



Comparison between SET Index and SET Property Development Index Based on Macro-economic Factors In Thailand during 2002-11

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Abstract

This study investigates whether macro-economic factors individually and/or collectively contribute both SET index and SET property development index. More specifically, this study seeks to examine the relationships between both indices and three macro-economic variables (exchange rate, interest rate and inflation rate) over the period of time from January 2002 to December 2011. This study uses Multiple Regression model to determine the relationships between both indices and three macro-economic variables. Moreover, both indices were compared by using Paired t-test model to find the relationships between them. The impact of exchange rate, interest rate and inflation rate to Thai stock market and property stock market were identified. In addition, the relationship between Thai stock market and property stock market was also confirmed. The findings of this study provide theoretical implications for future researches. This research emphasized both Indices. Given that both indices are sensitive to macro-economic factors. The identification of the significant impact of macro-economic factors on stock market confirmed the relationship between them introduced by many previous studies. Moreover, the findings also provide practical implications for stock investors that interest rates have higher predictive power than other variables for Thai stock market. For property stock, inflation rates have higher predictive power. Therefore, stock investors need to keep an eye on the change of both rates. Lastly, the result of this study indicated that Thai stock market and Thai property stock market movements are going in the same direction.

Keywords – SET index, Property stock, Exchange rate, Interest rate, Inflation rate, Thailand

INTRODUCTION

The Stock Exchange of Thailand (SET) was established by act of stock exchange of Thailand legislation in 1974. SET first traded officially on April 30th, 1975 as a secondary market for supporting trading asset documents of a company and assembling the asset



from the public investors. The stock market in Thailand has been growing rapidly ever since. Over the years, SET has been through crises both internally and externally like 1997 (Tom Yam Kung crisis) and 2008 (Hamburger crisis). Consequently, crisis led to purchasing and selling shares from/by foreign investors overwhelmingly. From these cases, SET returns are sensitive to economical factors. This study uses SET index (SETI) as the first representative which represent the price movement for all common stocks trading on the SET and aims to examine the potential impact that macro-economic factors have on SETI.

Base on the statement of Bank of Thailand (BOT), real estate sector is highly important to the Thai economy as real estate sector extends beyond its shares to 8% of GDP and 7% employment, respectively. Furthermore, loans extended to the real estate sector also account for 15 percent of total commercial bank loans, of which a higher portion goes to residential mortgages whereas a lower portion goes to property developers. According to Brown and Matysiak (2010) more over than 50 percent of the world's total assets are invested in direct real estate and securitized real estate investment vehicles such as real estate investment trusts (REITs) or real estate stocks. Clearly see that investors in real estate can choose to invest directly in physical property or invest indirectly through the purchase of shares in real estate companies. In Thailand, the stocks of these companies are generally known as property stocks. In addition to the SET index, which is calculated from the prices of all common stocks on the main board, the SET also provides industry group and sectoral indices. Both these types of indices are calculated from the prices of the common stock which share the same basic which characterize each particular industry group and sector. However, in this study the research emphasizes on property development sector which belongs to the property and construction industry. Therefore, the second representative is the SET property development index (SETPDI). Base on the statement of Kim et al. (2006) that since property stock combines the investment characteristics of direct real estate and general stock, property stock market return are likely to be different from those of stock markets, especially, in the long term. Therefore, this study will also cover Thai property stock market and investigates the potential impact that macro-economic factors have on SETPDI.

According to Joseph and Vezos (2006) macro-economic factors, such as exchange rate, interest rate, and inflation rate are important financial and economic factors affect the value of common stock. Similarly, several studies in Singapore like Kim and Huang (2006) and Kim et al. (2006) have observed that return of direct real estate, REITs and property companies are influenced by macro-economic factors movements. Previous studies such as, Adjasi et al. (2011) and Chen and Chen (2012) have provided compatible



evidence that the stock markets are sensitive to exchange rate movements as well as relevant in the price of common stocks. Moreover, Interest rate is an important macro-economic factor that influences both stock market and real estate market. Prior studies such as Kim and Huang (2006), Adjasi (2009) and Majid and Yusof (2009) have also provided consistent evidence that the stock markets are sensitive to interest rate movements. One interesting point is there are several studies such as Kim and Shukla (2006), Anthony and Kwame (2008) explain for the negative relationships between stock markets and inflation in different countries. However, there are seldom studies examine the relationships between inflation and Thai stock market.

This study uses Multiple Regression model to determine the relationships between both indices (SETI and SETPDI) and three macro-economic variables: exchange rate (EX), interest rate (PR) and inflation rate (CCPI). Moreover, SETI and SETPDI were compared by using Paired t-test to find the relationships between them. In detail, this study seeks to examine the relationships between both indices and three macro-economic variables over the period of time from January 2002 to December 2011.

