

# A STUDY ON RELATIONSHIP OF FOREIGN NET-FUND-FLOW AND THE INDEX OF STOCK MARKET IN THAILAND

Worapot Jumniandumrongkarn\*

## Abstract

The activities of investors create movements in funds; in other words, they cause funds to flow. The fund flow indicates the demand from investors on the stock market of a country. It also shows the demand for the stocks in the market. When funds flow into the market, there is more demand on purchasing. On the other hand, when funds flow out, it occurs together with stock selling or lower demand on stock purchasing. Since the stock market in Thailand is liberalized, opening up opportunities towards foreigners to invest in the market, the foreign investors in Thailand become the second biggest player in Thailand's stock market. As long as the market is liberalized to foreign investors, they will continue to speculate on the prices of stocks because the dividend yield of the stocks in the market will have decreased as time goes by. So it can be seen that the fund from foreign investors have more activities. This study tries to investigate the relationship between the foreign net fund flows and the SET Index. The SET Index will be used as a proxy of market return because the SET Index, or the Stock Exchange of Thailand, is calculated from the prices of all stocks listed for trading in the market. The result of this study shows that the foreign fund flows and the SET Index have a positive relationship despite an unexpected error in statistical equations shown by the value of R-Square. Furthermore, from the study, it can be clearly seen that the SET Index movement continues in the same direction in the long run even though it can move in the different direction during the short run period.

## บทคัดย่อ

กิจกรรมต่าง ๆ ของนักลงทุนทำให้เกิดความเคลื่อนไหวของเงินทุน หรืออาจกล่าวได้ว่ากิจกรรมเหล่านั้นทำให้เกิดการไหลของเงินทุน การไหลของเงินทุนแสดงถึงความต้องการของนักลงทุนในตลาดหุ้นของประเทศและยังแสดงถึงความต้องการหุ้นในตลาด เมื่อมีเงินทุนไหลเข้าสู่ตลาดมากขึ้น ความต้องการซื้อจะเพิ่มขึ้น ในทางกลับกันเมื่อมีเงินทุนไหลออกก็จะมีการขายหุ้นหรือความต้องการ

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\*Mr. Worapot Jumniandumrongkarn obtains his Masters of Science in Investment Analysis and Management from Assumption University, Thailand (2011-2013). He had pursued his Bachelors in Computer and Network Engineering from Assumption University (2005-2009). He is a freelance in PCL and mobile programming.

ซื้อหุ้นต่ำเช่นกัน เนื่องจากตลาดหุ้นแห่งประเทศไทยนั้นมีการเปิดเสรีให้นักลงทุนต่างชาติมาลงทุนในตลาด นักลงทุนต่างชาติเป็นผู้เล่นกลุ่มที่ใหญ่เป็นอันดับสองในตลาดหลักทรัพย์แห่งประเทศไทย ครอบคลุมได้ทั้งตลาดเปิดเสรีให้กับนักลงทุนต่างชาติ นักลงทุนต่างชาติจะเก็งราคาหุ้นอย่างต่อเนื่อง เพราะอัตราผลตอบแทนเงินปันผลของหุ้นในตลาดจะลดลงตามเวลา ดังนั้นจึงเห็นได้ว่าเงินทุนจากนักลงทุนต่างชาติมีกิจกรรมมากกว่า งานวิจัยนี้พยายามศึกษาความสัมพันธ์ของการไหลของเงินทุนสุทธิจากต่างประเทศ (Foreign Net-Fund-Flow) กับดัชนีของตลาดหลักทรัพย์แห่งประเทศไทยโดยใช้ดัชนีดังกล่าวเป็นตัวแทนของผลตอบแทนรวมทั้งตลาด เนื่องจากดัชนีของตลาดหลักทรัพย์แห่งประเทศไทยคำนวณจากราคาหุ้นทั้งหมดที่มีการซื้อขายในตลาด ผลการวิจัยแสดงว่าการไหลของเงินทุนสุทธิจากต่างประเทศกับดัชนีตลาดหลักทรัพย์แห่งประเทศไทยมีความสัมพันธ์กันในเชิงบวกถึงแม้จะเกิดข้อผิดพลาดที่ไม่ได้คาดการณ์ไว้ล่วงหน้าในสมการทางสถิติที่แสดงโดยค่า R-Square นอกจากนี้งานวิจัยนี้ยังแสดงไว้ชัดเจนว่า ความเคลื่อนไหวของดัชนีของตลาดหลักทรัพย์แห่งประเทศไทยเป็นไปในทิศทางเดียวกันในเวลาระยะยาว แม้วาอาจเป็นไปในทิศทางที่แตกต่างในเวลาระยะสั้น

## STATEMENT OF PROBLEM

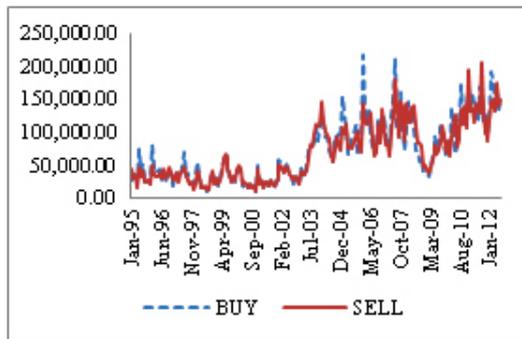
The activities of investors make a fund in the market flow. The flow of fund shows the demand on the stock in the market. And the supply of stock in the market cannot change much in supply, so the change in demand will directly change the price of stock in the market. This study focuses on how fund flows in Thailand's stock market because demand cannot be measured directly, but the flow of fund can show the demand on stock in the market. The fund flow can lead to the change of price and can pose an effect on the index of the market. Moreover, the index is calculated from the price movement of stock in the market, so it can show the return of the market.

