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## **The Relationship Between Real Estate Investment Trusts Property Types and Stock Exchange of Thailand Index**

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### **ABSTRACT**

As an early stage of Real Estate Investment Trusts (REITs) in Thailand, this research aimed to look for evidences to support the benefits of using REITs to secure portfolios and hedging strategies against the SET Index (Stock Exchange of Thailand Index). This research employed monthly data of 24 REITs from January 2006 to December 2010. The study concentrates on finding the relationship between REITs with SET index and other seven selective Indexes; exchange rate, leading economic index, economic growth index, business sentiment index, private consumption index and private investment index. The results from using various models find each REITs portfolio has a positive relationship with the SET Index.

**Key words:** REIT, stock exchange of Thailand, hedge, portfolio management

### **INTRODUCTION**

In Thailand, property funds were established in 1997 to rescue real estate investors and developers from the so called Tom-Yum-Kung crisis (Vanichvatana, 2007). Nine years later in 2006, real estate investment trusts were issued as property funds for public offering and listed in the SET as closed-ended mutual funds. On account of their unique hybrid character, REITs have multiplied their interest and become a growing part of investment exercises. REITs seem to be a pleasant alternative since the trusts could offer higher returns than government bonds and deposit rates in that period.

With constant annualized yield in recession period, Thai REITs offered investors a weighted average annualized yield of around 9% as of the end of 2009, REITs seem to show evidence of a hedging strategy in portfolio. Despite that, there are controversies in using REIT hedges against the Stock Index. While some empirical papers suggest the use of the REIT index hedge against the stock market (Gliberto, 1993; Thumrongrukkul, 2008), other studies of the US market concludes that REIT prices have a strong relationship with the stock index, especially large REITs but they have a negative relationship with Hedge Funds (Liang *et al.*, 1998).

This research explores Thai REITs data in both width and depth angles. All 24 REITs will be formed as a base model to analyze overall picture of their relationship with the SET and some controlled factors. Furthermore, the data were subdivided into six portfolios by the nature of each property type (airport, hotel, industrial, office, residential and retail) since each property may react to macroeconomic factors differently (Patterson, 2009). The research concentrates on finding relationship between each property and how they react to economic variables and the SET index.

The research also sheds light on whether investors could use these REITs as part of a hedge strategy against fluctuations in the SET Index.

## EMPIRICAL MODEL AND DATA

The REIT data was retrieved on a monthly basis from a Datastream such as price index, starting from the beginning of year 2006 to the end of year 2010, excluding the REITs that had been traded less than one year. For other financial data, we employ SET index from bank of Thailand. For macroeconomic indexes, this research selects seven leading indexes issued by Bank of Thailand. Exchange rate which converted to their Thai Baht equivalent using cross rates quoted by Bangkok Market Closing over 11 additional currencies. Leading economic index which is constructed from seven financial and economic components. This index is used as a complementary tool in the assessment of the economic trends and short-term economic forecasting. Economic growth Index is measured from the percentage change in GDP of Thailand. Business Sentiment Index is a questionnaire that bank of Thailand sends to survey to 1,500 listed businesses in the market. The survey has two parts. First part includes economic condition, total order, investment, employment, cost of production or the cost of business and production. The second part includes inventories, financial conditions, financial market outlook, selling price, export, production capacity, expected inflation and limits of business. Private consumption index is a composite index representing private consumption conditions. It comprises 5 components (from 10 indicators). Each component was seasonally adjusted and the base year is year 2000. Private investment index has been revised by the BOT (Bank of Thailand) in 1995 with the purpose of improving index performance to reflect private investment expenditure. The components of the new index were increased to 5 components. As a result, private investment in machinery was comprised of 3 indicators, namely imports of capital goods (at 1995 prices), domestic commercial car sales and domestic machinery sales at 1995 prices (from VAT database) which were added from 1998 to capture investment in domestically produced machinery and equipment. The remaining indicators represented private investment in construction. Each component was seasonally adjusted with a 3-month moving average, except construction area which had a 12-month moving average and the base year was year 2000. All indicators, except for in the construction areas permitted in municipal zones which was averaged for 12 months to reflect the construction work in progress, were seasonally adjusted and averaged for 3 months. Hence, the quarterly index became the indices of March, June, September and December. Multiple regression analysis is used in which the return on an REIT index is specified as a linear function of financial variables, macroeconomic factors, dummy variables and trend.

