solnik, B. 1995. The World Price of Foreign Exchange Risk. **Journal of Finance.** 50, 2 (June): 445-479.

Durbin, J. 1970. Testing for Serial Correlation in Least-squares Regression When Some of the Repressors are Lagged Dependent Variables. **Economictrica.** 38, 3 (May): 410-421.

Edwards, R. F. 1988. August . Future Trading and Cash Market Volatility: Stock Index and Interest Rate Futures. **Journal of Futures Markets.** 8, 4 (December): 421-439.

Engle, F. R. and Victor, K. N. G. 1993. Measuring and Testing the Impact of News and Volatility. **The Journal of Finance.** 48, 4 (December): 1749-1778.

Fama, E. F. and Kenneth, R. F. 1993. Common Risk Factors in the Returns on Stocks and Bonds. **Journal of Financial Economics.** 33: 3-56.

Frankel, A. J. and Schmukler, L. S. 2000. Country Funds and Asymmetric Information. **International Journal of Finance and Economics.** 5: 177-195.

Fung, H. G. and Patterson, A. G. 1999. The Dynamic Relationship of Volatility, Volume and Market Depth in Currency Futures Market. **Journal of International Financial Markets.** 9, 1 (January): 33-59.

Glostern, L. R.; Jagannathan, R. and Runkle, D. E. 1993. On the Relation between the Expected Value and the Volaility of the Nominal Excess Return on Stocks. **Journal of Finance.** 48: 1779-1801.

Girard, E. and Biswas, R. 2007. Trading Volume and Market Volatility: Developed Versus Emerging Stock markets. **Financial Review.** 42, 3 (August): 429-459.

Gonedes, J. N. 1978. Corporate Signaling External Accounting and Capital Market Equilibrium: Evidence on Dividends, Income and Extraordinary Items. **Journal of Accounting Research.** 16: 1978.

Goyal, A. 2004. Demographics, Stock Market Flows, and Stock Returns. **Journal of Financial and Quantitative Analysis.** 39, 1 (March): 115-142

Granger, J. C. W. 1980. Testing for Causality: A Personal Viewpoint. **Journal of Economic Dynamics and Control.** 2: 329-352.

Griffin, J. M. and Stulz, R. M. 2000. International Competition and Exchange Rate Shocks: a Cross-country Industry Analysis of Stock Returns. **The Review of Financial Studies.** 14, (1): 215-241.

Gunduz, L. and Hatemi, J. A. 2005. Stock Price and Volume Relation in Emerging Markets. **Emerging Markets Finance and Trade.** 41, 1 (January): 29-44.

Harris, M. and Raviv, A. 1991. The Theory of Capital Structure. **The Journal of Finance.** 16, 1 (March): 297-355.

Haugen, A. R. and Baker, L. N. 1991. The Efficient Market Inefficiency of Capitalization- weighted Stock Portfolios. **The Journal of Portfolio Management.** 17, 3 (Spring): 35-40.

Haugen, R. A.; Talmor, E. and Torous, W. N. 1991. The Effect of Volatility Changes on the Level of Stock Prices and Subsequent Expected Returns. **Journal of finance.** 46: 985-1007.

Heinkel, R. 1982. A Theory of Capital Structure Relevance Under Imperfect Information. **Journal of Finance.** 37: 1141-1150.

Heinkel, R. and Zechner, J. 1990. The Role of Debt and Preferred Stock as a Solution to Adverse Investment Incentives. **Journal of Financial and Quantitative Analysis.** 25: 1-24.

Hiemstra, C. and Jones, D. J. 1994. Testing for Linear and Nonlinear Granger Causality in the Stock Price-Volume Relation. **The Journal of Finance.** 49, 5 (December): 1639-1664.

Hsu, C. P. 2013. The Influence of Foreign Portfolio Investment on Domestic Stock Returns: Evidence from Taiwan. **The International Journal of Business and Finance Research.** 7(3b): 1-11.

Huan, J.; Wei, D. K. and Yan, H. 2012. **Investor Learning and Mutual Fund Flows, Social Science Network.** Retrieved November 12, 2013 from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=972780

Huang, J.: Wei, D. K. and Yan, H. 2007. Participation Costs and the Sensitivity of Fund Flows to Past Performance. **Journal of Finance.** 1273-1311.

