

Impacts of Foreign Portfolio Investment Flows on Stock Prices and Exchange Rate in Thailand after Asian Financial Crisis

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Abstract

The purpose of this study is to investigate the impacts of foreign portfolio investment on stock prices and exchange rate in Thailand after the Asian financial crisis. The monthly data used in this study are the net foreign portfolio investment and exchange rate of baht per US dollar issued by the Bank of Thailand. SET index data are from the Stock Exchange of Thailand. The period covers January 1997 to December 2012. The methods employed to investigate the relationship and impacts of foreign portfolio investment include: least square, correlation coefficient, VAR models, cointegration and error correction mechanism, impulse response analysis and variance decomposition. The results of the present study show that the stock prices had a long-run positive relationship with the net foreign portfolio investment, while the exchange rate had a long-run negative relationship with the net foreign portfolio investment. In addition, the high market return was a factor that influenced foreign equity securities investment in the stock market. The low volatility index was a factor influencing foreign equity securities investment in the stock market, while the high interest rate difference, low volatility index and high business sentiment index were factors that influenced foreign debt securities investment in the bond market. Due to the impacts of foreign portfolio investment, the Bank of Thailand introduced measures such as cut policy rate and reserve requirement on short-term capital inflows together with other alternative policies, for example, the method of switching from inflation targeting to exchange rate targeting, establishing emergency foreign exchange management mechanism, enforcing a capital control (limiting foreign investors from removing money within three months from entry date) and improving the Bank of Thailand's sterilization mechanism. This study revealed the evolution of changes from the financial crisis of January 1997 up to December 2012, showing a dramatic increase in debt securities investment. Therefore, the Bank of Thailand may take consider implementing an alternative measure such as the taxation of three-month bonds to six-month bonds to reduce short-term capital inflow.

Keywords : Foreign portfolio investment, Stock prices, Exchange rate

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1. Introduction

Foreign portfolio investment flow has significance on the direction, or tendency, of large-scale stock prices as well as direct impacts on the SET (Stock Exchange of Thailand) index. After 2007, the accumulated foreign portfolio investment and SET index have followed a similar direction. Thus, the fluctuation of stock prices demonstrates how it can be affected by the trading volume of major investors, in particular, the popular big market SET 50 cap due to high liquidity and security. Foreign investment, nevertheless, in the form of hedge funds or individual investors, shows funds will move in a circular flow under the fundamental principle of money movement. Funds shall flow into markets where investors see higher profits when compared to investment risk. When the Thai Stock Market gives high profit, foreigner investors who had been investing in other stock markets, for example, bond markets, money markets and commodities markets, will turn to the Thai Stock Market. This will raise stock prices as well as stimulate the SET index movement. However, if there is an economic crisis or changes in profit or investment risk, funds may flow out to other markets.

During the United States' subprime crisis that occurred in 2008, the Thai Stock Market faced such a severe outflow of funds that the SET index dropped to its floor price, which had happened in several years. After the problem was solved and the economy was stimulated, funds flowed back East, especially into emerging ASEAN markets, including Thailand. These countries that encountered the Asian Financial Crisis in 1997 and survived used their experience to improve their economic foundations. Banking sectors instituted good disciplines, while business sectors became stronger with higher net profits and continual dividends. These factors encouraged foreign portfolio investment flow returning to the Thai Stock Market, which was reflected by the rebound of the SET index that climbed from 400 points to 1200 points within four years. Furthermore, the U.S. Federal Reserve employed new measures, known as QE1 (Quantitative Easing), in November 2008, buying \$600 billion in Mortgage-backed securities (MBS), and QE2 in November 2010, buying \$600 billion of Treasury securities, to inject money into economic systems. In addition, they announced the QE3 September 2012, by launching a new \$40 billion a month, open-ended, bond purchasing program of agency mortgage-backed securities that is to continue until at least mid-2015. Moreover, the US FED's policy on interest rate reduction together with the situation of dollar depreciation promoted an enormous funds flow into the stock market.

These economic stimulation measures opened an advantageous opportunity for speculators and investors to earn large profits from buying and selling shares in the stock market. In late 2009, fears of a European Sovereign Debt Crisis developed among investors as a result of rising private and government debt levels around the world together with a wave of downgrading of government debt in some European states. The causes of the crisis varied in different countries, depending on their specific economic conditions. In several nations, private debts arising from a property bubble were transferred to sovereign debt as a result of banking system bailouts and government responses. The efforts, including European Central Bank (ECB) interest rate reduction measures, the bond-buying back program of Euro zone countries, and a rescue package to inject more liquidity into the Euro economic system, contributed to an increase funds flow into stock markets, particularly in Asia, which attracted more interest from investors. In addition, the demand of stock investment in the USA and European countries was restricted by several factors such as social and economic crises, the weakness of economic fundamentals, 0-interest rewards and increased investment risks.

