A lead-lag relationship between price premium and NAV in property fund and REIT

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ความสัมพันธ์เชิงชี้นำและตามระหว่างราคาส่วนเพิ่มและมูลค่าทรัพย์สินสุทธิในกองทุนและทรัสต์เพื่อการลงทุนในอสังหาริมทรัพย์

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กองทุนรวมอสังหาริมทรัพย์และทรัสต์เพื่อการลงทุนในอสังหาริมทรัพย์มีบทบาทสำคัญในการจัดสรรเงินลงทุน เนื่องจากสามารถเพิ่มผลตอบแทนและกระจายความเสี่ยงของพอร์ตการลงทุนได้ อย่างไรก็ตามราคาของกองทุนและทรัสต์เพื่อการลงทุนในอสังหาริมทรัพย์ในตลาดหลักทรัพย์มักจะมีความคลาดเคลื่อนไปจากราคาพื้นฐานหรือมูลค่าทรัพย์สินสุทธิซึ่งก่อให้เกิดราคาส่วนเพิ่มหรือราคาส่วนลด การเข้าใจสาเหตุของการคลาดเคลื่อนของราคาจะช่วยให้นักลงทุนสามารถกำหนดกลยุทธ์ในการลงทุนและเพิ่มผลตอบแทนได้ ดังนั้นงานวิจัยชิ้นนี้จึงมีวัตถุประสงค์เพื่อศึกษาบทบาทของราคาส่วนเพิ่มในการทำนายผลการดำเนินงานของกองทุนและทรัสต์เพื่อการลงทุนในอสังหาริมทรัพย์ในอนาคต โดยใช้การวิเคราะห์เชิงถดถอยแบบเวกเตออร์ (Vector Autoregressive Analysis) นอกจากนี้งานวิจัยยังศึกษาหาสาเหตุที่ก่อให้เกิดราคาส่วนเพิ่ม โดยศึกษาจากผลกระทบจากการซื้อขายของกองทุนรวมของกองทุนอสังหาริมทรัพย์และผลการทบจากทัศนคติผู้ลงทุน จากผลการศึกษาบ่งชี้ว่าราคาส่วนเพิ่มกับมูลค่าทรัพย์สินไม่มีความสัมพันธ์กันซึ่งแตกต่างจากงานวิจัยชิ้นก่อน อย่างไรก็ตามงานวิจัยนี้พบว่าราคาส่วนเพิ่มนั้นเกิดมาจากการเปลี่ยนแปลงของทัศนคติผู้ลงทุนเป็นหลัก แต่ไม่พบว่าราคาส่วนเพิ่มเกิดจากผลจากการซื้อขายของกองทุนรวม นอกจากนี้ยังไม่พบหลักฐานว่าราคาส่วนเพิ่มกลับสู่ราคาพื้นฐาน

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Property fund and real estate investment trust (REIT) play an important role in asset allocation since it increases risk-adjusted return and diversifies portfolio risk. However, in stock market, price of property fund and REIT is deviated from its fundamental value or net asset value (NAV) causing price premium or discount. Understanding causes of price deviation helps investor to plan for investment strategy and generates more profit. Therefore, this paper aims to study the role of price premium in forecasting future performance of property fund and REIT by using vector autoregressive analysis (VAR). Moreover, we examine causes of price premium by studying price pressure from REIT mutual funds trading and investors' sentiment effect. Unlike previous studies, the results indicate that there is no relationship between price premium and NAV. However, we find that premiums are mainly caused by changing in investor sentiment while REIT mutual funds trading shows no effect to price premium. Furthermore, we find no evidence that price premium reverses to its fundamental price.

Department: Banking and Finance Student's Signature .....
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INTRODUCTION

Background

Investing in real estate assets has significantly increased over the past few years in Thailand. Since real estate is a financial asset class, it is important for asset allocation in which increases risk-adjusted return and diversifies portfolio risk. Investors can allocate their fund to real estate asset via direct property investment or indirect property investment. Direct investment can be done by owning a land or properties while indirect investment can be done more easily by purchasing unit of property funds (PFs) real estate investment trust (REITs) or infrastructure funds (IFFs) in the stock market.