Investors who invest in the stock market in developed countries prefer to get the highest return with the lowest risk, making the investor seem to be a rational in-

vestor. The rational investor is an investor who desires wealth, but does not desire to work if it can be avoided. Verma (2009) and Alsin (2007) give the idea that a rational investor is someone with a rational expectation that the current economic situation will partially affect the economy of the future. From a rational concept, if investors expect that the stock prices will rise in the future, investors will buy and hold the stock until they expect the stock's price to drop. To reduce the risk from investing, one choice is to diversify their portfolio to emerging markets.

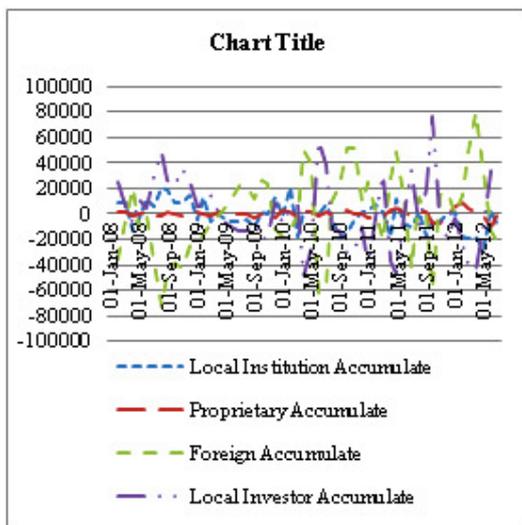
The movements of fund from the investors to the market create a fund flow. Funds that flow to be invested in Thailand tend to increase through time as you can see in Figure 1. Figure 1 shows the amount of buy and sell of foreign investors in the market from January 1995 to July 2012. The fund flow shows the demand on the stocks in the market. When the funds flow

into the market, this means there is more demand in purchasing. On the other hand, when the funds flow out, it occurs from the selling or lower demand of stock purchasing.



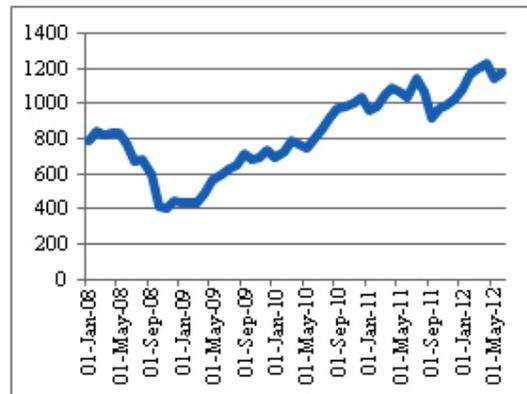
**Figure 1: Foreign Trading Data (1995 - July 2012) (Million baht)**

Source: www.set.or (Data obtain on 5 August 2012)



**Figure 2: Accumulate Fund by Investor Type (2008 - July 2012)**

Source: www.set.or.th (Data obtain on 5 August 2012)



**Figure 3: SET Index (Jan 2008 - July 2012)**

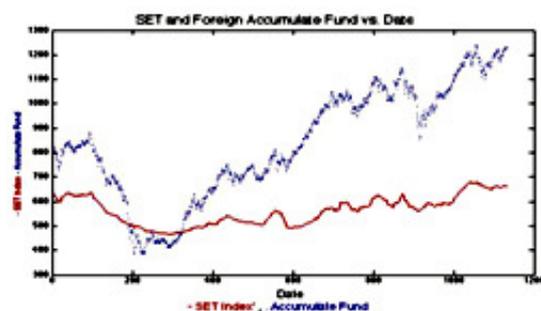
Source: www.set.or (Data obtain on 5 August 2012)

The proprietary and local institution trading has a small amount of fund that flows in the market as shown, in Figure 2, which shows the trading data of each group of investor's market. They usually buy and hold their stocks. Most activities are from foreign investors and retail traders. According to Figure 2 and 3 when comparing both Figures, the slope of change in foreign fund moving in the market tends to have the same movement (co-movement) with the SET index, which is opposite to the local-investor trading funds. So the foreign fund flows may have a significant effect on the market return and stock price. This study will investigate the relationship between foreign fund movement (fund flow) and Thailand's stock market return.

The Stock Exchange of Thailand (SET) has divided the investor into categories: Local Individuals, Local Institutions, Proprietary trading, and Foreign Investors. Local Investors and Foreign Investors are two groups that trade everyday with more

than 80% of the total trading volume. The largest amount of trading is from local investors and is followed by that of foreign investors. Institute Trading and proprietary trading do not have much activity in the market each day. It shows that these two groups of investors are seeking capital gains more than a cash dividend. The Study of Bekaert & Harvey (2000) shows the result which indicates that speculators from foreign investors are liberalized because the dividend yield in stock market is likely to decrease as long as the market is liberalized and the price of stock is higher.