Under the fundamental principle of money movement, funds flow into markets that give higher profits compared to investment risk. Bohn and Tesar (1996) and Bekaert et al (2002) have found a positive relationship between equity flows and market returns, with equity flows tending to move into markets with a rise in returns. This positive relationship is often hypothesized as “return-chasing”, “trend-chasing” or “momentum trading”. The explanation for return-chasing is the search for profit under extrapolative expectations. Investors form a view about future performance based on recent past performance, thus, allocating more funds to where returns have risen and cutting back otherwise. Brennan and Cao (1997) suggest that if foreign investors are less informed than their domestic counterparts about domestic market conditions, they will revise their expectations and adjust their portfolio investments relatively more in response to news about market returns, resulting in a positive correlation between flows and (past) returns.

Some papers detect a positive relationship between past market returns and current flows to that market. They also report a positive relationship between flows and current or future returns, suggesting “positive feedback”, positive feedback trading and herding among foreign investors in their trading behavior. The earlier theoretical predictions of DeLong et al (1990) and Sentana and Wadhwani (1992) suggest that such behavior could potentially lead stock returns to deviate from the equilibrium path implied by fundamentals. On the other hand, there are also

papers that report a negative relationship, which is often hypothesized as “portfolio rebalancing” behavior. In these cases, investors reallocate funds away from assets in their portfolio that have appreciated in value (due to price rises and/or currency gains) towards those that have depreciated, in order to restore the optimal portfolio balance (Hau and Rey, 2004).

Another relationship between net equity flows and exchange rates is discussed in many papers that examine the impact of stock returns on equity flows and the role of exchange rate changes (currency returns) as a component of total returns for cross-border investors (Brennan and Cao, 1997, Karolyi, 2002, Chai-anant, 2003).

The traditional approach, or “flow-oriented theory”, states that a depreciation of domestic currency can have a crucial impact on stock prices, by increasing firms’ competitiveness, while, in turn, raising their profitability. When firms are able to pay more dividends to stockholders, stock prices will increase and also attract more foreign investment. Thus, there should be a positive relationship between exchange rates and foreign investment flows. In this case, exchange rates lead stock prices and foreign investment flows. However, the “portfolio balance approach” indicates that stock prices and foreign investment flows lead exchange rates when a rising trend in stock prices induces foreign investors to invest more in domestic stocks. This causes more capital inflows, which, in turn, cause domestic currency appreciation. In addition, a rise in domestic stock prices causes wealth to increase, and thus induces investors to increase their demand for money, which results in a rise in domestic interest rates. Higher interest rates induce capital inflows, and thus cause an appreciation in domestic currency. According to this approach, stock prices and foreign investment flows have a negative impact on exchange rate. The details of the flow-oriented model are in Dornbusch and Fisher (1980), while the portfolio balance approach is discussed by Branson and Henderson (1985).

The fund flow in Thailand not only had an impact on the movement of large market cap stock prices but also directly affected the SET index. It had other impacts as well. There are several theoretical and empirical studies about these impacts. In one, Griffith-Jones (1998) revealed that a large amount of short-term fund flow that moved into developing countries could lead to negative effects. Furthermore, these short-term investments can distort the long-term balance of major macroeconomic variables such as exchange rate, asset price and stock price. In addition, Turner (1991) and Taylor and Sarno (1999) found that portfolio investment fluctuates more than foreign direct investment.

Bhagawati (1998) and Reisen (1999) showed that the movement of these severely oscillatory portfolio investments could be a factor of an unstable economy as well as increase inflation rates and strengthen real exchange rates. This will have an impact on a country's export business and their current account balance. In addition, Calvo and Reinhart (1996) and Carbo and Hernandez (1996) concluded that foreign fund flow was a cause of a country's undue real exchange rate appreciation, increasing inflation rate, and strengthening real exchange rates, which can affect export business and current account balance.