LITERATURE REVIEW

Exchange Rate

The relationship between the stock market prices and the exchange rate movements has been explained within the context of two portfolio models of exchange rate transmission mechanism within an economy, namely, the Flow-Oriented model which was introduced by Gavin (1989) and the Stock-Oriented model which was introduced by Frankel (1983).

According to the Flow-Oriented model, exchange rate movement affects the output levels of firms and also the trade balance of an economy. Share price movements on the stock market also affect total demand through wealth, liquidity effects and indirectly, the exchange rate. A reduction in stock prices reduces wealth of local investors and further reduces demand for money with following implications for currency depreciation. This follows the monetarist models of exchange rate determination (Gavin, 1989).

In the case of the "Stock-Oriented" model, the stock market exchange rate link is explained through a country's capital accounts. In this model, the exchange rate equalizes demand and supply for assets (Stocks). Therefore, expectations of relative currency movements have a significant impact on price movements of financially held assets. Thus, stock price movements may influence or be influenced by exchange rate movements. For



example, the depreciation of Thai currency against US currency increases returns on the US currency. This induces investors to shift funds from Thai assets (stocks) towards US assets, depressing stock prices. Thus, a depreciating currency has a negative impact on stock market returns.

The theoretical link between exchange rate and stock prices is also derived within an efficient market environment. It is important to note that in an efficient market environment the equity market should reflect company valuations. Consequently, expectations of future variables should incorporate all available information at the time the expectations are formed. Therefore, in an efficient market, no expected risk-adjusted arbitrage should be profitable. A parity condition frequently used in such conditions is the uncovered interest parity.

Therefore, the linkage between the exchange rate and the asset market equilibrium in an efficient market is then creates interest parity. From this viewpoint, exchange rate change is expected to give rise to stock price change. However, as argued by Granger et al. (2000), as the capital market becomes more and more integrated, changes in stock prices and exchange rates may reflect more of the capital movement than current account imbalance. Thus, a decrease in stock prices causes a reduction in the wealth of domestic investors, which in turn reduces the demand for money and lowers interest rates. The lower interest rates encourage capital outflows and then could lead to currency depreciation.

The Relationships between Exchange Rate and Stock Market

There are several studies that show the existence of long run relationships between exchange rate and stock market. Ray (2012) attempted to examine how changes in exchange rates and stock prices are related to each other, both in long as well as short run. The result suggested that in countries like Hong Kong, Japan and Singapore, long run relationships exists between exchange rate and stock prices but short run causality disappears whereas in case of India and Korea. Meanwhile, several studies have documented negative relationships between the stock markets and exchange rate, such as, the studies of Puah and Jayaraman (2007) and Bhunia (2012). However, it was argued by Adjasi et al. (2011). They studied the relationships between stock prices and exchange rate movement in seven African countries for the selected period 1992-2005. They found that the depreciation of exchange rate would decrease stock prices in either long run or short run in Tunisia, Ghana, Kenya, Mauritius and Nigeria. Nevertheless, the stock prices would be increased in Egypt and South Africa. Their results indicate that there is uncertainty of the impact that the exchange rate has on one country's stock market.



Interest Rate

The volatility of interest rate over the past century is crucial for the pricing of assets, because they represent opportunities costs and negative relationship between the value of financial instrument and the level of interest rate. High interest rate reduces the present values of future cash flow, thereby reducing the attractiveness of investment opportunities. For this reason, real interest rate is key determinants of business investment expenditure. Interest rates are dependent not only on interest rate in other financial markets but also upon the real sector of the economy and consumption. The consideration of interest rate must be expanded to include the effect of inflation on returns. With inflation rate, a baht will be worth less in purchasing power than a baht at the time the stock was bought.

All these factors interact to determine an equilibrium structure of interest rate. Forecasting interest rate is one of the most difficult parts of applied Macroeconomics. The expected rate of inflation is one of the most important factors influencing interest rate forecasts. When the rate of inflation is higher, it will cause lenders to demand higher nominal rate of interest as to compensate for the erosion in their purchasing power. Borrowers are forced to pay higher rate if they want the funds.