Figure 4 shows the trend of foreign accumulated funds compared with the index of Thailand's stock market. So the foreign accumulated funds might have a correlation to the SET index. The movements of both parameters are not moving with the same slope because the amount of change in the accumulated fund is a large amount when compared to the index of the market, which changes in a small portion.



**Figure 4: SET Index and Foreign Investor Accumulate Fund**

**Source:** [www.set.or.th](http://www.set.or.th) (Data obtain on 5 August 2012)

The local investors who put their money in the stock market have a lot of information to forecast the stock move-

ment (i.e. Economic news, Trading data of each group of investor, information from community web board, etc.). So the question is whether foreign investor activities in Thailand stock market have an effect on the return of the market in terms of price movement (a capital gain from the market). So this study will find out the relationship of the net foreign fund flow, and Thailand stock market return.

The investor can obtain a profit in the stock market by capital gains and cash dividends from the company (excluding the stock options and future, those kind of things are used as a tool of diversification and arbitrage). Capital gains are focused on price movement of stock and from the SET index, which is calculated from the stock price movements, which show the best return when compared to cash dividends. Not all stocks have a cash dividend, so gain on capital is a chance to earn more profit. From trading data, it shows that retail investors and foreign investors usually place a trade every day. It might be said that these two groups of investors are not much seeking cash dividends but focusing on capital gains. And the target return of hedge fund (foreign investor) is high and cash dividends are not enough to reach their target, capital gains are considered to be more interesting to earn a profit from the price changes.

### Scope of Research

The study will focus on the SET index change and foreign fund flows. To achieve the objective of this study the data that will be used are described below.

SET Index is an index of the Stock Ex-

change of Thailand which is used to measure the return of the stock market in Thailand, because it is calculated from the price of all stocks listed in the market for trade. And for Foreign Trading Data, SET will announce the amount of buying and selling of each group of investors at the end of every day after the market is closed. This study will use buy amounts minus sell amounts each day to calculate the fund flows of foreign investors. The time period of the data that this study will use is from January 2008 to July 2012. The 1129 samples of data will be obtained on a daily basis for analysis because this time period includes the economic crisis period of the United States and European Union, all pre-crisis, during crisis, and post economic crisis period.

### **Limitation of this Study**

The return of capital gains from the stock market has a large volatility that consists of many factors. The factors that affect the return of the stock market are country economic condition, global economic condition, earnings on real management, expectation on interest rates, exchange rates, information access of investors, etc. Fund flow is a factor of return volatility. The results of this study show the relationship of foreign fund flow with the SET index changes. It does not include all other factors of volatility.

This study uses the last five years of historical data from January 2008 to July 2012, which include the pre-economic crisis period, economic crisis period and post-economic crisis period. However, the economic crisis period includes the crisis of

the European Union and the U.S. Economic crisis does not include Thailand's economic crisis period. Another important point to mention is that every time the crises occurred, they had different results and also occurred from different causes. So a crisis that may occur in the future may have a different impact on the market because the investors have learned lessons from the past.

The crisis in 2008 is known as "Global Financial Crisis" and "2008 financial crisis", is considered by many economists to be the worst financial crisis since the Great Depression of the 1930s. It resulted in the threat of total collapse of large financial institutions, the bailout of banks by national governments, and downturns in stock markets around the world. In many areas, the housing market also suffered, resulting in evictions, foreclosures and prolonged unemployment. A number of commentators have suggested that if the liquidity crisis continues, there could be an extended recession or worse. The continuing development of the crisis has prompted in some quarters fears of a global economic collapse although there are now many cautiously optimistic forecasters in addition to some prominent sources who remain negative. The financial crisis is likely to yield the biggest banking shakeout since the savings-and-loan meltdown. These crises make the fund out of flow from Thailand's stock market and other countries market also. Investors seek less volatility and lower risk market to invest; for example, gold price is increasing because gold is considered to be less volatile and have lower risk. And after the crisis, the money changes back to be in-flow and increase the market

index and return.

This study uses a data from 2008 to July 2012 to study the relationship of foreign fund-flow and SET Index return. The market condition can be changed in the future (i.e. market policy of foreign investment, becoming a developed country, etc.). The new emerging markets are open for foreigners and make the foreigner fund expand to another market and reduce the investment fund in Thailand's stock market. So the effect of fund-flow from foreigners on the SET Index can be changed.

Since a price base model is used to calculate the SET index, the stock in the market can move in different directions. When the SET index increases, it does not mean prices of all stocks in the market will increase too, but it does mean that the average price of stock increases.

### Significance of Study

The results from the study of the relationship between foreign fund flow and the SET index return will show the reaction from foreign fund flows towards SET index. This study should benefit local investors who invest in Thailand's stock market and might be studied by local fund managers to manage their portfolios.

In addition, this study will be an academic resource of Assumption University. And the researcher hopes that this study can benefit all who need to study the fund flow effect, stock market return volatility as a resource or guide line of study in the future. Moreover, this study might be a resource to create a forecasting model for the SET index.