In case of Thailand, the paper by ChaiAnant (2008) examines from various angles foreign investors' daily transactions in six emerging Asian equity markets including Thailand and their relationship with local market returns and exchange rate changes over the period 1999-2006. Confirming much of the literature, they found that equity market returns matter for net equity purchases, and vice versa. In addition, we find that while currency returns tend to show little influence over foreign investors' demand for Asian equities, net equity purchases do have some explanatory power over near-term exchange rate changes. Gyntelberg (2009) presents empirical evidence that the Thai exchange rate is driven in part by international investors' cross-border portfolio rebalancing decisions. This paper finds that net purchases of Thai equities by nonresident investors lead to an appreciation of the Thai baht. In addition, higher returns in the Thai equity market relative to a reference stock market are associated both with net sales of Thai equities by these investors and with a depreciation of the Thai baht. Chatchawan (2012) studied the investment behavior and impact of foreign investment behavior on the fluctuation of SET during both market going up and down situation. The results of the study showed that there was no significant implication of foreign investor's behavior during the market-up period. While the market-down period, it was found that foreign investors significantly behaved against the market trend.

Several points of these studies demonstrated to the importance of foreign portfolio investment flow in Thailand, especially for the Stock Exchange of Thailand and exchange rate. This foreign portfolio investment impacted the capital market in relation to stock prices and the SET index. It also had an impact on the money market in relation to exchange rate. Foreign portfolio investment flow may also cause a fluctuation in both stock prices and exchange rate, thus, affecting the stability of both markets and Thailand's overall economy. This had a strong influence on the decision to study the impacts of foreign portfolio investment flow and the direction and mechanisms of foreign portfolio investment flow in Thailand.

The purpose of this study is to investigate the impacts of foreign portfolio investment on stock prices and exchange rate in Thailand after the Asian financial crisis. This research also investigates the factors that influence foreign portfolio investment flow in Thailand and have an impact on stock prices and exchange rate, the foreign portfolio investment volatility after the Asian financial crisis and policies initiated to deal with the impacts of the foreign portfolio investment flow. The scope of this study comprise the monthly data of foreign portfolio investment, including foreign equity security investment and foreign debt security investment in Thailand and exchange rate of baht per US dollar issued by the Bank of Thailand. SET index data are from the Stock Exchange of Thailand. The period covers January 1997 to December 2012. Knowledge acquired from this study will be very useful for policymakers in their planning and decision-making. In addition, domestic investors can employ study results for their investment decision-making as well.

2. Methodology

The research methodology consists of five parts: first, data analysis and data calculation; second, the investigation of the relationships between all influencing factors and net foreign portfolio investment using the Least square method and correlation coefficient; third, the investigation of the impacts of foreign portfolio investment on stock prices using VAR models, including cointegration and error correction mechanism, impulse response analysis and variance decomposition; fourth, the investigation of the impacts of foreign portfolio investment on exchange rate using VAR models as well; and finally, the investigation of the foreign portfolio investment volatility following the Asian financial crisis.

According to the theoretical framework, there are many factors that influence foreign portfolio investment such as returns, risk and interest rate. In this study, influential factors such as market return, currency return and interest rate difference due to the theoretical framework as well as the volatility index, representing world market risk, and the business sentiment index, representing the business sentiment in Thailand. Empirical testing is employed to investigate the results of each variable. The least square method and correlation coefficient will be used to estimate the relationship between all of these factors and net foreign portfolio investment.

Least square is a method for estimating the unknown parameters in a linear regression model. This method minimizes the sum of squared vertical distances between the observed responses in the dataset and the responses predicted by the linear approximation. The resulting

estimator can be expressed by a simple formula, especially in the case of a single regressor on the right-hand side. The ordinary least squares (OLS) estimator is consistent when the regressors are exogenous and there is no perfect multicollinearity, and it is optimal in the class of linear unbiased estimators when the errors are homoscedastic and serially uncorrelated. Under these conditions, the method of OLS provides minimum-variance mean-unbiased estimation when the errors have finite variances. The simple regression model is below:

$$y_i = \alpha + \beta x_i + \varepsilon_i$$

where,

y_i	=	dependent variable (net portfolio investment)
x_i	=	independent variables or regressors (influential factors)
α	=	constant
β	=	correlation coefficient
ε_i	=	error term

β represents the relationship between the influential factors and net foreign portfolio investment.

2.1 VAR Model

For the study of impacts of net foreign portfolio investment on stock prices, VAR models are used, following earlier work such as ChaiAnant (2008) in using the vector auto-regression (VAR) framework to estimate the interaction as a system and assess how shocks to one variable impact other variables. With the many advantages of a VAR approach, like allowing investigation of the multivariate model and identifying structural shock through variance decomposition, the VAR model is used to determine impacts of net foreign portfolio investment on stock prices. It is one of the most popular methodologies, often used in time series analysis. In practice, there are many tools employed in VAR analysis like the cointegration test, impulse response analysis, error correction mechanism and variance decomposition. These applications can explain the relationship among variables and their behaviors. However, this study first tests for cointegration and error correction mechanism, followed by impulse response analysis and variance decomposition.