The Relationships between Interest Rate and Stock Market

The relationships between interest rate and stock markets have been investigated by great number of studies. Park and Choi (2011) studied interest rate sensitivity of the US property/liability insurer stock and found that the US property/liability insurers' stock returns are sensitivity to interest rate changes. Moreover, it also reports that the interest rate sensitivity of insurer stock returns is time varying. According to Kim and Huang (2006) property stocks are also generally sensitive to changes in the long-term and short-term interest rates. They analyzed data for property stock indexes from 1987 to 2003 and found that the results indicate changes in the interest rate level and volatility effects before and after the 1997 Asian financial crisis. Nevertheless, these changes are not similar and depend on the individual property market. Most of the literatures reveal that there is a positive relationship between interest rate and stock markets, such as the studies of Adjasi (2009) and Majid and Yusof (2009) However, Hussainey and Ngoc (2009) argued that the long-term and short-term interest rates are not affecting stock prices in the same direction.

Inflation Rate



When the price of most goods and services are rising over time, the economy is said to be experiencing inflation. Sullivan and Sheffrin (2003) define inflation rate as a measure of inflation, or the rate of increase of a price index such as the consumer price index. In other words, inflation rate is the rate at which the general level of the price rising. High rates of inflation often are associated with “overheat” economies, that is, economies where the demand for goods and services is out-stripping productive capacity, which leads to upward pressure on prices. Usually, government tries to stimulate their economies enough to maintain nearly full employment, but not so much as to bring an inflationary pressure.

The relation between the inflation rate and the stock market has frequently been a subject of focus on many researches. Theories suggest that any inflation rate, which is correctly and universally anticipated by the financial market, should have no effect at all on the stock price. In short, if everybody in the financial market regarding future inflation than the inflation itself, the inflation rate should have zero effect on the price of the common stock.

It is generally accepted the stock return are negative to expected inflation, unexpected inflation and changes in expected inflation. For example, stock price of any positive relation to the dividend that investors expect the company to pay to shareholders in future periods is negatively related to risks attached to that stream of expected dividend. The more risky the company's dividend streams, the higher rate of return to compensate them for the added risk of holding the stock. It is obvious that if the rise in expected inflation raises stock price, it must increase the amount of dividend that shareholders expect each company to pay them, or lower the perceived risk of holding stock or both. On the other hand, stock price will tend to fall with higher inflation if investors lower their dividend expectations, or the inflation increases the perceived risk to shareholders or both.

The Relationships between Inflation and Stock Market

Several studies have confirmed that there is a negative relationship between inflation rate and stock market. Kim and Shukla (2006) researched the cross-sectional variation in the relation between international security returns and expected inflation based on their sensitivities to world stock factors. They collected monthly stock market index values for 23 countries over the period from 1988 to 2002 and also monthly inflation rates for the world are computed based on the monthly Consumer Price Index for industrial countries available in the IMF International Financial Statistics. It was found that the inflation sensitivity of a security is negatively related to its sensitivity to the world



stock index. Anthony and Kwame (2008) examined how macro-economic indicators affect the performance of Ghana's stock market. They found that inflation rate is found to have a negative effect on stock market performance as well as lending rates from deposit money banks have an adverse effect on stock market performance.

Model Development and Hypotheses

This study investigates three macro-economic variables that all have a significant impact on SET index and SET property development index over the period January 2002 to December 2011.

SET index (SETI)

According to Odera (2000), stock market indices, as an aggregate measure, provides information to investors on the market performance by characterizing the development of global markets and specified market segments. He further stated that Index numbers are applied in the measurement of movements at the stock market. An Index number effectively summarizes hundreds of price movements.

SET Property Development Index (SETPDI)

The SET index, which is calculated from the prices of all common stocks on the main board, the SET also provides industry group and sectoral indices. Both these types of indices are calculated from the prices of the common stock which share the same basic which characterize each particular industry group and sector. As a result, SETPDI is one of the sectors in the property and construction industry.

Three independent variables in this study include: exchange rate, Thai Baht to US Dollar (EX); Interest rate, policy rate (PR); Inflation rate in the Thai economy measured by the change of consumer price index comparing to previous year (CCPI) as a representative for the influence of both dependent variables.

Exchange rate: TH Baht to US Dollar Average Selling Rate (EX)

Sullivan and Sheffrin (2003) suggest that exchange rate between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the equivalent value of one country's currency in terms of another currency.

Interest rate: Policy Rate (PR)

Policy rate is an interest rate set by Bank of Thailand (BOT) in order to conducting monetary policy under the inflation-targeting framework, the monetary stance is indicated through the policy rate. According to BOT, the 14-day repurchase rate was used at policy rate up until 16 January 2007, which the policy rate was switched to the 1-day



repurchase rate. However, Since 12 February 2008, the policy rate was switched again to the 1-day bilateral repurchase rate. In Thailand, policy rate is the benchmark of the interest rates. In addition, changes in the policy rate lead to a chain of events that affect loan rate, short-term interest rate, fixed deposit rate, long-term interest rate, the amount of money and credit and related issues.