Indexthai. 2010. **Thai Economic Events.** Retrieved November 12, 2013 from http://www.oknation.net/blog/indexthai/2010/12/26/entry-1

Jaffe, J. and Westerfield, R. 1985. June. The Week-end Effect in Common Stock Returns: The International Evidence. **The Journal of Finance.** 40, 2 (June): 433-454.

Jobson, D. J. 1982. A Multivariate Linear Regression Test for the Arbitrage Pricing Theory. **The Journal of Finance.** 37, 4 (September): 1037-1042.

Karpoff, M. J. 1986. A Theory of Trading Volume. **The Journal of Finance.** 41, 5 (December): 1069-1087.

Karpoff, M. J. 1987. The Relation Between Price Changes and Trading. **The Journal of Financial and Quantitative Analysis.** 22, 1 (March): 109-126.

Kasman, S.; Vardar, G. and Tunc, G. 2011. The Impact of Interest Rate and Exchange Rate Volatility on Banks' Stock Returns and Volatility: Evidence from Turkey. **Economic Modeling.** 28, 3 (May): 1328-1334.

Korajczyk, A. R.; Lucas, D. and McDonald, L. R. 1990a. **The Effect of Information Releases on the Pricing and Timing of Equity Issues.** Working paper, Kellogg School, Northwestern University.

Korajczyk, A. R.; Lucas, D. and McDonald, L. R. 1990b. **Equity Issues with Time December Varying Asymmetric in Formation.** Working paper, Kellogg School, Northwestern University.

Krasker, W. 1986. Stock Price Movements in Response to Stock Issues under Asymmetric Information. **Journal of Finance.** 41: 93-105.

Leland, H. and Pyle, D. 1977. Informational Asymmetries, Financial Structure and Financial Intermediation. **Journal of Finance.** 32: 371-387.

Lensink, R. and Morrissey, O. 2006. Foreign Direct Investment: Flows, Volatility, and the Impact on Growth. **Review of International Economics.** 14, 3 (August): 478-493.

Li, J. and Wu, C. 2006. Daily Return Volatility, Bid-Ask Spreads, and Information Flow: Ananlyzing the Information Content of Volume. **The Journal of Business.** 79, 5 (September): 2697-2739.

Llorente, G.; Michaely, R.; Saar, G. and Wang, J. 2002. Dynamic Volume-Return Relation of Individual Studies. **The Review of Financial Studies.** 15, (4): 1005-1047.

Lockwood, L. J. and Linn, S. C. 1990. An Examination of Stock Market Return Volatility During Overnight and Intraday Period 1964-1989. **Journal of Finance.** 45: 591-601.

Mahajan, S. and Singh, B. 2009. The Empirical Investigation of Relationship between Return, Volume and Volatility Dynamics in Indian Stock Market. **Eurasian Journal of Business and Economics.** 2, (4): 113-137.

Manaster, S. and Koehler, G. 1982. The Calculation of Implied Variances from the Black-Sholes Model: A Note. **The Journal of Finance.** 37, 1(March): 227-230.

Miller, H. M. and Modigliani, F. 1961. Dividend Policy, Growth and the Valuation of Shares. **Journal of Business.** 34 (October): 411-433.

Miller, H. M. and Rock, K. 1985. Dividend Policy under Asymmetric Information. **The Journal of Finance.** 40, 4(September): 1031-1051.

Myers, C. S. 1984. The capital structure puzzle. **Journal of Finance.** 39, 3 (July): 575-592.

Myers, C. S. and Majluf, S. N. 1984. Corporate Financing and Investment Decisions When Firms have Information that Investors Do Not Have. **Journal of Financial Economics.** 13: 187-221.

Nelson, B. D. 1991. Conditional Heteroskedasticity in Asset Returns: A New Approach. **Econometrica.** 59, 2 (March): 347-370.

Ning, C. and Wirjanto, S. T. 2009. Extreme Return-volume Dependence in East-Asian Stock Markets: A Copula Approach. **Finance Research Letters.** 6, 4 (December): 202-209.