Property fund was first introduced to Stock Exchange of Thailand in 2003 in order to provide liquidity and encourage investors to gain more exposure to the real estate asset class. Property fund will invest in real estate whereas benefits will be distributed to shareholders as a dividend. In 2007, Securities and Exchange Commission (SEC) has improved a new regulation and presented real estate investment trust (REIT) to the market. Both REITs and property funds share the same objectives, however REITs provide more benefits to stakeholders as it able to invest in varied types of real property including abroad property and able to use more leverage. Due to an expanding in REITs and property funds sector, SEC has created property fund and REIT index (PF&REIT) to support the growth of these fund in mid-2010. Later in 2011, infrastructure fund (IFF) was introduced to investors in order to finance public infrastructure projects. Hence, IFFs can only invest in assets involved in infrastructure business such as telecommunications system, transportation system, electrical power and irrigation system. Similar to property fund and REIT, returns from investing in the infrastructure assets will be shared to investors. Moreover, dividends distributed from the IFF to the individual unit holders is tax exemption for 10 years starting from the day IFF is established.

At the end of October 2017, there are 61 property funds and REITs and 6 infrastructure funds. The total market capital of REITs sector and IFFs rise to ฿540.52 billion (US$16.93 billion) which is account for 3.17% of total SET market capital. The

proportion of institutional investor also increases as REITs sector expands. In other words, institutional investors have driven the growth of this sector and played an important role in REIT market. However, Thai REIT market is relatively small when compared to Asia developed markets for example Singapore and Hong Kong REIT market which have approximately US$53 billion and US$27 billion in REIT market capitalization respectively.

Property funds, REITs, and IFFs, like other closed-end funds, are traded in stock exchange at the market price while net asset value (NAV) of property funds, REITs, and IFFs fund will be calculated and announced monthly by REIT management company or asset management company (AMC). In general, net asset value is calculated by income approach by taking the net operating income of the rent collected and dividing it by the capitalization rate. However, in stock market, Most of these funds, are usually traded at lower (discount) or higher price (premium) than its NAV causing NAV price deviation. Many literatures argue that price deviation reflects imperfect price discovery between market price and underlying assets.

Previous researches have explained the causes of premium and discount by using various theories combined which are investors' sentiment (noise theory) and information flow (information theory). In behavioral studies, noise theory explains that REIT price deviation are driven by uninformed investor, who usually trades on sentiment. In the other hand, Information theory shows that premium or discount are caused by informed traders who can act on new information and drive a price away from REIT's NAV. Some research also suggests institutional trading, as an informed trader, makes price premium in REIT sector.

In addition to information theory, securitized market is more efficient in transferring an information than unsecuritized market so price discovery should firstly occur in public market. Therefore, many recent literatures focuses on using premium or discount to predict NAV return by studying lead-lag relationship between public return and NAV return. Despite the fact that information should flow from public to private market, existing researches provide the mixed result. Most studies show positive relationship between public REIT index and private real estate index (NAV index)

while some studies find negative or no relationship in individual REIT level. The results revealed that lead-lag relationship also depends on other factors such as REIT's specific factor or real estate cycle.

Nowadays, the lead-lag relationship are only studied in developed market and results are still inconclusive and remain to be studied.

Objective and contributions

Unlike prior researches, this study focuses on property fund, REITs, and IFFs in emerging market like Thailand since Thai REIT market is still small compared to developed market, factors that drive price premium may different from other country.

This paper aims to answer the question "Does lead-lag relationship between price premium and NAV occur in Thai REIT market and what affects the changing in price premium?" by studying price premium return and NAV return in property funds, REITs, and IFFs using VAR model. To study changing in premium level, this study investigates the price pressure from institutional trading via mutual funds on average price premium and find an effect of market sentiment to premium. In addition, this paper include the study of mean reversion in REIT price.

Motivation and preliminary test

Before we start this research, we performed a vector autoregressive analysis to find a lead-lag relationship between premium return and NAV return. Using data from January 2009 to August 2017 of all REIT to construct premium index and NAV index, we found that premium and NAV have no significant relation in any lags (detail in next section). Therefore, the rest of this study aim to answer "what affects the changing in price premium?"

Research hypothesis

Hypothesis 1: *Price pressure from institutional trading (represented by REIT mutual fund) does not affect REIT premium and REIT return.*

Since institutional investor recently plays an important role in REIT market growth, several researches in developed market find that capital flow from institutional investor (REIT mutual fund) to REIT equity market positively affects premium and REITs return indicating that fund flows and mutual fund manager contain some information. In the same time, institutional investor, as an informed trader, is responsible for driving price deviation and causing lead-lag relationship. Disappearing in price pressure effect will support preliminary result that there is no lead-lag relationship between premium and NAV return. We use funds' netflow from all REIT mutual fund as a representative of institutional flow in order to study effects on REITs premium.