The first part of analysis constructs all 24-REITs as one portfolio ( $REIT_{all}$ ) to be examined with some financial variables and macroeconomic factors. The REIT data in each month was created as a mean of the portfolio in that month.

**Base model:**  $REIT_{all} = \beta_0 + \beta_1 (\text{set index}) + \beta_2 (\text{exchange rate}) + \beta_3 (\text{leading economic index}) + \beta_4 (\text{economic growth index}) + \beta_5 (\text{business sentiment index}) + \beta_6 (\text{private consumption index}) + \beta_7 (\text{private investment index}) + \text{years' dummies} + \text{months' dummies} + \text{trends} + u.$

The second part of analysis uses portfolios of REITs formed on the basis of property type. A portfolio of each property type is calculated on the mean of their price index and each portfolio covers a different period depending on the data available.

**Model 1:**  $REIT_{\text{airport}} = \beta_0 + \beta_1 (\text{set index}) + \beta_2 (\text{exchange rate}) + \beta_3 (\text{leading economic index}) + \beta_4 (\text{economic growth index}) + \beta_5 (\text{business sentiment index}) + \beta_6 (\text{private consumption index}) + \beta_7 (\text{private investment index}) + \text{years' dummies} + \text{months' dummies} + \text{trends} + u.$

In model 1, the airport portfolio REIT (REIT<sub>airport</sub>) is formed from Samui airport property fund covers the period from November 2006 to the end of 2010.

**Model 2:** REIT<sub>hotel</sub> =  $\beta_0 + \beta_1$  (set index) +  $\beta_2$  (exchange rate) +  $\beta_3$  (leading economic index) +  $\beta_4$  (economic growth index) +  $\beta_5$  (business sentiment index) +  $\beta_6$  (private consumption index) +  $\beta_7$  (private investment index) + years' dummies + months' dummies + trends + u.

In Model 2, hotel portfolio REIT (REIT<sub>hotel</sub>) is formed from three REITs, covers the period from April 2008 to the end of 2010; Centara hotel and resorts, luxury real estate and quality hospitality.

**Model 3:** REIT<sub>industrial</sub> =  $\beta_0 + \beta_1$  (set index) +  $\beta_2$  (exchange rate) +  $\beta_3$  (leading economic index) +  $\beta_4$  (economic growth index) +  $\beta_5$  (business sentiment index) +  $\beta_6$  (private consumption index) +  $\beta_7$  (private investment index) + years' dummies + months' dummies + trends + u.

In Model 3, industrial portfolio (REIT<sub>industrial</sub>) is formed from four REITs cover the period from early 2006 to the end of 2010: Ticon property fund, Thai industrial 1, Tpark logistic and MFC-strategic.

**Model 4:** REIT<sub>office</sub> =  $\beta_0 + \beta_1$  (set index) +  $\beta_2$  (exchange rate) +  $\beta_3$  (leading economic index) +  $\beta_4$  (economic growth index) +  $\beta_5$  (business sentiment index) +  $\beta_6$  (private consumption index) +  $\beta_7$  (private investment index) + years' dummies + months' dummies + trends + u.

In Model 4, office portfolio (REIT<sub>office</sub>) is constructed from four REITs: Bangkok commercial property fund, Millionaire property fund, quality house and sala @ Sathorn.

**Model 5:** REIT<sub>residential</sub> =  $\beta_0 + \beta_1$  (set index) +  $\beta_2$  (exchange rate) +  $\beta_3$  (leading economic index) +  $\beta_4$  (economic growth index) +  $\beta_5$  (business sentiment index) +  $\beta_6$  (private consumption index) +  $\beta_7$  (private investment index) + years' dummies + months' dummies + trends + u.

In Model 5, residential portfolio REIT (REIT<sub>residential</sub>) is formed from nine REITs: 101 Montri storage, gold property fund, TU dome residential, Nichada Thani property fund 2, MFC-Nichada Thani, UOB apartment, property perfect fund, multi-national residential and urbana property fund.