The basic VAR process is expressed in this form:

$$Y_t = \mu + \sum_{i=1}^p \alpha_i Y_{t-i} + u_t$$

$$u_t = R\varepsilon_t$$

$$t = 1, 2, \dots, T$$

$$p \geq 1 \text{ and } 1 \leq i \leq p$$

where,

$$Y_t = \text{vector of observable}$$

$$\mu = \text{vector of intercept term}$$

$$i = \text{vector of coefficient}$$

$$\varepsilon_t = \text{vector of error term}$$

$$R = \text{unknown fixed non-singular matrix}$$

$$\varepsilon_t \sim iid N(0, I)$$

From VAR model, the vectors $Y_t = (Y_{1t}, Y_{2t}, \dots, Y_{kt})'$, $t = -p + 1, 2, \dots, T$, are observable, p is a specified non-negative integer ($p \geq 1$) and $\mu = (\mu_1, \mu_2, \dots, \mu_k)'$ is an unknown $k \times 1$ vector of intercept term. Vector $i = [i_{jl}]_{j \times l=1, 2, \dots, k}$ is unknown $k \times k$ matrix of coefficient matrices ($1 \leq i \leq p$), R is unknown fixed non- non-singular matrix.

Next, the cointegration test is employed to examine the long run relationship between net foreign portfolio investment and stock prices. This is followed by an error correction mechanism, impulse response analysis and variance decomposition.

2.2 Cointegration Test and Vector Error Correction Model (VECM)

The concept of cointegration test has become popular in many empirical studies (Engle and Granger (1987), Johansen (1995)). Johansen's method was developed from the initial approach by Engle and Granger (1987) that builds directly on maximum likelihood estimation instead of partly relying on least squares. This application tests for the relationship between non-stationary time series variables. If two or more series each have a unit root or $I(d)$ process, whereas a linear combination of them is stationary or $I(0)$, then these time series are cointegrated, which means there exist long run relationships.

Johansen (1995) thus deals with the more general case where y_t follows a VAR(p) process that focuses on the effect of lag specification on test results. It can be expressed as follows:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \varepsilon_t$$

where,

$$y_t = k \times 1 \text{ random vector}$$

$$A_i = k \times k \text{ fixed coefficient matrices}$$

$$\begin{aligned}\varepsilon_t &= \text{vector of error term} \\ t &= 1, 2, \dots, T, \varepsilon_t \sim iid N(0, I)\end{aligned}$$

Ender (2004) showed that “cointegrated variables share the same stochastic trends and so cannot drift too far apart”. In order to perform Johansen’s cointegration analysis, the VAR in equation is converted into a vector error correction model (VECM) by incorporating an error correction mechanism term (Dy_{t-1}) into the system (Johansen, 1995). The transformed VECM is presented in the equation as shown below:

$$\Delta y_t = D_1 y_{t-1} + D_2 \Delta y_{t-2} + \dots + D_{p-1} \Delta y_{t-p+1} + Dy_{t-1} + e_t$$

where,

$$\begin{aligned}D_i &= -(A_{i+1} + \dots + A_p) \\ D &= (A_1 + A_2 + A_p - I_n) = -A(1) \\ y_t &= k \times 1 \text{ random vector, } y_t \sim CI(1) \\ D &= k \times k \text{ fixed cointegration matrix} \\ D_i &= k \times k \text{ fixed coefficient matrices} \\ e_t &= k \times 1 \text{ white noise process}\end{aligned}$$

Δ is the first-difference operator. If cointegration, or long run equilibrium, exists, an error correction mechanism (ECM) is consequently revealed. It is possible that these variables will not be equal to this long run equilibrium value at all times. Whenever it diverges from this equilibrium, the “error” will tend to be corrected over time by the error correction mechanism. It is a dynamic system with properties that show deviation of the current state from its long run relationship, represented by short run dynamics.

2.3 Impulse Response Analysis

For the VAR model, a shock to any single variable transmits dynamically to all endogenous variables. An impulse response function traces the effect of a one-time shock on current as well as future values of the endogenous variables. From the equation, the set of i is called the impulse response functions. Plotting the impulse response functions is a practical way to visually represent the behavior of time series in response to the various shocks at the time of the shock and over subsequent points in time (Enders, 2004). For this study, impulse response analysis presents the response of stock prices to net foreign portfolio investment.