Inflation rate: changes in Consumer Price Index (CCPI)

According to Kim et al. (2006), inflation rate influences are considered important in financial and real asset pricing. It is commonly estimated by changes in Consumer Price Index (CCPI) which measure the retail prices of several thousand goods and services purchased by consumers. Sullivan and Sheffrin (2003) define inflation rate as a measure of inflation, or the rate of increase of a price index such as the consumer price index. It is the percentage rate of change in price level over time, usually one year.

Hypothesis 1: Macro-economic variables have impact on SET Index

Hypothesis2: Macro-economic variables have impact on SET property development Index

Hypothesis 3: SET property development index has relationships with SET Index

SAMPLINGS AND DATA COLLECTION

Most secondary data for this research were collected from the database provided by SET market analysis and reporting tool (SETSMART), the web-based application from the Stock Exchange of Thailand that can seamlessly integrate comprehensive sources of Thai listed company data including historical stock prices, historical indices, listed company profile and historical news. Another source of secondary data was the website of the Bank of Thailand. Last source of secondary data was the website of Bureau of Trade and Economic Indices.

All secondary data for this research were obtained ranging from 1 January 2002 to 31 December 2011.

RESEARCH MODEL

This study uses Multiple Regression model to determine the relationships between both indices (SETI and SETPDI) and three macro-economic variables: exchange



rate (EX), interest rate (PR) and inflation rate (CCPI). Moreover, SETI and SETPDI were compared to by using Paired t-test to find the relationships between them.

Statistical Findings

Table I - Analysis of Variance

Analysis of Variance	SETI	SETPDI
	EX+PR+CCPI	EX+PR+CCPI
Pr>F	<0.0001	<0.0001
F value	1071.19	86.77
Mean Square	17612928	69031
Error	2442	2442

As Table I indicates, the p value of SETI for EX+PR+CCPI is <0.0001. Thus, EX+PR+CCPI is reliable to predict the SETI at significant level of 95% and the p value of SETPDI for EX+PR+CCPI is <0.0001. Thus, EX+PR+CCPI is reliable to predict the SETPDI at significant level of 95%.

Table II – Overall Model Fit

Overall Model fit	SETI	SETPDI
	EX+PR+CCPI	EX+PR+CCPI
Root MSE	128.22768	28.20510
Dependent Mean	683.48716	115.68034
Coeff. Var	18.76080	24.38193
R-Square	0.5682	0.0963
Adj R-Sq	0.5677	0.0952

R-Square shown in Table II presents the SETI which can be predicted by EX+PR+CCPI for 56.77% and are left with 43.23% by residual variability while R-Square of SETPDI can be predicted by EX+PR+CCPI for 9.52%.



Table III – Testing result of Parameter Estimate

Parameter Estimate					
	DV	EX	PR	CCPI	EX+PR+CCPI
Parameter Estimate	SETI	33.1764	44.4438	-16.0463	-607.3084
	SETPDI	1.4999	-2.9099	-2.6369	66.6391
Std error	SETI	0.61792	2.53924	1.35131	24.59296
	SETPDI	0.13592	0.50358	0.29723	5.40950
T value	SETI	53.69	17.50	-11.87	-24.69
	SETPDI	11.04	-5.78	-8.87	12.32
Pr> t	SETI	<.0001	<0.0001	<0.0001	<0.0001
	SETPDI	<0.0001	<0.0001	<0.0001	<0.0001

Table III presents Parameter Estimate or beta coefficient which shows that EX,PR and CCPI affects on SETI for 33.18, 44.44 and -16.05, respectively while EX,PR and CCPI affects on SETPDI for 1.50, 0.47 and -2.64, respectively.

Table IV – Testing result of Durbin-Watson D Output

Durbin-Watson D Output	SETI	SETPDI
	EX+PR+CCPI	EX+PR+CCPI
Durbin-Watson	0.007	0.006
Number of Observations	2446	2446
1st Order Autocorrelation	0.996	0.996

Durbin-Watson results for SETI shown in Table IV provides further confirmation of the research model's prediction. The Durbin-Watson statistic is used to detect the presence of autocorrelation. Table IV shows value of both indices closed to 0.007. They indicate positive serial correlations.