### LITERATURE REVIEW

Duc, L. B., & Breton, G. L. (2009) stated that the the flow-of-funds framework is an indispensable tool of financial-market analysis. This framework enables the analyst to analyze the movements of saving through the economy in a highly structured, consistent, and comprehensive manner. Analysts are able not only to evaluate the complex independence of financial claim throughout the economy but also to identify the various pressure points in the system. Flow-of-Fund also makes it possible to analyze the interaction between the financial and real segment of the economy. Flow-of-Funds data for an economy are derived from specific economic periods of time by

(1) Preparing source-of-fund and use-of-fund statements for each sector in an economy once the economy has been divided into sectors.

(2) Totaling the sources and uses of all sectors.

(3) Presenting the information in the flow-of-funds matrix, for the entire economy.

Source-and-use statements can be made once economy has been divided into sectors. The starting point is a balance sheet for each sector. By definition, a balance sheet shows the stock of assets, liabilities and net worth of the sector at a moment in time. By taking the change that occurs between two balance sheets at different times, we can obtain the net-flows, which can be expressed in a source- and-use-of-funds statement.

The financial market indicates the credit and debt of funds as a whole plus the total

process of financial liquidity. Investigating more carefully, Zheng (2011) shows that the items of financial markets include in-flows of domestic funds, overseas funds by domestic savings and credit loans of banks on the side of fund-sources (funds inflow). On the other hand, funds split into supply of funds for the domestic economy and fund outflows overseas (fund outflows). When the flow of funds in financial markets is tied up with the international balance of payments, the overseas sector will experience a fund outflow excess (net capital outflows), if the current account is in surplus. Conversely, the domestic sector will experience fund inflow excess. Therefore, when the real economic sides of the domestic economy and overseas are analyzed under an open economic system, the balance of savings-investment of the domestic economy corresponds to the current account balance, according to the dynamic process of external flow of funds and the definitional equation of a System of National Account.

The flows of fund statistics show the financial assets and liabilities of all economic sections (household, non-financial firms, financial corporation, the general government, and the foreign sector). Flow of Funds can be used for economic analysis and monetary analysis. In monetary analysis, fund flow provides an insight into various sectors. For economic analysis, it provides an insight into the development of a balance sheet.

In the stock market, the fund flow data shows the aggregate demand of stocks from the investor. However, the stocks cannot be increased to meet the immediate decline in the amount of supply (share of

the company) and most companies in the market are not likely to do so. When demand occurs, the fund will flow into the market ready to be purchased. The price will automatically increase because the demand of stock will be greater than the supply of stock, as a result, the supply of stock will not increase to absorb the demand level. This means that the fund is in an in-flow condition. On the other hand, when the demand decreases, the number of investors who are willing to pay decreases and the number of stockholders who are willing to sell increases. That means the demand on stock will decrease and the investors who seek capital gain from stock purchasing will need to sell their stock for a gain and profit, then the price of stock will decrease. And the fund will be in an out-flow condition. In other words, the return from the capital gains in the stock market, which are gains from the price movements of the stock, has a relationship with the fund flows.

### **Definition and Feature of Independent Variable**

Flow of funds or fund movements are the net of fund in-flows and out-flows. The fund flows indicate the fund liquidity. This method was developed in the United States in 1951 by the US. Federal Reserve System. It represents the financial assets and liabilities of all sectors of the economy. Fund flow data capture the financial transactions and positions of sectors in the economy. It is used to assess the development in the financial position of the sector. The fund flow data may have an influence and an impact on the aggregate demand of

an asset. In analysis, fund flows can be used for economic analysis and monetary analysis. In monetary analysis, fund flows provide an insight into various sectors. For economic analysis, it provides an insight into the development of the balance sheet, which shows the wealth and debt of the sector. In the stock market, the fund flow data shows the aggregate demand of stocks from investors. This study will focus on the fund flow of foreigners or in other words the aggregate demand of foreigners for Thailand's stock market.

### Theories related to Dependent Variable

The SET index is an index of Thailand stock market, which represents the price movements for all common stocks that trade in the market. The SET index is calculated by the capitalization-weighted price index formula and uses 100 as a base market value. The formula is shown below.

$$\begin{aligned} \text{SET Index} \\ = \frac{(\text{Current market value} \times 100)}{(\text{Base Market Value})} \end{aligned}$$

**Source:** Stock Exchange of Thailand Website (20 July 2012)

From the above equation, current market value is a total value on the current day, and base market value is a total value on the previous day, so SET index can show the overall value change of the Market, which also shows the return of the market. In this study, the researcher uses the SET index as a proxy of stock market return.

### Theories Related to Independent Variable

Some investors need high returns from investment, but some investors prefer lower return and stock market returns are related to many conditions (e.g. economic condition, expect earning). Investors need to forecast the future with current conditions to make a decision about investing, and all events are unpredictable. So volatility of the stock market occurs and has become one major thing that investors focus on. Uppal (1997) indicated the changes in volatility of stock returns in emerging markets. After the liberalization of the market, the volatility of emerging markets will increase in significance and will stabilize after the event at a new and higher level.

The macroeconomic is one cause that affects performance of stock market returns. The macroeconomic or global factor, consists of expected inflation, change in expected inflation, economic crisis, real interest rates, crude oil price, commodity prices, etc. Ferson and Harvay (1994) used cross sectional regression to test the global risk factor relation with stock market return. The testing result shows that global risk factors are more important than the return volatility of local factor. A year later, Dumas and Solnik (1995) obtained the same results from their study. An increase in inflation leads to high liquidity in the stock market because when the business cycle is at the peak, the demand for stocks increases from the demand side. Jiang (2011) proved this relationship by running a predictive regression with the theory based on liquidity measure in his study in 2011. On the other hand, when

the economy is in the down side, the demand of stocks is decreasing in demand side.