Nopphon Tangjitprom. 2010. Preholiday Returns and Volatility in Thai Stock Market, **Asian Journal of Finance & Accounting.** 2, (2): 41-54.

Park, J. and Ratti, A. R. 2008. Oil Price Stocks and Stock Markets in the U.S. and 13 European Countries. **Energy Economics.** 30, 5 (December): 2587-2608.

Parkinson, M. 1980. The Extreme Value Method for Estimating the Variance of the Rate Return. **The Journal of Business.** 53: 61-66.

Pastor, L. and Veronesi, P. 2010. Learning in Financial Markets. **Annual Review of Financial Economics.** 1: 361-381.

Paul, K. 1999. What Happened to Asia, Global Competition and Integration. **Business & Economics.** 4: 315-327.

Poitevin, M. 1989. Financial Signaling and the Deep-pocket Argument, R. **Journal of Economics.** 20: 26-40.

Poland, M. K.; Hoy, Mo. and Sadanand, A. 2006. Advantageous Effects of Regulatory Adverse Selection in the Life Insurance Market. **Economic Journal.** 116: 327-354.

Poon, S. P. 1994. An Empirical Examination of the Return Volatility-Volume Relation in Related Markets: The case of Stock and Options. **Financial Review.** 29, 4 (November): 473-496.

Richards, A. 2004. Big Fish in Small Ponds: the Trading Behaviour and Price Impact of Foreign Investors in Asian Emerging Equity Markets. **Journal of Financial and Quantitative Analysis.** 40, 1 (June): 1-27.

Roll, R. 1984. A Simple Implicit Measure of the Effective Bid-Ask Spread in an Efficient Market. **Journal of Finance.** 39, (4): 1127-1139.

Ross, A. S. 1989. Information and Volatility: the No-Arbitrage Martingale Approach to Timing and Resolution Irrelevancy. **The Journal of Finance.** 44, 1 (March): 1-17.

Rothschild, M. and Stiglitz, J. 1976. Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information. **The Quarterly Journal of Economics.** 90, (4): 629-649.

Sadorsky, P. 1999. Oil Price Shocks and Stock Market Activity. **Energy Economics.** 21, 5 (October): 449-469.

Salma, F. 2002. Risk-return-volume Relationship in an Emerging Stock Market. **Applied Economics Letters.** 9, (8): 549-552.

Scholes, M. and Milliams, J. 1977. Estimating Betas from Nonsynchronous Data, **Journal of Financial Economics.** 5: 309-328.

Schwert, G. W. 1989. Why Does Stock Market Volatility Change Over Time? **The Journal of Finance.** 24, 5 (December): 1115-1153.

Schwert, G. W. 1990. Stock Market Volatility. **Financial Analysis Journal.** 46, 3 (May): 23-34.

Sinclair, E. .2008. **Volatility Trading.** Hoboken: John Wiley & Sons.

Spence, M. 1973. Job Market Signaling. **The Quarterly Journal of Economics.** 87, (3): 355-374.

Stiglitz, J. 1975. The Theory of Screening Education and the Distribution of Incomes. **The American Economic Review.** 65, (3): 283-300.

Tai, S. C. 2000. Time-varying Market, Interest Rate, and Exchange Rate Risk Premia in the US Commercial Bank Stock Returns. **Journal of Multinational Financial Management.** 10, 3-4 (December): 397-420.

Takada, K. 2014. March 20. **China Opens Door Further to Foreign Stock Investors, Reuters.** Retrieved June 20, 2013 from http://www.reuters.com/article/2014/03/20/us-china-foreigninvestment-stocks-dUSBREA2J02F20140320

Tanthanongsakkun, S; Treepongkaruna, S.; Wee, M. and Brooks, R. 2011. **The Effect of Trader Type on Realised Volatility: Evidence from Thai Stock Market.** Working paper, Pp. 1-37.

Toda, H. Y. and Yamamoto, T. 1995. Statistical Inference in Vector Autoregression with Possibly Integrated Processes. **Journal of Economics.** 66: 225-250.

Watanabe, T. 2001. Price Volatility, Trading, Volume and Market Depth: Evidence from the Japanese Stock, Index Futures Market. **Applied Financial Economics.** 11, (6): 651-658.