Table V – Testing result of Multicollinearity Statistics

Collinearity Statistics				
		EX	PR	CCPI
Intercept	SETI	0.00555	0.00594	0.98770
	SETPDI	0.00555	0.00594	0.98770
Variance inflation	SETI	1.04092	1.34182	1.34500
	SETPDI	1.04092	1.34182	1.34500
Tolerance	SETI	0.96069	0.74525	0.74350
	SETPDI	0.96069	0.74525	0.74350
Eigenvalue	SETI	0.29173	0.10318	0.00603
	SETPDI	0.29173	0.10318	0.00603

EX, PR and CCPI of both indices in Table V indicate the variance inflation factors at lower than 5 which are 1.04, 1.34 and 1.35, respectively. There is very little multicollinearity among independent variables. Also, the tolerances of EX, PR and CCPI are 0.96, 0.75 and 0.74 which is higher than 0.20. The tolerances result confirms that these three independent variables have no multicollinearity problem.

Table VI – Testing result of Paired t-test

N	Mean	Std Dev	Std Err	Minimum	Maximum
2446	567.8	174.8	3.5343	249.3	979.8

Mean	95% CL Mean	Std Dev	95% CL Std Dev
567.8	560.9 574.7	174.8	170.0 179.8

DF	t Value	Pr > t
2445	160.66	<.0001

As Table VI indicates, the p value between SETI and SETPDI is <0.0001. This result indicates that the mean of SETI is not statistically significantly different from the mean of SETPDI.

HYPOTHESES TESTING

The coefficient of macro-economic variables of SETI was identified to be negative at confidence level of 95 percent. However, the coefficient was found to be moderately positive for SETPDI. Among EX, PR and CCPI assumed to be capable of predicting SETI and SETPDI, PR is a stronger predictor for SETI with beta coefficient rate at 44.44. As for SETPDI, PR is also a stronger predictor with beta coefficient rated at -2.91.

In addition, the relationships between SETI and SETPDI were identified to be significant as t value is 160.66 and p value is <0.0001.

DISCUSSION OF MAJOR FINDINGS

Macro-economic variables had negative relationships with the SET index. Interest rate was found to be a stronger indicator. On the other hand, inflation was found to be a weaker indicator. In the contrast, Macro-economic variables had positive relationships with the SET property development index. Interest rate was found to be a stronger indicator while exchange rate was found to be a weaker indicator. The significant of relationships of interest rate with both indices were viewed as the most crucial finding of this research. Interest rate has positive relationships with SET index. In the meantime,



interest rate also has negative relationships with SET property development index. A higher interest rate would result in a higher SET index. However, in case of a higher interest rate, it would result in a lower SET property development index. This finding indicates that macro-economic factors are very important for predicting Thai stock market and property stock market.

IMPLICATIONS AND CONCLUSIONS

The findings of this study provide theoretical implications for future researches. This research emphasized both Indices (SETI and SETPDI). Given that both indices are sensitive to macro-economic factors. The identification of the significant impact of macro-economic factors on stock market confirmed the relationship between them introduced by many previous studies. Moreover, the result of this study indicated that Thai stock market and Thai property stock market movements are going in the same direction.

The results of this study have implications on both local and foreign investors, stock market regulators such as Securities and Exchange Commission, policy makers and stock market analysts. For both local and foreign investors and stock analysts, they could predict the direction of stock market and earn profits. As for stock market regulators, they could take steps to monitor the activities of companies to prevent manipulation of stock prices and get the general public educated on the stock market and encourage them to invest in stocks. Finally, policy makers should be more aware of these Macroeconomic effects on stock market so that they could make their decisions more effectively and accurately.

An important aspect of this study relates to the impacts of Macroeconomic factors on Thai property stock market which can be positive or negative depending on model parameters. Although it is now well recognized that Thai property stock market react to fluctuation in Macroeconomic factors, the definite prediction of the impacts of Macroeconomic factors on Thai property stock market still remain difficult. However, our results will help local and foreign investors and stock brokers deepen their understanding of their relationships implications in Thai property stock markets. Additionally, policy makers may play a role in influencing the volatility on Thai property stock markets through the use of Macroeconomic policy. Moreover, inflation rate is one of the most important factors affecting Thai property stock market and it might also affect political stability, financial market deregulations, property supply and property prices and alternative investment opportunities.



The findings also provide practical implications for Academies who would like to research further on this field of study. This study might be useful as a guide for academicians who are interested in doing further studies on Thai stock market. Future researches can be conducted on other industries or sectors in the SET and it is also suggested to include other factors such as GDP, gold price, oil price, unemployment rate and related factors. In the future, academicians who wish to extend this research can increase the number of years in which their researches are carried out. It would also be interesting to find out whether the conclusion drawn from Thai stock market would be applicable to other developing countries like China, Malaysia, Singapore or not.

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