2.4 Variance Decomposition

Variance decomposition is another way to characterize the dynamic behavior of a VAR system through forecast future fluctuation. It separates the variation in an endogenous variable into the component shocks and simply apportions the variance of forecast error in the selected variable to those of the other variables and its own shock as well. The forecast error variance decomposition shows the proportion of the movements in a sequence from its own shocks and shocks to other variables (Enders, 2004). Thus, this also helps to explain impact of net foreign portfolio investment to stock prices fluctuations in this study.

2.5 Volatility Study

In this section, the volatility in foreign portfolio investment in Thailand after Asian financial crisis from 1997 to 2012 is analyzed. Net foreign portfolio investment, net foreign equity securities investment, net debt securities investment, foreign portfolio investment value, foreign equity securities investment value, foreign debt securities investment value, the percentage change of SET index, the percentage change of exchange rate and the volatility index (VIX) are the variables employed in this analysis. Moreover, this study focuses on three crisis periods that have a high volatility in foreign portfolio investment: the Asian financial crisis from 1997 to 1998, the global financial crisis and subprime mortgage crisis from 2007 to 2009 and the European sovereign-debt crisis and quantitative easing from 2010 to 2012. This volatility analysis can be separated into two steps:

First, the period, year with high fluctuation in net foreign portfolio investment must be determined. This study assumes the high fluctuation or high volatility period means the year that has the standard deviation of net foreign portfolio investment (12 observations in each year), greater than the average standard deviation of net foreign portfolio investment from 1997 to 2012 (192 observations). Then, the standard deviation for each year is calculated and compared with the average one.

In statistics and probability theory, standard deviation (SD) shows how much variation or dispersion exists from the average (mean, or expected value). A low standard deviation indicates that the data points tend to be very close to the mean. A high standard deviation indicates that the data points are spread out over a large range of values.

$$\text{Standard Deviation} = \sqrt{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2}$$

Next, after the results of the net foreign portfolio investment volatility are attained, each period is analyzed by using variables such as foreign portfolio investment value, the percentage change of SET index, and the percentage change of exchange rate. The volatility index (VIX) is also used as an indicator of the risk or crisis situation. After this, a comparison is made between the results and the historical events. These analyses are separated into two parts: Beginning with an explanation of the background of the crisis, followed by an analysis of the impacts and volatility of foreign portfolio investment in Thailand.

3. Empirical Results

The empirical results of this study consist of five main parts: the data analysis, the relationships between all of influencing factors and net foreign portfolio investment, the impacts of foreign portfolio investment on stock prices, the impacts of foreign portfolio investment on exchange rate and the foreign portfolio investment volatility after the Asian financial crisis. These results can be summarize and separate into three points:

First, after empirical testing is employed to investigate the results in each variable, the least square method and correlation coefficient are used to estimate the relationship between all of these factors and net foreign portfolio investment. Results showed the market returns, currency returns, interest rate difference and business sentiment index have positive relationships with net foreign portfolio investment, while the volatility index has a negative relationship with net foreign portfolio investment. Unfortunately, all of the variables have significance except currency returns. Therefore, the results exclude currency returns. The market returns have a positive relationship with the net foreign equity securities investment, while the volatility index has a significant negative relationship with the net foreign equity securities investment. Furthermore, the interest rate difference and business sentiment index have positive relationships with the net foreign debt securities investment, while the volatility index has a significant negative relationship with the net foreign debt securities investment. The results of all significant relationships between influential factors and net foreign portfolio investment are shown in Table 1.

Table 1: Significant Relationships between Influential Factors and Net Foreign Portfolio

Investment			
Relationship	Net foreign portfolio investment	Net foreign equity securities investment	Net foreign debt securities investment
Market returns	+	+	
Currency returns			
Interest rate difference	+		+
VIX	—	—	—
BSI	+		+

Sources: Stock Exchange of Thailand; Bank of Thailand; author's calculations.

Second, after the impacts of foreign portfolio investment on stock prices are studied by employing four variables: net foreign portfolio investment, net foreign equity securities investment, net debt securities investment and SET index for cointegration test, the vector error correction model is employed to determine if a long run equilibrium existed. Consequently, the study investigated how the SET index responded to net foreign portfolio investment shocks through impulse response function analysis and variance decomposition. The results of the cointegration test and vector error correction model show that the stock prices had a long-run positive relationship with the net foreign portfolio investment. Furthermore, if each type of foreign portfolio investment is examined, results show that all types of net foreign portfolio investment have long-run positive relationships with stock prices with a significance of 5%. In addition, the results of the impulse response analysis and variance decomposition show that stock prices respond to contemporaneous change from net foreign portfolio investment. In other words, stock prices are contemporaneously affected by change in net foreign portfolio investment.