Watts, R. 1973. The Information Content of Dividends. **Journal of Business.** 46, (April): 191-211.

Wikipedia 2014. **F test.** Retrieved September 15, 2013 from Wikipedia, http://en.wikipedia.org/wiki/F-test

Wongsawan, J. 2006. Transmission of Information Across International Equity Market. **The review of Financial Studies.** 19, 4 (March): 1157-1189.

Worthington, A. 2004. Transmission of Equity Returns and Volatility in Asian Developed and Emerging Markets: a Multivariate GARCH Analysis. **International Journal of Finance & Economics.** 9, 1 (January): 71-80.

APPENDICES

APPENDIX A

RETURN AND VOLATILITY DISTRIBUTION

RETURN AND VOLATILITY DISTRIBUTION

Appendix A presents the testing of data distribution. This paper uses t-test for hypotheses testing. T-test model is applied for statistic test for normal distribution. Appendix A.1 illustrates the distribution testing for return, and Appendix A.2 shows the distribution testing for volatility.

Appendix A.1

Appendix A.1 presents the scatter diagrams of return distribution during 2003-2014.

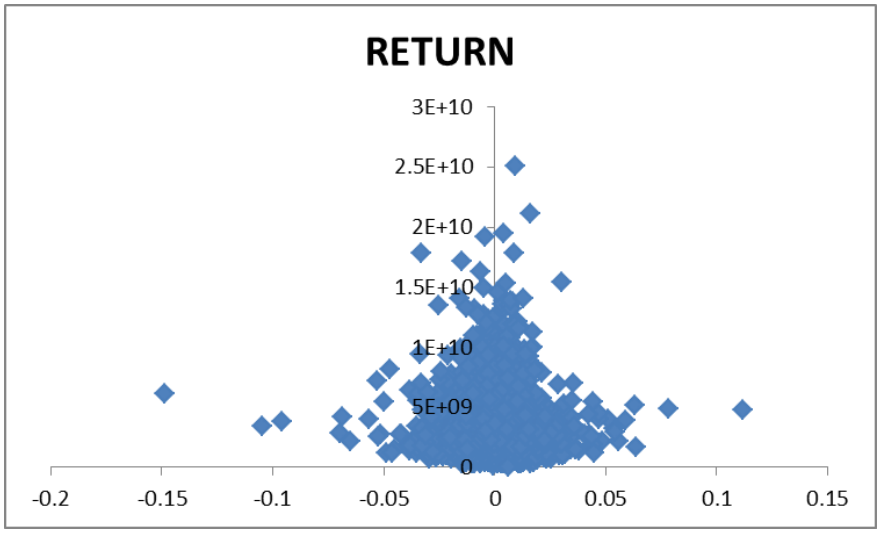

Figure A.1.1 Scatter Plot for Return and Volume

According to scatter plot in figure A.1.1, the result shows that it does not show the significant relation between return and volume. For hypotheses testing, this paper will use t-test for analysis, which will be appropriate for normal distribution or linear regression. As a result, this paper will examine the data by taking logarithm into the data, shown in the scatter diagram in figure A.1.2.