Earnings management has an effect on the stock price and in the market also. Wang (2006) argued that the stock price has an effect from the real earning management. His study in 2006 used EGARCH model to make a specific prediction about intertemporal dynamics of conditional volatility and return process under real management. The result from the Wang (2006) model shows that the unexpected earnings shocks move the stock price and increase volatility of the stock price. The effects from expected earnings are an asymmetric impact of positive and negative earnings. The earning news will be negligible for the company because of the least capability to practice real earning management but for the firm that almost did well in their real earnings, they will have more volatility on earning expectation and earning news. In the same paper, Wang (2006) also showed that liquidity and idiosyncrasy have a relationship with each other. The stock that has lower liquidity will have high idiosyncratic risk. The liquidity and idiosyncrasy cannot be used to predict the return of stock in the markets although liquidity and idiosyncrasy must be measured with volume or value. From the study of Bekaert & Harvey (1997), which shows that the liberalization of the market has increased the volatility, buy cannot deter the foreign investors to diversify their portfolio into the emerging market.

From the discussion above about the volatility and stock return relationship, we can see that the cause of volatility comes from many sources. There are many re-

searches and studies that focus on volatility but they usually focus on each source of volatility. The researcher can categorize the volatility into 2 main groups which are macroeconomic and local. Both of the local volatility and the macroeconomic volatility are independent events and cannot be controlled. All studies indicate that volatility will increase with risk. Most studies try to investigate to create a model or use a specific indicator (e.g. inflation, exchange rate, export date) to predict the future movement of the market. Fund flows are used to be a factor of stock volatility because after the forecast are done by any researchers, it will be submitted to the investors or fund manager. They will make an adjustment to their portfolio and make the fund move in or out of the market, so the fund flows occur. To focus on the fund flows, we need to include many events in one variable. Economic forecast, earning forecast, economic condition, real earnings management forecasts and results, etc. are the causes of fund flows.

### **Relationship of Independent Variables to the Dependent Variable**

The liberalization of the market tends to increase the fund in-flow to the market. Foreigners will come to be players in the market and increase the amount of money every year as a function of time in which trading data show the activities' of foreign investors. The foreign investors tend to earn benefit from capital gain more than from focusing on dividends. It also increases the volatility of the market but it cannot deter the foreign investors to have Thailand stocks in their portfolio for they

benefit from portfolio diversification and capital gain

For foreigners who are interested in investing in Thailand's stock market, they can invest through Non-Voting Depository Receipt (NVDR), which is a trading instrument for foreigners to invest in Thailand's stock market. This instrument helps ease the limitation from the foreign ownership restriction in Thailand. NVDR is a choice for foreigners to gain a financial benefit of shareholders (e.g. dividends, warrants) in the same way as local investors who invest in the ordinary share market. The one difference is that NVDR holders do not have the right to vote for company decision-making. Not only can foreigners invest through NVDR, Thailand's local investors also have a right to invest in NVDR holdings. The SET has divided investors into four main groups, which are retail investor, institutional investor, foreign investor and proprietary investors. The amounts of funds that come from foreign trading are the 2<sup>nd</sup> biggest fund following the fund from local trading.

Foreign investors that invest in emerging markets like Thailand usually come in with a kind of mutual fund when they focus on the buy/sell amount. When we use a stock holding data that are calculated from buy amount minus sell amount of foreign investors, the number from buy/sell of foreign investors shows that the SET index moves in the same way with the holding amount of foreign investors. So the relationship of the holding amount of foreign investor and the SET index usually moves in the same direction or has a co-movement. Figure 4 shows the change in SET index and Foreign Accumulated Funds

from January 2008 to July 2012 in monthly period of data. We can see that the slopes of the two graphs in the same period are moving in the same direction. So the foreigners may have a significant effect on the index of the stock market (SET index) and might be used as a tool to forecast the market movement.

### Scope of Research

The study will focus on the SET index changes and foreign fund flows. To achieve the objective of this study, the data that will be used are described below.

SET Index is an index of the Stock Exchange of Thailand which is used to measure the return of the stock market in Thailand, because it is calculated from the price of all stocks listed in the market for trade. Foreign Trading Data, SET will announce the amount of buys and sells of each group of investors in every day after the market is closed. This study will use buy amount minus sell amounts of each day to calculate the fund flows of foreign investors. The time period of the data that this study will use is from January 2008 to July 2012. The 1129 samples of data will be obtained on a daily period for analysis because this time period includes the economic crisis period of the United States and European Union, all pre-crisis, during crisis, and post economic crisis period.