Hypothesis 2*: REITs premium is significantly correlated to market sentiment.*

According to noise theory, uninformed trader usually trade on market sentiment regardless of REIT fundamental. As a result, in short term, REIT price premium should change in the same way as stock and bond return changes since REITs equity are said to be a mixed asset of stock and bond. Regarding to previous literatures, REIT premium mostly associates with mid-small capital stock return rather than large capital stock return because mid-small capital stock are mostly held by individual investor. In this model, we use FTSE SET large cap return, FTSE SET mid cap return, market turnover, and stock mutual fund flow to represent market sentiment. Meanwhile, 10 year bond yield is used for risk fee rate.

Hypothesis 3*: There is price reversion to its mean in all premium groups.*

Regarding to both information theory and noise theory, price deviation in property funds and REITs should exist for short term and disappear in the end. In the other word, REITs that had premium should give negative excess return while discount REIT should generate positive excess return.

LITERATURE REVIEW

Information theory and REIT premium

Departure of REIT share price from its NAV has been studying since REITs growth period in US. Nowadays, price premium and discount can generally be explained by two theories combined which are noise theory and information theory.

According to information theory, Chordia & Swaminathan (1996) presented that P/NAV discounts on closed-end funds were caused by market imperfection making it difficult for rational investors to arbitrage away mispricing. Gyourko & Keim (1992), Barkham & Geltner (1995) and Glascock, Lu, & So (2000) suggested that departures from their NAV in REITs price reflect market inefficiency in transferring information between securitized and private market. Moreover, they shown that the equity REIT market is more efficient compared to the other one. That is, in REIT equity market, informed trader can incorporates new information into price reflecting in REIT price premium or discount which can leads future return of underlying asset.

From the reason above, many recent literatures tents to study lead-lag relationship and find evidences suggest that there exists a causality between REIT return, premium return and NAV return in real estate market which public market leads the private market overtime. In US market, Myer & Webb (1993) examined the relation between EREIT return index and private property return index (NAV index return) and found that EREIT return leaded private property return in commercial sector. Barkham & Geltner (1995) presented that the information flow from public to private market was faster in the UK than in the US market due to a larger scale of securitization of REIT sector. Newell & Chau (1996) together with Chau, Macgregor, & Schwann (2001) also reported a positive lead in REIT index return to NAV index return in Hong Kong.

To specify on premium and discount usage, Liow (1996) used discount instead of REITs return to predict private property indexes. He supported that discount change is positively leads future property indexes return in Singapore market. Chiang (2009),

using premium return to study lead-lag relationship in US REIT market, also gave the same result that premium was able to predict future NAV return.

Gentry, Jones, & Mayer (2004), using Fama-French model, found that REIT premium can indicate a future growth in underlying asset. They also found that institutional investor plays an important role in REIT market and drive REIT price back to its mean. In addition, Yavas & Yildirim (2011) studied the lead-lag relationship across REIT types and individual firms in US and reported that there were variations across different property types and across individual firms. They proposed that fundamental characteristics could impact return correlations across property types.

Impact of institutional trading on REIT return

In the equity market, there are mixed result of aggregate mutual fund flow affect market-wide price movement. Warther (1995) investigated the correlation of aggregate market returns and cash flows into mutual funds and indicated that net flows into mutual funds were highly correlated with concurrent security returns. There was evidence of a positive relation between flows and subsequent returns in the weekly data while no relation in monthly quarterly and annual data. More recent study by Edelen & Warner (2001), gave the same results that institutional trading via stock mutual fund affecting returns using daily return. They pointed that monthly interval may not reveal this relation. Furthermore, they also found a "feedback trading" which flow reacting to previous return. In contrast, Fortune (1998) found some evidence of causation from fund flows to security returns in monthly interval.

Since institutional investors play an important role in REIT market especially in emerging market and they are viewed as informed trader that cause lead-lag relationship, their trading should also affect premium and REIT return. To examine price pressure effect in REIT market, Ling & Naranjo (2003 and 2006) studied aggregate fund flow to REIT mutual fund and REIT return and provided evidence that in monthly interval institutional capital flows to REIT sector, represented by flow into REIT mutual funds, did appear to have some influence on equity REIT returns.

Nevertheless, REIT mutual fund flow showed no effect to price premium level. They further discussed that although flows to REIT mutual fund mostly come from individual investor which may contain information, fund flow are manage by REIT mutual fund manager who are informed. If fund managers agree on a new information, they will let price pressure to happen which cause REIT return to lead future NAV performance.