**Model 6:** REIT<sub>retail</sub> =  $\beta_0 + \beta_1$  (set index) +  $\beta_2$  (exchange rate) +  $\beta_3$  (leading economic index) +  $\beta_4$  (economic growth index) +  $\beta_5$  (business sentiment index) +  $\beta_6$  (private consumption index) +  $\beta_7$  (private investment index) + years' dummies + months' dummies + trends + u.

In Model 6, retail portfolio REIT (REIT<sub>retail</sub>) is formed from three REITs: CPN retail growth, future park property fund and major cineplex.

## RESULTS AND DISCUSSION

Table 1 shows correlation analysis between REIT portfolios. The result reveals that some of correlations have a low degree of correlation and a few of them have a negative correlation. For REIT<sub>all</sub>, this overall REIT price index has a high degree of correlation with most REIT portfolios by property types in terms of price index, except REIT<sub>residential</sub> which has correlation equal to 0.4548. For REIT<sub>airport</sub>, this portfolio has a high correlation with REIT<sub>retail</sub> at 0.9192, a low relationship with REIT<sub>hotel</sub> at 0.1386 and a negative relationship with REIT<sub>industrial</sub> at -0.1654. For REIT<sub>hotel</sub>, this portfolio has a low relationship with REIT<sub>retail</sub> at 21.40. For REIT<sub>industrial</sub> this portfolio has a medium

Table 1: The result of correlation analysis between REIT portfolios

Variables	REIT <sub>all</sub>	REIT <sub>airport</sub>	REIT <sub>hotel</sub>	REIT <sub>industrial</sub>	REIT <sub>office</sub>	REIT <sub>residential</sub>	REIT <sub>retail</sub>
REIT <sub>all</sub>	1.0000						
REIT <sub>airport</sub>	0.7234	1.0000					
REIT <sub>hotel</sub>	0.7118	0.1386	1.0000				
REIT <sub>industrial</sub>	0.8504	0.6038	0.6140	1.0000			
REIT <sub>office</sub>	0.8537	0.5892	0.6451	0.5331	1.0000		
REIT <sub>residential</sub>	0.4548	0.1654	0.6298	0.2197	0.4970	1.0000	
REIT <sub>retail</sub>	0.7239	0.9192	0.2140	0.6869	0.5359	-0.2556	1.0000

Table 2: The result of correlation analysis between financial and macroeconomic variables

Variables	Set index	Exchange rate	Loading economic index	Economic growth index	Business sentiment	Private consumption index	Private investment index
Set index	1.0000						
Exchange rate	-0.4197	1.0000					
Loading economic index	0.3793	-0.7200	1.0000				
Economic growth index	0.0629	-0.0071	0.6501	1.0000			
Business sentiment	0.6493	-0.4329	0.6531	0.3606	1.0000		
Private consumption index	0.4247	-0.8100	0.6700	-0.0095	0.5886	1.0000	
Private investment index	0.6402	-0.3750	0.2225	-0.2013	0.3106	0.5826	1.0000

correlation with most REITs but a low correlation with REIT<sub>residential</sub> at 0.2197. REIT<sub>office</sub> has a medium correlation with other REITs. However, REIT<sub>residential</sub> and REIT<sub>retail</sub> have a negative correlation at -0.2556.

Table 2 reports correlation analysis between financial and macroeconomic variables. The analysis found that the SET index has a medium relationship with most factors except exchange rate which has a negative relationship at -0.4197. For exchange rate, this variable has all negative relationships with all factors and a very high negative relationship with the leading economic index and private consumption index at -0.81 and -0.72, respectively. For the leading economic index, this variable has a medium relationship with most factors and a low relationship with the private investment index at 0.2225. For the economic growth index, this index has a low relationship with the business sentiment index and a negative relationship with private consumption and private investment at -0.0095 and -0.2013, respectively. For the business sentiment index, this index has a medium relationship with the others. Furthermore, the private consumption index has a medium relationship with the private investment index at 0.5826.