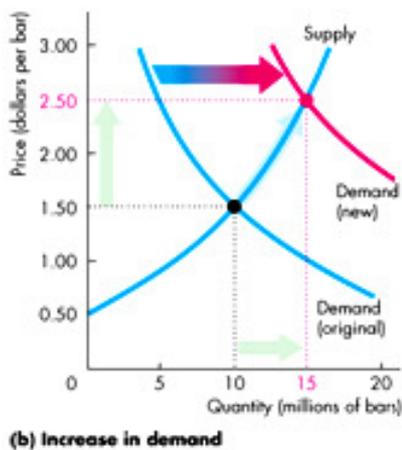
### RESEARCH FRAMEWORKS

This study will implement simple regression analysis and use the Generalize AutoRegressive Conditional Heteroske-

lasticity (GARCH) model in order to test the correlation of foreign fund flows and SET index return.

Figure 5 shows the curve of Demand and Supply and the movement of demand curve when the supply does not change. It shows that the price will increase. The investors' action affects the movement of funds in the market and causes the price movement of stocks due to the demand change.

The SET index uses the price of stock in its calculation, so when the price changes, the index will change to follow the average price of stock in the market. This study focuses on the foreign trading data (fund flows of foreign investors) that affect the return of stock market, which use SET index as a proxy.



**Figure 5: Supply and Demand Curve movement with No Change in Supply**

Source: Parkin, M. (2008). *Parkin Economic*, 9<sup>th</sup> Ed, (pp.74)

The study will use data from 2008 to July 2012. The first model that was used to test for a correlation of foreign fund

flows and market returns is the regression model. Regression model will test for the correlation of all data as one period (single variance). And the financial markets react nervously to related event (e.g. political problem, policy change, natural disaster, wars, economic crisis, financial crisis, etc.) GARCH model assumes that the variance changes over time to absorb the event that happen overtime past. So GARCH model will be implemented for all data again to confirm the results of linear regression model.

### Conceptual Framework

This study focuses on the return and volatility of foreign fund flows in Thailand's stock market (SET). This study will use daily trade data from January 2008 to July 2012. Trading data and aggregate funds (calculate from trading data) are used as a proxy of fund flows. Most of the previous studies focused on mutual fund flows. Baoling (2008), Wang (2006), & Hu (2008), used a mutual fund data in their study of fund flow effects. This study will use the trading data from The SET to find out the correlation of foreign fund flows and SET index returns. The factor that affect, SET returns are not only Foreign flows but it also consists of economic conditions, GDP data, expect interest rates, expect CPI, exchange rates, etc. Foreign flow consists of foreigner portfolio movement, which are affected from many factors mentioned before. The independent variable of this study is foreign daily trading data and the dependent variable is Thailand's stock market return and its volatility. This study will use a linear regres-

sion model and GARCH to analyze the correlation of foreign fund flows and stock returns and the variables are described below:

$$R \approx \int (F, \beta)$$

- R* Represents the returns of the stock index by measuring the movement of the SET index in daily periods. It is the independent variable, which will have an effect on the movement of foreign fund flow.
- F* Represents the fund flows of foreign investors. This variable is obtained by using daily trading data from the SET. The data will be calculated by using buy volume minus sell volume. It is an independent variable.
- $\beta$  Represents the relationship of *R* and *F*.

**Hypothesis**

$H_0$	There is no significant relationship between the foreign fund flow (inflow or out-flow) and the SET index return.
$H_a$	There is a significant relationship between the foreign fund flow (inflow or out-flow) and the SET Index return.

If the result of statistical testing matches alternative hypothesis, more investigation is needed to find out the relationship of both variable that can be positive or negative correlation.

**RESEARCH METHODOLOGY**

This study intends to find a correlation

of the SET index and foreign trading data from January 2008 to July 2012 in order to investigate the result by using the secondary data (historical data) and investigating the effect of one variable on another variable (which are Foreign Trading Data and SET Index respectively). So, this study is a causal research.

To find out the correlation of the SET Index and Foreign Fund-Flow which uses a foreign trading data as a proxy, we choose Simple Regression as the first method and Generalize AutoRegressive Conditional Heteroskedasticity (GARCH) as the second method for more accuracy in the result.

To perform a statistic test in this study, we will use three different time periods: daily, monthly and yearly, to measure the result in short time period and long time period, and to measure the effect of fund flow on the SET Index in different time length.

Regression Analysis is a method used to identify the relationship between dependent variable and one or more independent variable. In this study, the simple regression will be implemented in order to get the result for testing the relationship of the SET Index in foreign Fund Flows. The simple linear regression attempts to find a straight line that best fits with the two variables, where variation of real data that moves away from the line is minimized.

The equation of simple linear regression is

$$y = \beta_0 + \beta_1 x + e$$

$\beta_0$  is a zero-intercept on the y-axis.  $\beta_1$  refers to the slope of the line. *e* refers to the model parameter, and is an error term

that occurs. If the error term were not represented, the regression model would be deterministic.  $e$  is obtained by using the least squares method. It is the most widely used method for developing an estimate value of  $k$ .

Another method that will be used in this study to get more accurate results from testing is the Generalize AutoRegressive Conditional Heteroskedasticity (GARCH) model. Bollerslev introduced the GARCH model in 1986. This model is a weighted average of past square residuals, but it has declining weights that never go completely to zero. It gives parsimonious models that are estimated and, even in its simplest form, has proven surprisingly successful in predicting conditional variance. The most widely used GARCH model specification asserts that the best predictor of the variance of the next period is a weighted average of the long run weighted average variance predicted for this period, and new information from this period that is captured by the most recent square residual. Such an updating rule is a simple description of adaptation or learning or can be thought of as Bayesian updating.