Market sentiment and REIT premium

Apart from information theory, the noise theory can also explain why price premium occur in the market. The noise theory, firstly proposed by DeLong, Shleifer, Summers, & Waldmann (1990) and C. Lee, Shleifer, & Thaler (1991), explains that retail investor in close-end funds are easily influenced by fads in the market. These investors drive asset price away from its fundamental value making price anomaly in close-end funds. In addition, Barkham & Ward (1999) discussed that REIT price deviation also driven by changes in investor sentiment likewise in close-end funds. That is, the REITs price will be pushed below their underlying assets value when investors become pessimistic about stock market whereas optimistic investors will drive REIT price above their true value. Clayton & MacKinnon (1999 and 2000) and Clayton, Ling, & Naranjo (2009), using microstructure method and survey-based method respectively, showed a significant causality between investor sentiment and price to NAV deviation in US market. In Singapore property market, included in developed market, N. J. Lee, Sing, & Tran (2013) also reported an evidence of sentiment effects of investors on P/NAVs.

A number of researches have been studying the correlation between REITs and other asset classes by using time-series regression. Since equity REITs are hybrid of stock equity and bond, macroeconomic factors that drive stock and bond should similarly affect REITs return. Clayton & MacKinnon (2002 and 2003) broke down REITs correlation among financial asset classes in US between 1979 and 1998. They reported that, for overall period, large cap stock, small cap stock and bond return significantly drove REITs return whereas direct real estate return did not affect REIT

return. However, when divided in sub-period, the result showed that the relation among asset classes had changed overtime. That is, REITs' sensitivity to stock declined while the connection to direct real estate became stronger overtime. Some studies also use REITs price premium to examine correlation among asset classes. Chiang (2009) reported that premium return was positively related to stock market return but showed no significant to bond return.

Modern existing literatures have been using different proxies to construct sentiment index via principal component analysis (PCA). Although it is difficult to measure sentiment index, Brown & Cliff (2004) found that some indirect market-based variables have high correlation to direct survey-based measure such as concurrent market return, number of IPOs issuance and flow to mutual funds. Lemmon & Portniaguina (2006) proposed that consumer confidence index can be used as a proxy for investor sentiment. They also reported that market sentiment can forecasts the returns of small stocks and stocks with low institutional ownership. Baker & Stein (2004) suggested that market turnover ratio can be used as sentiment indicator since high liquidity reflects high proportion of uninformed investors. Baker & Wurgler (2006) proposed a sentiment index which is comprised of discount in the closed-end fund, stock turnover, number of IPO, first day return of IPO, equity issues in total equity and debt issues, and dividend premium. The result also showed high correlation between market sentiment and stocks that are attractive to optimists and speculators like small cap stock and growth stock.

DATA AND METHODLOGY

Sample data

This study focuses on monthly data of all property funds, REITs and infrastructure funds based on Bloomberg database and Stock Exchange of Thailand website (http://www.set.or.th). The close price and net asset value (NAV) of all property funds, REITs and infrastructure funds are collected from January 2009 to August 2017. The close price is the last price traded of each months while NAV is net asset value reported by REIT Management Company at the end of each month. Regarding to general real estate appraisal method, NAV is normally calculated by income approach which is equal to the net operating income of the rent collected and dividing it by the capitalization rate. Capitalization rate, also called cap rate, is the market rate of return of real estate. In addition, NAV may increase or decrease due to revaluation of underlying asset which only occurs when REITs have a significant transactions in their properties. The income approach formula is as followed:

$$NAV = \frac{net\ operating\ income\ (NOI)}{capitalization\ rate\ x\ number\ of\ shares}$$

As of October 2017, there are 61 property funds and REITs and 6 infrastructure funds. The total market capital of REITs sector and IFFs rise to ฿540.52 billion (US$16.93 billion) which is account for 3.17% of total SET market capital. In this paper, property funds, REITs and IFFs that have been listed in the market less than one year or provide incomplete data will be excluded. As a result, there are total of 44 funds that give complete information. Premium of each fund is simply derived from price over NAV (PNAV). REIT and NAV return are calculated in a general method while REIT premium return is derived as follow:

$$Rpre_{i,t} = \frac{1 + Rreit_{i,t}}{1 + Rnav_{i,t}}$$

REIT return index (Rreit), NAV return index (Rnav), and premium return index (Rpre) are calculated by value-weighted average return in each period. We start calculating the index since 2009 because property fund and REIT total value was large enough and first REIT mutual fund was launched in that year. The descriptive data are shown in Table 3.1.