The last part of this analysis on the volatility in foreign portfolio investment in Thailand after the Asian financial crisis from 1997 to 2012 focused on three crisis periods with a high volatility in foreign portfolio investment: the Asian financial crisis from 1997 to 1998, the global financial crisis and subprime mortgage crisis from 2007 to 2009 and the European sovereign-debt crisis and quantitative easing from 2010 to 2012. All three suggest that the impacts of the high volatility in net foreign portfolio investment are passed through the fluctuation in stock prices in these periods. As a result, it can be concluded that the foreign portfolio investment had impacts on stock prices.

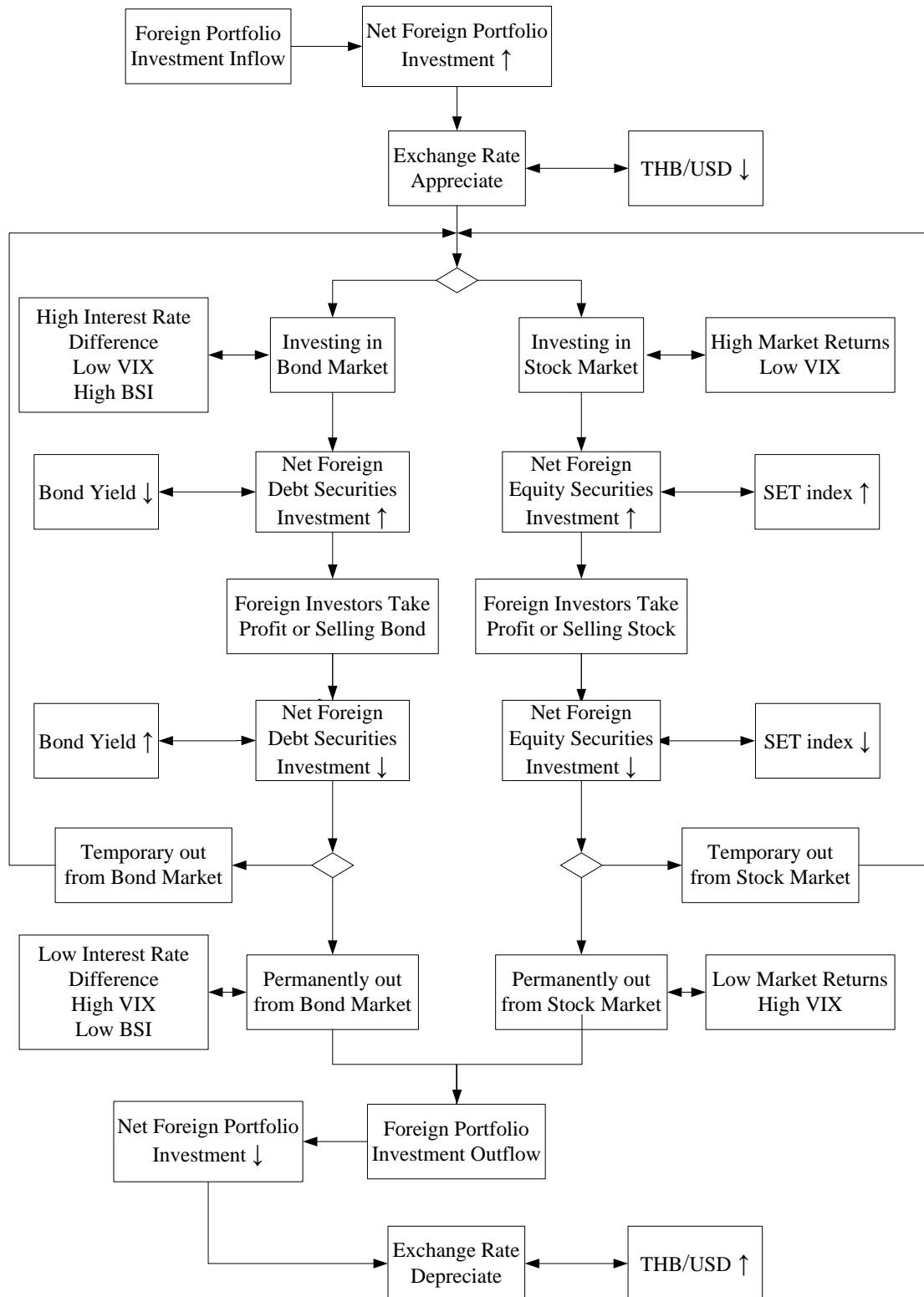
Third, after the impacts of foreign portfolio investment on exchange rate were studied by employing four variables: net foreign portfolio investment, net foreign equity securities investment, net debt securities investment and exchange rate for cointegration test, the vector error correction model was employed to determine if a long run equilibrium existed. Consequently, the study investigated how exchange rate responds to net foreign portfolio investment shocks through impulse response function analysis and variance decomposition. The results of the cointegration test and vector error correction model show that the exchange rate has a long-run negative relationship with the net foreign portfolio investment. If each type of foreign portfolio investment is examine, the study shows that all types of net foreign portfolio investment have long-run negative relationships with the exchange rate with a significance of 5%. The results of the impulse response analysis and the variance decomposition also show that exchange rate responds to contemporaneous change from net foreign portfolio investment. In other words, exchange rate is contemporaneously affected by change in net foreign portfolio investment.