The GARCH model is define by

$$y_k = \sigma_k \varepsilon_k$$

$$\sigma_k^2 = \omega + \sum_{i=1}^p \alpha_i y_{k-i}^2 + \sum_{j=1}^q \beta_j \sigma_{k-j}^2$$

Where  $\omega > 0$ ,  $\alpha_i > 0$ ,  $\beta_j > 0$  and the innovation sequence  $\{\varepsilon_i\}_{i=-\infty}^{\infty}$  is independent and identical distributed with  $E(\varepsilon_0) = 0$  and  $E(\varepsilon_0^2) = 1$ . The main idea is that  $\sigma_k^2$  the conditional variance of  $y_k$  of information available up to  $k-1$  has an auto regressive structure and it has a positive correlation with recent data of its own and recent

value of squared return  $y^2$ . This captures the idea of volatility (= conditional variance) being “persistent”: large (small) value of  $y_k^2$  are likely to be followed by large small values.

The standard deviation or volatility can be caused by some event in a short time and then go back to normal. GARCH Model perfectly captures this type of event for a long run period of data.

GARCH model is used by financial professionals including trades, investing and hedging to approach, to estimate and to predict financial volatility because the GARCH model can provide a more real world context than other forms.

## RESULTS

### Correlation Testing

#### Result of Correlation Testing of Fund and SET Index

Time Period	Correlation of Fund and SET Index
Daily (2008 - July 2012)	0.8454348457584938
Daily (2009)	0.9612079993763781
Daily (2010)	0.9590927290269471
Daily (2011)	0.7096265859567650
Daily (2012)	0.7729748985589631
Monthly (2008 - July 2012)	0.8885038441409965
Monthly (1995 - July 2012)	0.8631389938871044

The correlation testing of data in 2008 and 2009 show a Strong Positive Correlation level between the SET Index and Fund Flow and the other results show a Moder-

ate Positive Correlation level of data. But when using the SET index and Accumulated fund for all testing, it showed a weak positive correlation. All correlation testing shows a positive correlation between the SET Index and fund flow.

### Regression Analysis

#### Result of Regression Model Testing

Time Period	Result of Regression Model
Daily (2008 - July 2012)	SET_D = 0.000321553894972 + 0.11657838516*FUND_D
Daily (2009)	SET_D = 0.000138487196475 + 0.252357666269*FUND_D
Daily (2010)	SET_D = 0.00136292669554 + 0.0745577625077*FUND_D
Daily (2011)	SET_D = 0.00110569470779 + 0.080781860004*FUND_D
Daily (2012)	SET_D = -1.56542287875e-05 + 0.31699295879*FUND_D
Monthly (2008 - July 2012)	SET_D = 0.000411434659654 + 0.220146234426*FUND_D
Monthly (1995 - July 2012)	SET_D = 0.00735334097104 + 0.0831467137272*FUND_D

Time Period	P-Value
Daily (2008 - July 2012)	0.000000
Daily (2009)	0.000007
Daily (2010)	0.000001
Daily (2011)	0.000086
Daily (2012)	0.000000
Monthly (2008 - July 2012)	0.003250
Monthly (1995 - July 2012)	0.000418

The null hypothesis of statistical testing is that the change in the fund flows has no significant relationship to the SET Index. On the other hand, the alternative hypothesis is that the fund flows had a sig-

nificant level of correlation with the SET Index.

The Significant level indicates that the result of statistical testing is rejected, or non-reject. The null hypothesis is 0.95. So, the value of p-value (Prob(t-statistic) in the result) must be below 0.05 to reject the null hypothesis. By rejecting the null hypothesis, it indicates that the fund flows have a significant relationship with the SET Index.

All results from testing have a value of p-value below 0.05 that means the fund flows have a significant relationship with the SET Index. The change of the SET Index and accumulated funds also show that there is a significant relationship between both variables. All testing results also show a positive correlation of both variables in each time period used in testing.

### GARCH Model Testing

#### Result of GARCH Model Testing

Time Period	Result of GARCH Model
Daily (2008 - July 2012)	SET_D = 0.000782069868128 + 0.107439361842*FUND_D
Daily (2009)	SET_D = 0.000850968646808 + 0.372292326238*FUND_D
Daily (2010)	SET_D = 0.00144833518682 + 0.0735743600883*FUND_D
Daily (2011)	SET_D = 0.00114658163364 + 0.0704515305701*FUND_D
Daily (2012)	SET_D = 0.000188212840466 + 0.29426201496*FUND_D
Monthly (2008 - July 2012)	SET_D = 0.000793783482162 + 0.185430975933*FUND_D
Monthly (1995 - July 2012)	SET_D = 0.0157144849289 + 0.0942655894769*FUND_D

The results from the GARCH Model

testing are used to confirm the results of the regression analysis again to make the results more accurate. The results from the GARCH Model show that there are significant relationships between the SET Index and fund flows, as well as in changes of the SET Index and fund flow testing. GARCH Model shows the significant relationship of both variables. The GARCH Model results show that the SET Index is a positive function of fund flows.