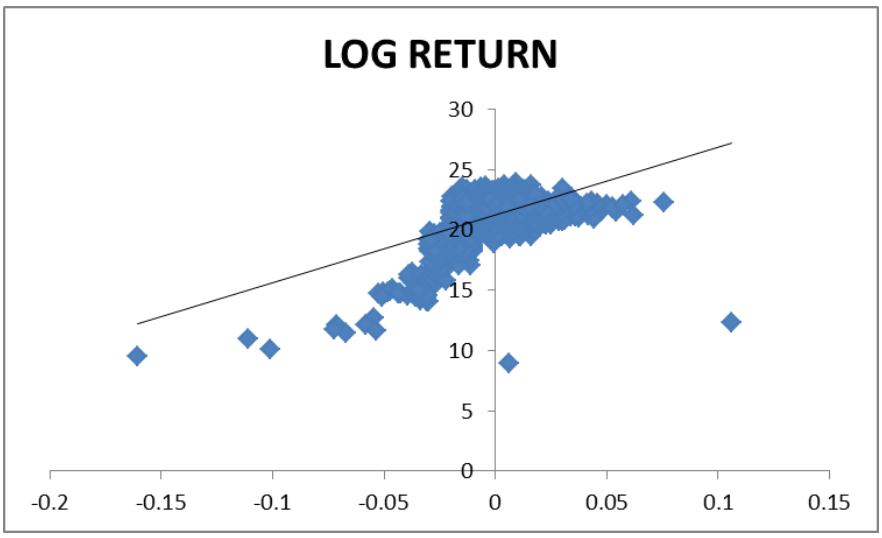

Figure A.1.2 Scatter Plot for Logarithm Return and Logarithm Volume

Figure A.1.2 illustrates that based on previous studies (i.e Chang and Wang (2002)), they suggested taking log in the equation due to t-test. After taking log into the data for both of return and volume as figure A.1.2, the data is shown as linear, so the equation can be use t-test for do the hypotheses testing. However, the relation is shown in the figure is weak due to autocorrelation.

Appendix A.2

Appendix A.2 presents the scatter diagrams of volatility distribution during 2003-2014

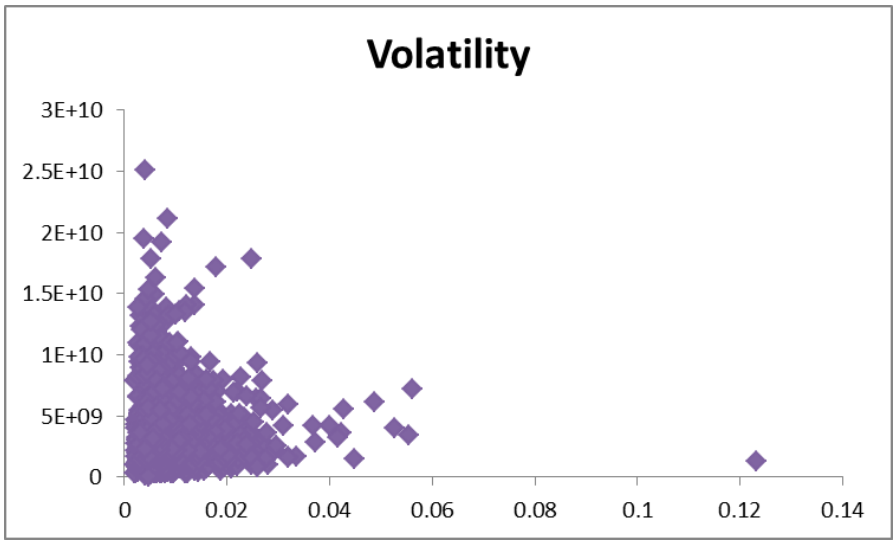

Figure A.2.1 Scatter Plot for Volatility and Volume

Figure A.2.1 illustrates that the scatter plot for volatility and volume does not show the relation between volatility and volume. Based on the previous studies (i.e Chang and Wang (2002)), they studied the relation between volatility and mutual fund flow. In their model, they took the logarithm in the equation for the relation testing between return and volume, or testing the logarithm return and logarithm volume. As a result, this paper will apply their model for the analysis. The data with taking logarithm in both of volatility and volume is shown in figure A.2.2.