According to the results from multiple regression analysis as shown in Table 3 and 4, each REIT portfolio shows a different relationship with the controlled factors. The results show that each property type may react differently to the same economic factors. However, the SET index is the only factor that shows a positive relationship with all the REIT portfolios. Specifically, REIT<sub>all</sub>, REIT<sub>industrial</sub> and REIT<sub>retail</sub> have statistically significant and positive relationships with the SET Index while the other REITs have no statistical but still positive relationship with SET index. For the exchange rate, this factor shows a different relationship with each REIT. The interesting point is that the exchange rate shows a statistically significant and positive relationship with the hotel REIT but a negative relationship with the airport REIT. For the leading economic index, this factor shows a statistically and significant positive relationship as expected with REIT<sub>all</sub>, REIT<sub>office</sub> and REIT<sub>industrial</sub>. Economic growth index, on the other hand, results in a negative relationship with most REITs except the industrial REIT. The business sentiment index also shows a negative

Table 3: The result of coefficient from multiple regression analysis

Variables	REIT <sub>all</sub>	REIT <sub>airport</sub>	REIT <sub>hotel</sub>	REIT <sub>industrial</sub>	REIT <sub>office</sub>	REIT <sub>residential</sub>	REIT <sub>retail</sub>
Intercept	-150.5992	14.3054	-276.5730	31.4943	-311.8279	-212.0940	-123.1694
Set index	0.0163**	0.0387	0.0288	0.0324**	0.0015	0.0040	0.0496**
Exchange rate	0.0014	-1.5348	19786*	0.4688	-0.1999	0.2921	0.5391
Leading economic index	2.0425*	0.4195	2.9316	-0.5642	3.9035**	2.6255**	1.4710
Economic growth	-1.3688**	-0.2843	-1.1479	0.1167	-2.2823**	-2.2741**	-0.2480*
Business sentiment index	0.2234*	0.7331	-0.4576	-0.3467	-0.0002	-0.2673	-0.4468*
Private consumption index	0.2886	-0.1691	-0.3121	0.4107	0.0985	0.5391**	0.2467
Private investment index	-0.1139	0.3761	0.2316*	0.3173	-0.1748**	-0.3702**	*0.0748
F-test	73.18	237.85	54.73	14.55	73.87	33.46	42.73
R <sup>2</sup>	0.9648	0.9398	0.9713	0.9078	0.9572	0.8884	0.937

\*\*Significant level at 5%, \*Significant level at 10%

Table 4: Hypothesized sign of coefficient from multiple regression analysis

Variables	Hypothesized sign						
	REIT <sub>all</sub>	REIT <sub>airport</sub>	REIT <sub>hotel</sub>	REIT <sub>industrial</sub>	REIT <sub>office</sub>	REIT <sub>residential</sub>	REIT <sub>retail</sub>
Intercept	Negative	Positive	Negative	Positive	Negative	Negative	Negative
Set index	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Exchange rate	Positive	Negative	Positive	Positive	Negative	Positive	Positive
Leading economic index	Positive	Positive	Positive	Negative	Positive	Positive	Positive
Economic growth index	Negative	Negative	Negative	Positive	Negative	Negative	Negative
Business sentiment	Negative	Positive	Negative	Negative	Negative	Negative	Negative
Private consumption index	Positive	Negative	Negative	Positive	Positive	Positive	Positive
Private investment index	Negative	Positive	Positive	Positive	Negative	Negative	Negative

\*\*Significant level at 5%, \*Significant level at 10%

relationship with most REITs except the airport REIT. For the private consumption index, this factor shows a positive relationship with most REITs except the properties in the tourism sector which show a negative relationship. For the private investment index, this factor, shows a statistically and significant positive relationship with the hotel REIT but a statistically and significant negative relationship with residential and retail REITs.

## CONCLUSION

This research employs monthly data of 24 REITs from January 2006 to December 2010. The research focuses on finding the relationship between REITs with SET index and other seven selective indexes; exchange rate, leading economic index, economic growth index, business sentiment index, private consumption index and private investment index. The results show that while each property type may react differently to the same economic and financial factors, the SET Index is the only factor that shows a positive relationship with all the REIT portfolios. Especially, the results from this research demonstrate that REIT<sub>all</sub>, REIT<sub>industrial</sub> and REIT<sub>retail</sub> have statistically significant and positive relationships with the SET Index while the other REITs have no statistical but still positive relationship with SET index. Thus the findings imply no evidence of a hedging strategy for REIT and SET index.

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