## **DISCUSSIONS AND CONCLUSION**

Given that the fund flow is showing the demand on stocks in the market and foreign investors are the second biggest group of players in the market, the researcher investigates the relationship of foreign fund flows and the SET Index. The SET Index can show an average movement of stock prices in the market because it is calculated from the price of stocks in the market. So, the SET index can be used as an indicator or a proxy of market return.

From the statistical testing results, it shows that the foreign fund flows and the SET Index have a positive relationship. It also has an unexpected error in statistical equations that is shown by the value of R-Square. Fund flow of foreign investors does not include all volatilities in the market. Although the SET Index movement moves in the same direction, which can be seen clearly in the long run period, in the short run it can be moving in a different direction.

The time period has a different effect than the results of data from 1995 and 2012 which show a very low correlation but for

the last five year period it shows a moderate correlation of the SET Index and foreign fund flow.

And for each year in last five years, it shows different relationships of the SET index and foreign fund flows which move in the same direction but with a different effect, as shown by the difference in the slope of the regression line and slope in GARCH model. But for the result of 2008 to July 2012, which includes a pre-economic crisis, during economic crisis and post economic crisis, it shows a moderate relationship and a significant relationship of both variables.

In the early state of market liberalization, the foreign investor comes to the market with a small amount of funds, so it does not affect the SET Index much, the foreign funds invested in Thailand's stock market increases every year and because the foreign funds that invested in Thailand are from mutual funds, they have a policy to buy and sell, in which they don't buy all stock in the market and very small company stocks. By looking at the index, we know that the returns of the stock market can be called in other words, "the return of the stock portfolio that contain all stocks". So when the foreign fund in-flow to the large capitalization company stocks, it affects the SET index more than buying a small capitalization company's share because the current market value increases more easily when the price of large capitalization stock is increased and this situation leads to an increase in the SET Index.

## RECOMMENDATION

This study focuses on the effects of foreign fund flows that occur in the index of Thailand's stock market. However, the foreign investors do not buy or sell all stocks in the market. So with the movement of foreign fund, it has a co-movement with the index but it does not mean that all stock prices that trade in that market will follow the foreign fund flows. By focusing on fund flow, we will see a movement of the index but it does not mean that all-stock price movements are a result.

The volatility in the market is from many sources such as expectation of inflation, GDP, interest rate, etc. the fund flow also absorbs some volatility but not all and it also has a lag of time which cannot be seen in a very short period. It shows a better view in medium term and long term period.

The fund flow can show the economic condition and also show the strength in how the economic grows, because when a fund manager looks at the market to invest, the strength of the market is one of the major factors to choose a market to invest. When fund is in-flow, the economy is in good condition; on the other hand, out-flow shows some significant weakness on economic condition.

The data of fund-flow can also be used to analyze the situation of the economy. When people with fund seek a market to invest, they need to analyze that market to observe the economic condition of the market in order to reduce the risk in investing. So if we look at the fund flow, it's actually a result of fund analysis. The problem is there is a time lag but we can con-

firm the analysis by using the fund flow data.

Retail investors cannot buy all stocks in the market into their portfolio. By forecasting the index movement, you will see the overall direction of the index but not all stocks. For a better performance of a portfolio, choosing a stock is still an important step for building a strong portfolio. Although you can forecast the direction of the market, each stock has an idiosyncratic risk as mentioned by Wang (2006). So individual stock analysis is still an important process for including a stock into portfolio.

## FURTHER RESEARCH

This study focuses only on foreign fund flow and the effect that it has on the SET Index. Further investigation may scope the sample from SET Index into an individual sector or individual stocks, by picking a stock that foreign investors have activity in buying and selling. The study also investigates the effect the foreign fund flows on those stocks.

Retail Investors are the biggest group of players in the market and have activities in the opposite directions to the foreign investors as mentioned in chapter 1, so investigating the retail fund flows and the SET Index movement may show a significant point of view.

The change in the exchange rate might have a significant relationship to stock market because the funds that move between countries are affecting the exchange rate. So it may show some point of interest. The inflation rate and the interest rate

might also have a significant relationship to the return in stock market. With the higher inflation rate, it shows a rise in the general level of prices of goods and services in an economy over a period of time, which means people have more money and they may invest more in stock market. In case of the low interest rate for depositing money in bank account, the investors may invest their money in stock market to gain more profit.

Free-Float of stock is another interesting area to investigate. When foreign investors start a buying period, it will take time to buy, and in a selling period it also takes time as well. Investigating the foreign fund flows and stock free-float may show a significant result of free-float changing and also price changes.

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### Appendix

#### Trading Value by Investor Group (Billion Baht)

Year	Foreign Investors		Local Investors	
	Buy	Sell	Buy	Sell
2008	1,076.61	1,238.92	2,148.69	2,032.44
2009	878.08	839.85	2,594.22	2,631.54
2010	1,331.48	1,250.52	4,245.66	4,311.45
2011	1,636.34	1,638.46	3,843.52	3,813.25
2012	925.04	861.50	1,861.56	1,888.01

Year	Local Investors		Proprietary Trading	
	Buy	Sell	Buy	Sell
2008	302.42	257.24	392.13	391.21
2009	293.83	296.13	572.32	570.94
2010	526.58	541.07	845.13	845.82
2011	615.65	646.52	949.04	946.32
2012	302.42	257.24	392.13	391.21

**Source:** www.set.or.th (13 August 2012)