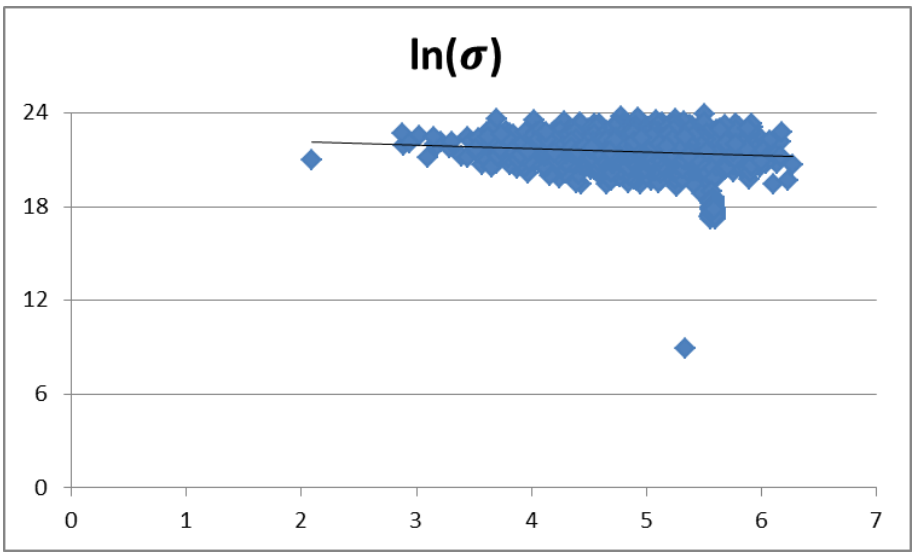

Figure A.2.2 Scatter Plot for Logarithm Volatility and Volume

The scatter diagram in figure A.2.2 shows that after taking logarithm in volatility and volume, the graph shows a weak negative relation between volatility and volume.

APPENDIX B

AUTOCORRELATION TEST

AUTOCORRELATION TEST

Appendix B presents the results of autocorrelation test for both of return and volatility. Based on previous studies, the autocorrelation may occur for time-series data. The autocorrelation test measures the related data with their own past values. The null hypothesis will be no serial correlation. This testing in the paper is to test the autocorrelation data for adjust the applied equation for the relation testing, mainly to prevent autocorrelation problem in the equation.

Appendix B.1

Appendix B.1 presents the result of autocorrelation testing for return data during 2003-2014. The result shows that the equation should add up the lag form for lag 3 to prevent the autocorrelation problem.

H_0 : no serial correlation or $r_1 = r_2 = 0$

H_a : $r_1 \neq r_2 \neq 0$

Table B.1.1 Autocorrelation for Return Data During 2003-2014

Lag	Autocorrelation	U-Critical Value	L-Critical Value
1	0.0453	0.0382	-0.0382
2	0.0409	0.0382	-0.0382
3	-0.0315	0.0382	-0.0382
4	-0.0080	0.0382	-0.0382
5	0.0015	0.0382	-0.0382
6	-0.0271	0.0382	-0.0382
7	0.0181	0.0382	-0.0382
8	-0.0283	0.0382	-0.0382
9	0.0171	0.0382	-0.0382
10	0.0148	0.0382	-0.0382

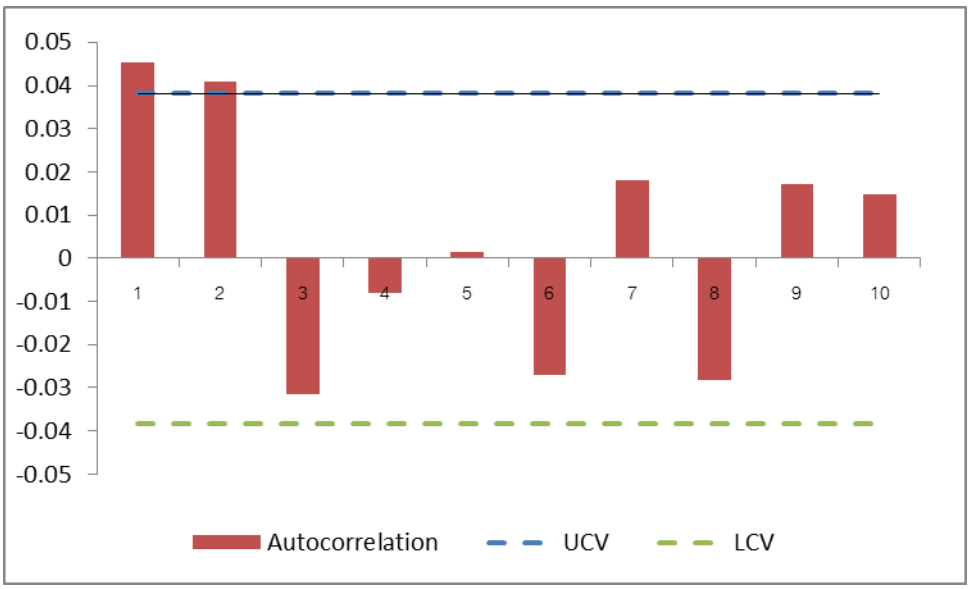

Figure B.1.1 Autocorrelation for Return Data

Table B.1.1 and Figure B.1 present the autocorrelation test for return data during 2009-2014. The results show that the autocorrelation testing started from lag 1 to lag 10; however, the hypothesis is accepted in lag 3, or accepts the hypothesis in lag 3. As a result, the equation will add lagged return till lag 3 to prevent autocorrelation problem.