Table 3.1: Descriptive statistic of monthly REIT return (Rreit), NAV return (Rnav), and premium return (Rpre) from Jan 2009 to Aug 2017.

VARIABLES	No. of period	Mean	S.D.	Min	Max
Rnav	104	0.18%	1.13%	-3.64%	5.50%
Rreit	104	0.58%	2.80%	-8.50%	7.10%
Rpre	104	0.22%	4.00%	-27.28%	13.53%
PNAV	104	1.13	0.14	0.61	1.46

Market data and factors

According to Ling & Naranjo (2006) method, This paper uses aggregate fund flow to REIT mutual fund to represent impact of institution trading on REIT return and premium changes. We obtain the monthly aggregate fund flow to mutual fund from Morningstar database from November 2009 to August 2017. As of October, there are 24 REIT mutual fund which total net asset value is approximately 41.16 billion baht and accounts for 7.61% of property fund and REIT sector value. Nevertheless, fund flow to REIT mutual fund is responsible for 10.69% to 82.03% (32.15 % on average) of trading value in property fund and REIT sector. It can be seen that REIT mutual funds still have important role trading in this sector and flow to REIT mutual fund, at least in part should affect REIT return. In this paper, we calculate relative fund flow to property fund and REIT market capitalization (RFlowr).

For Fama-French factors, we use 10-year Thailand government bond to represent risk free rate (Rf) due to its most liquid characteristic in the bond market. SET index total return (Rm) is also used for market return. Data of individual stocks in the

market, comprised of stock return, size, and book to market ratio, are derived to create SMB and HML. Descriptive data are reported in Table 3.2.

Table 3.2: Descriptive statistic of monthly market variables including risk free rate (Rf), market risk premium (Rm − Rf), SMB, and HML and descriptive statistic of flow to REIT mutual fund in million baht, and fund flow as percentage to REIT capitalization (RFlowr) between 2009 and 2017.

VARIABLES	No. of period	Mean	S.D.	Min	Max
Rf	104	0.26%	0.05%	0.14%	0.35%
Rm − Rf	104	0.39%	4.42%	-14.68%	8.51%
SMB	104	0.78%	2.73%	-7.08%	7.63%
HML	104	-0.01%	2.12%	-5.14%	4.44%
Flow(MB)	94	329.80	712.54	-1606.73	2992.11
Flow to trade value	94	32.15%	17.98%	10.69%	82.03%
RFlowr	94	0.19%	0.31%	-0.50%	1.15%

Sentiment variables

In order to construct sentiment indicator, stock market return, and other data are also collected from Bloomberg database in monthly basis as described in Table 3.3

As suggested by Brown & Cliff (2004), market return explicitly reflects investor sentiment regardless of investor group – institutional or individual investor. A large capital stock index gives an overview of all investor sentiment; meanwhile, mid capital stock index can reflect more sentiment since mid-cap stocks are less held by institutional investor. Therefore, we use FTSE SET large-cap index and FTSE SET mid-cap index as a proxy of SET large-cap return (RSETL) and SET mid-cap return (RSETM). FTSE SET index series, provided by FTSE Group – one of the leading index expert in the world, is specially designed to measure the performance of Thai capital market.

Brown & Cliff (2004) also pointed that during times of high sentiment investors are putting money into mutual funds and the funds are holding relatively little cash. Thus, this study uses relative fund flow of stock mutual fund to stock market value (RFlows) . Fund flow data including LTF and RMF are collected from Morningstar database from January 2009 to August 2017.

Following Baker & Stein (2004) and Baker & Wurgler (2006), we also used market turnover ratio (TURN) to represent market liquidity and sentiment. Market turnover is calculated by trading value divided by stock market capital which we obtain from Bloomberg database.

From Lemmon & Portniaguina (2006) finding, Consumer confident index (CCI) ,as an macroeconomics variable, is correlated to investor sentiment and can be used to predict market return. Therefore, we add this variable into our sentiment index. CCI index data are collected from Division of Trade Information and Economic Indices, Ministry of Commerce. CCI index is transformed into percentage change of CCI (RCCI) in order to make it stationary.

Table 3.3: Descriptive statistic of monthly market variables that use to construct sentiment index including SET large-cap return (RSETL), SET mid-cap return (RSETM), market turnover (TURN), fund flow to stock mutual fund as percentage to market value (RFlows) ,and change of consumer confidence index (RCCI) from 2009 to 2017.