The last results of the analysis that show the volatility in foreign portfolio investment in Thailand during the Asian financial crisis from 1997 to 2012 focus on three crisis periods with a high volatility in foreign portfolio investment: the Asian financial crisis from 1997 to 1998, the global financial crisis and subprime mortgage crisis from 2007 to 2009 and the European sovereign-debt crisis and quantitative easing from 2010 to 2012. All suggest that the impacts of the high volatility in net foreign portfolio investment are passed through the fluctuation in exchange rate in these periods. Due to these results, it can be conclude that foreign portfolio investment has impacts on exchange rate.

4. Mechanism of Foreign Portfolio Investment Flow

The results of this study show the relationships between all influencing factors and net foreign portfolio investment, the impacts of foreign portfolio investment on stock prices and the impacts of foreign portfolio investment on exchange rate. These theoretical and empirical results are then used to explain the mechanism of foreign portfolio investment flow in Thailand following the Asian financial crisis as shown in Figure 1.

Figure 1 Mechanism of Foreign Portfolio Investment Flow



As can be seen, the inflow of foreign portfolio investment will increase the net foreign portfolio investment as well as lead to an appreciation in exchange rate. Studies by Calvo and Reinhart (1996), Bhagawati (1998), Reisen (1999) and Gyntelberg (2009) support this theory that foreign portfolio investment flow is a cause of undue exchange rate appreciation. This study's empirical results also show that there is a negative relationship between net foreign portfolio investment and exchange rate. In other words, net foreign portfolio investment is a cause of exchange rate appreciation. After the inflow of foreign portfolio investment, foreign investors will decide which market to invest in. There are two options: the bond market and stock market. In addition, this study's empirical results of factors influencing foreign portfolio investment show that high market returns and low volatility index are factors that influence foreign equity securities investment in the stock market. These results are supported by Bohn and Tesar (1996) and Bekaert et al (2002), who demonstrated a positive relationship between equity flows and market returns based on the concepts "return chasing", "trend-chasing" or "momentum trading". The volatility index (VIX), as an indicator of world market risk, has a negative relationship with net foreign portfolio investment. Therefore, the low VIX will be attractive to foreign investors as it will have an influence on foreign equity securities investment flows into Thailand. The empirical results of the factors influencing foreign portfolio investment also show that the high interest rate difference, low volatility index and high business sentiment index are factors that influence foreign debt securities investment in the bond market. These results are supported by the fundamental principle of money movement that states funds will flow into a market that gives higher returns. Thus, the country that offers the higher interest rate will be more attractive to foreign investors. The difference between interest rates is a major influence on the capital movement around the world. A low VIX will attract foreign investors as well as influence foreign debt securities investment flows into Thailand. The business sentiment index (BSI) acts as an indicator of business sentiment as it affects business growth in Thailand. In other words, a high BSI will attract foreign investors as it influences foreign debt investment flows into Thailand as well.

For when the stock market, net foreign equity securities investment is seen to increase, it will lead to an increase in stock prices and, thus, the SET index. This study's empirical results of the impacts of foreign portfolio investment on stock prices show that stock prices have a positive relationship with net foreign equity securities investment. However, if foreign investors decide to take their profits, or sell stocks, this will lead to a decrease in stock prices and the SET index.

In the bond market, the mechanism pattern is slightly different from the stock market. When net foreign debt securities investment increase because of foreign debt securities investment flow, there will be a decrease in bond yield. However, if foreign investors decide to take their profits, or sell stocks, there will be an increase in bond yield.