Appendix B.2

Appendix B.2 presents the result of autocorrelation testing for volatility data, calculated by Parkinson (1980), during 2003-2014. The result shows that the equation should add lagged-3 volatility to prevent autocorrelation problem.

H_0 : no serial correlation or $r_1 = r_2 = 0$

H_a : $r_1 \neq r_2 \neq 0$

Table B.2.1 Autocorrelation for Volatility Data During 2003-2014

Lag	Autocorrelation	U-Critical Value	L-Critical Value
1	-0.0533	0.0382	-0.0382
2	0.0409	0.0382	-0.0382
3	-0.0315	0.0382	-0.0382
4	-0.0080	0.0382	-0.0382
5	0.0015	0.0382	-0.0382
6	-0.0271	0.0382	-0.0382
7	0.0181	0.0382	-0.0382
8	-0.0283	0.0382	-0.0382
9	0.0171	0.0382	-0.0382
10	0.0148	0.0382	-0.0382

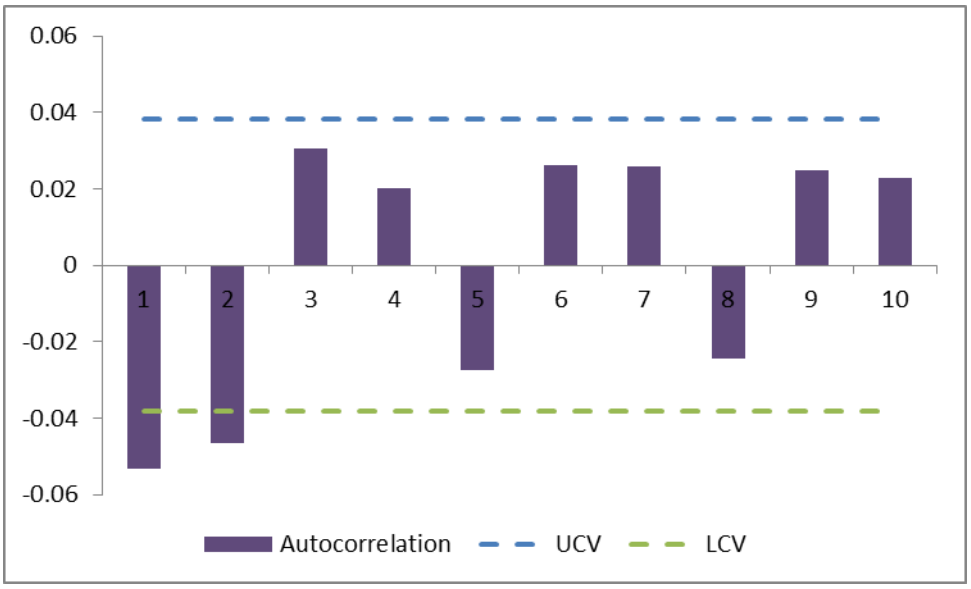

Figure B.2.1 Autocorrelation for Return Data

Table B.2.1 and Figure B.2.1 present the autocorrelation test for Parkinson (1980) volatility data during 2009-2014. Those table and graph show that started from lag 3, the results show significant or accept the hypothesis. As a result, the equation will add lagged volatility till lag 3 to prevent the autocorrelation problem.

BIOGRAPHY

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ACADEMIC BACKGROUND	Industrial Engineering (with honor), Kasetsart University, Thailand MSc, Engineering Business Management, University of Warwick, UK MEng, Engineering Management, Chulalongkorn University, Thailand Ph.D, Financial (International program), NIDA, Thailand
PRESENT POSITION	Vice President, TDD construction group, Thailand
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