VARIABLES	No. of period	Mean	S.D.	Min	Max
RSETL	104	0.75%	6.00%	-30.47%	15.55%
RSETM	104	0.95%	7.19%	-40.71%	21.93%
TURN	104	6.18%	1.64%	2.97%	10.84%
RFlows	104	0.02%	0.07%	-0.12%	0.28%
RCCI	104	1.22%	14.26%	-31.84%	54.44%

Methodology

The main tool in this study is vector autoregressive (VAR) model which becomes a prevalent method of time-series modeling. A VAR model consists of a set of dependent variables which are expressed as a linear function of their own lags and all of the others' lags value plus an error term. In its simplest form, a bivariate model, two-variable VAR model, as following have proven to be useful in forecasting time-series variable.

$$X_t = \alpha_1 + \beta_1 X_{t-1} + \gamma_1 Y_{t-1} + \varepsilon_t$$

$$Y_t = \alpha_2 + \beta_2 Y_{t-1} + \gamma_2 X_{t-1} + \varepsilon_t$$

Using VAR model, Researchers should keep in mind that all variables in equation must be stationary and non-cointregrated if else VAR model will rise a spurious problem. Before we perform a test in any model, we first perform Dickey-Fuller test for stationary test. Moreover, we use Akaike Information Criterion (AIC) to choose optimal lag length.

Preliminary model

To examine a lead-lag relationship between public and private market, we follow Chiang (2009) methodology by applying bivariate VAR model between premium return and NAV return because we expect that premium return and NAV return is a linear function of its own lags and of another lags. We also test for stationary and reject null hypothesis meaning that both premium return and NAV return appear to be stationary. Furthermore, we apply AIC analysis for optimum lag length and result suggests a lags of three periods. The VAR model stated as follow:

$$Rnav_t = \alpha + \beta_1 Rpre_{t-1} + \beta_2 Rpre_{t-2} + \beta_3 Rpre_{t-3} + \beta_4 Rnav_{t-1} + \beta_5 Rnav_{t-2} + \beta_6 Rnav_{t-3} + \varepsilon_t$$

$$Rpre_t = \alpha + \gamma_1 Rpre_{t-1} + \gamma_2 Rpre_{t-2} + \gamma_3 Rpre_{t-3} + \gamma_4 Rnav_{t-1} + \gamma_5 Rnav_{t-2} + \gamma_6 Rnav_{t-3} + \varepsilon_t$$

Where $Rnav_t$ is weighted average of NAV return at time t

$Rpre_t$ is weighted average of premium return at time t.

Model 1: Institutional trading and REIT return

Institution investors are believed to be an informed and sophisticated investor. Some researches claimed that this type of investor drives lead-lag relation between premium and NAV. REIT mutual funds, as one of the informed trader, contribute high proportion in trading value every month. As a result, their trading should affect the REIT return and drive premium. However, from our preliminary test, the result shows no lead-lag relation between premium and future NAV. Disappearing in price pressure effect will support preliminary result that there is no lead-lag relationship between premium and NAV return. Then, we hypothesize that *price pressure from institutional trading (represented by REIT mutual fund) does not affect REIT premium and REIT return.*

Previous literatures have shown that daily and weekly interval are suitable to examine price pressure effect from mutual fund (Edelen & Warner, 2001). Due to data constrain, this study is not able to obtain weekly or daily data. Nevertheless, Ling & Naranjo (2003) used VAR model with monthly fund flow data and gave a significant results. We then use their VAR method as followed:

$$Rreit_t = \alpha + \beta_1 Rreit_{t-1} + \beta_2 Rreit_{t-2} + \beta_3 Rreit_{t-3} + \beta_4 RFlowr_{t-1} + \beta_5 RFlowr_{t-2} + \beta_6 RFlowr_{t-3} + \varepsilon_t \quad (1.1)$$

$$RFlowr_t = \alpha + \gamma_1 Rreit_{t-1} + \gamma_2 Rreit_{t-2} + \gamma_3 Rreit_{t-3} + \gamma_4 RFlowr_{t-1} + \gamma_5 RFlowr_{t-2} + \gamma_6 RFlowr_{t-3} + \varepsilon_t$$

Where $Rreit_t$ is the weighted average of REIT return at time t.

$RFlowr_t$ is the fund flow of REIT mutual fund as percentage to REIT sector market value at time t.