The permanent outflow of foreign portfolio investment will decrease net foreign portfolio investment as well as lead to a depreciation in exchange rate. This is supported by research conducted by Calvo and Reinhart (1996), Bhagawati (1998), Reisen (1999) and Gyntelberg (2009). The empirical results of this paper also show that there is a negative relationship between net foreign portfolio investment and exchange rate. However, the temporary outflow of foreign portfolio investment in both markets will not affect the depreciation in exchange rate. Furthermore, this study's empirical results of the factors influencing foreign portfolio investment show that low market returns and a high volatility index are factors that influence foreign equity securities investment in the stock market. The empirical results of the factors influencing foreign portfolio investment also demonstrate that low interest rate difference, high volatility index and low business sentiment index are factors that influence foreign debt securities investment in the bond market.

5. Conclusion

This study demonstrates the importance of foreign portfolio investment flow in Thailand, especially for the Stock Exchange of Thailand and exchange rate. Foreign portfolio investment had an impact on capital markets in stock prices and the SET index as well as on the money market in the exchange rate. It may cause fluctuation in both stock prices and exchange rate, thus affecting the stability of both markets as well as the stability of Thailand's economy. This research investigated the factors that influence foreign portfolio investment flow in Thailand and have an impact on stock prices and exchange rate, the foreign portfolio investment volatility after the Asian financial crisis and policies initiated to deal with the impacts of the foreign portfolio investment flow. The scope of this study comprised the monthly data of foreign portfolio investment, including foreign equity security investment and foreign debt security investment in Thailand during 1997 to 2012.

The research methodology consists of five parts: first, data analysis and data calculation; second, the investigation of the relationships between all influencing factors and net foreign portfolio investment using the Least square method and correlation coefficient; third, the

investigation of the impacts of foreign portfolio investment on stock prices using VAR models, including cointegration and error correction mechanism, impulse response analysis and variance decomposition; fourth, the investigation of the impacts of foreign portfolio investment on exchange rate using VAR models as well; and finally, the investigation of the foreign portfolio investment volatility following the Asian financial crisis.

The empirical results of this study found that market returns have a positive relationship with net foreign equity securities investment, while the volatility index has a negative relationship with net foreign equity securities investment with significance. Furthermore, the interest rate difference and business sentiment index have positive relationships with net foreign debt securities investment, while the volatility index has a negative relationship with the net foreign debt securities investment with significance. The results of the cointegration test and the vector error correction model show that stock prices have a long-run positive relationship with net foreign portfolio investment. Thus, these results, including those of impulse response analysis and variance decomposition as well as the analysis of the volatility in foreign portfolio investment in Thailand after the Asian financial crisis from 1997 to 2012 show that foreign portfolio investment has impact on stock prices. The results of the cointegration test and vector error correction model show that the exchange rate has a long-run negative relationship with net foreign portfolio investment, while foreign portfolio investment has impacts on exchange rate as well.

Accordingly, the Bank of Thailand introduced a number of measures in the past few years to curb short-term foreign capital inflows to prevent Thai Baht speculation, maintain Thai Baht stability and protect the money, bond and capital markets from any impacts caused by short-term capital inflows. The results of this research demonstrate the conformity of the impacts of foreign portfolio investment on the capital market for stock prices and the SET index as well as on the money market for exchange rate. High market return was a factor influencing foreign equity securities investment in the stock market. In addition, this study demonstrated that a low volatility index was a factor influencing foreign equity securities investment in the stock market, while high interest rate difference, low volatility index and high business sentiment index were factors influencing foreign debt securities investment in the bond market. These factors can be employed as indicators for foreign portfolio investment inflow, being very useful for tendency prediction of foreign portfolio investment flow in the future.

Due to the impacts of foreign portfolio investment, the Bank of Thailand initiated measures such as cut policy rate and reserve requirement on short-term capital inflows

together with other alternative policies, for example, switching from inflation targeting to exchange rate targeting, establishing emergency foreign exchange management mechanism, enforcing a capital control (limiting foreign investors from withdrawing money within 3 months from entry date) and improving the Bank of Thailand's sterilization mechanism. The research results also reveal the difference between the financial crisis in 2005 and the period after the subprime crisis in 2008 to the present. It was found that the inflow capital of foreign investors in debt securities during the period after subprime crisis in 2008 to the present has been increasing dramatically with significant increase of the net bond holdings of foreign investors, including government bonds, short-term debt securities and long-term debt securities, during the past few years. In this case, the appreciation of the Thai Baht has been a major result of foreign investment in Debt Securities. Therefore, the Bank of Thailand may consider employing an alternative measure such as taxation of three-month bond to six-month bonds to reduce short-term capital inflow.

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