To be more explicit, we further investigate the effect of REIT mutual fund flow to average REIT premium change in order to prove that institution plays a part in price deviation by using following bivariate VAR model.

$$Rpre_t = \alpha + \beta_1 Rpre_{t-1} + \beta_2 Rpre_{t-2} + \beta_3 Rpre_{t-3} + \beta_4 RFlowr_{t-1} + \beta_5 RFlowr_{t-2} + \beta_6 RFlowr_{t-3} + \varepsilon_t \quad (1.2)$$

$$RFlowr_t = \alpha + \gamma_1 Rpre_{t-1} + \gamma_2 Rpre_{t-2} + \gamma_3 Rpre_{t-3} + \gamma_4 RFlowr_{t-1} + \gamma_5 RFlowr_{t-2} + \gamma_6 RFlowr_{t-3} + \varepsilon_t$$

Where $Rpre_t$ is weighted average of premium return at time t.

$RFlowr_t$ is the fund flow of REIT mutual fund as percentage to REIT sector market value at time t.

Model 2: Market sentiment and REIT premium

According to Baker & Wurgler (2006) and Schmeling (2009), principal component analysis (PCA) is a common statistic method in exploratory data analysis for making forecasting model. PCA usually can be done by mean normalizing or using

Z-scores for each variable and then decomposition of a data covariance (or correlation) matrix. The transformed variable values results in terms of principal component and factor loading of each variables. Set of principal component that gives highest Eigen value and variance is selected to construct transformed indictor.

Unfortunately, in sentiment indicators construction as discussed earlier, there is no exact variable that completely refer to market sentiment. In this study, we use market turnover and fund flow to mutual fund in next period as indicator for market sentiment. We also add change of consumer confidence index as macroeconomics variable and since we study premium return, market return can also be one of market sentiment as well.

In conclusion, we form a sentiment index (SENT) composes of SET large-cap return (RSETL), SET mid-cap return (RSETM), market turnover (TURN), fund flow to stock mutual fund as percentage to market value in next period (RFlows_{t+1}) , and change of consumer confidence index (RCCI) to answer *hypothesis 2* that *REITs premium is significantly correlated to market sentiment.* Regression model is as followed:

$$SENT_t = aRSETL_t + bRSETM_t + cTURN_t + dRFlows_{t+1} + eRCCI_t \qquad (2.1)$$

Where $SENT_t$ is a sentiment index construct from five market proxies.

$RSETL_t$ is the return on FTSE SET large-cap index.

$RSETM_t$ is the return on FTSE SET mid-cap index.

$TURN_t$ is the market turnover.

$RFlows_t$ is flow to stock mutual fund as percentage to market value.

$RCCI_t$ is the percentage change of consumer confidence index.

a, b, c, d, and e represent factor loading of each variables

After generating sentiment index, we perform multivariate time-series regression. Bond yield return (RBond), a 10-year bond yield change, is used instead of bond yield (Rf) due to its non-stationary. We also add lag variable of premium return to control for autocorrelation problem.

$$Rpre_t = \alpha + \beta_1 SENT_t + \beta_2 RBond_t + \beta_3 Rpre_{t-1} + \varepsilon_t \quad (2.2)$$

Where $Rpre_t$ is weighted average of premium return.
$SENT_t$ is a sentiment index construct from five market proxies.
$RBond_t$ is a 10-year bond yield change.

Model 3: REIT premium reversion

From previous model, we find that REIT premium and return are correlated to market sentiment, in other word, stock return. Hence, we use Fama-French model to capture excess return (alpha) from market return (market sentiment). We also add dummy variable for upward market, representing a periods that market return is positive, in order to capture premium in upward market and discount in downward market.

The Fama and French three factor model is an asset pricing model that develops from the capital asset pricing model (CAPM) by adding size (SMB) and value factors (HML) to the market risk factor (Rm − Rf) in CAPM. Since this model consider the truth that small and value firm tend to outperform the market on a regular basis, adjusting for this performance makes the model becomes better tool to evaluating firm performance.

SMB factor is calculated from using all stocks in SET index by sorting high book to market ratio to small book to market ratio first. Then, sorting small market capitalization to large market capitalization. Lastly, the average returns of small size portfolio would be used to minus the average return of big size portfolio to get SMB

factor. HML factor use the same method as SMB but HML calculation has to sort small market capitalization to large market capitalization first and book to market later.

In price premium reversion, we follow Gentry et al. (2004) and apply Fama-French three factors model to capture excess return (premium or discount) of REIT return in four different premium portfolio. First, we classify property funds, REITs, and IFFs into four portfolio regarding to their premium level (PNAV). Next, we calculate value-weighted return of REIT return and NAV return in each groups and then regress REIT return on Fama-French factor and NAV return for fundamental control. To be noted, all portfolio are adjusted to its PNAV at the beginning of each year though study periods – 2009 to 2017.

In this model, we want to clarify the *hypothesis 3* that *there is price reversion to its mean in all premium groups.* In the other word, REIT that has premium should generate negative excess return which contrasts to discount REIT that should give excess positive return. The model are as followed:

$$Rreit_{i,t} = \alpha + \beta_1(Rm - Rf)_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 Rnav_{i,t} + \beta_5 UP_t + \varepsilon_t \quad (3)$$

Where $Rreit_{i,t}$ is the weighted average of REIT return of portfolio i.

$Rm - Rf_t$ is a market return minus the risk free rate.

SMB_t is a size premium, defined as the return on small firms in excess of the return on big firms.

HML_t is a value premium, defined as the return on high book to market stocks less the return on low book to market stocks.

$Rnav_{i,t}$ is a weighted average of NAV return of portfolio i.

UP_t is a dummy variable representing upward market return.

EMPIRICAL RESULTS AND DISCUSSION

Baseline result

Figure 4.1: The cumulative monthly return of NAV, premium, and SET indices from 2009 to 2017. NAV and premium indices is calculated by NAV and premium weighted average of each property fund, REIT, and IFF in that period.

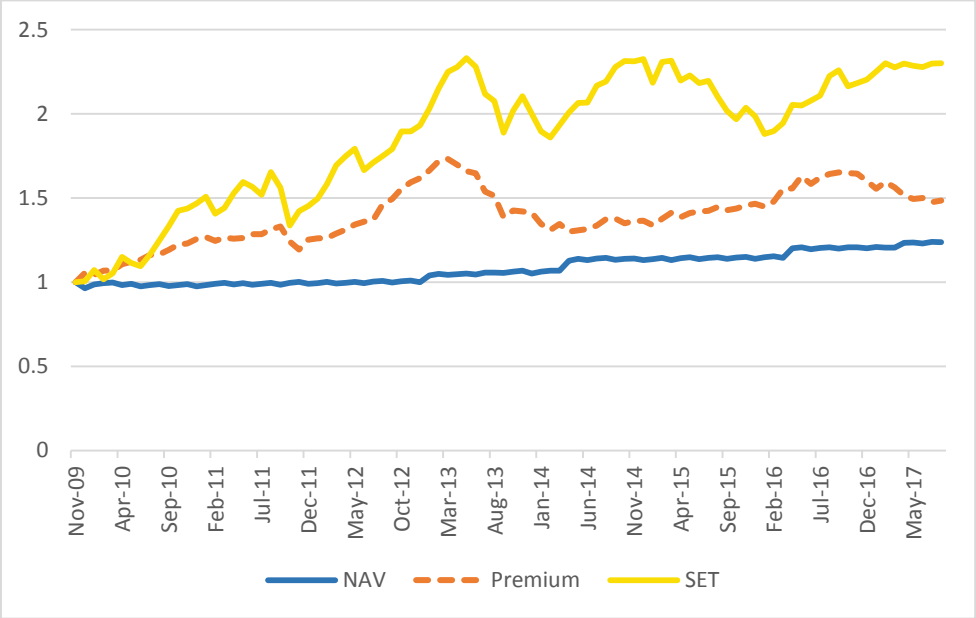

Figure 4.1 shows the cumulative monthly return of NAV, premium, and SET indices starting from November 2009 to August 2017. It shows that property fund and REIT sector grow overtime. However, premium tends to move apart from its fundamental value and move more correlated to SET index especially during 2011-2014.

To confirm the relation between premium and NAV in statistic method, we perform vector autoregressive model (VAR) between premium return and NAV return and check for unit root. The unit root test by augmented Dickey-Fuller test, reported in appendix, shows that null hypothesis of unit root can be rejected for REIT and premium return. Therefore, our lead-lag investigation can be done in a straightforward data setting. In addition, we also found that three lags length is enough for our VAR model.

Table 4.1: Monthly vector autoregressive model between premium return (Rpre) and NAV return (Rnav) from January 2009 to August 2017.

VARIABLES	Rnav	Rpre
L.Rnav	0.284***	0.497
	(0.082)	(0.312)
L2.Rnav	0.182**	0.115
	(0.082)	(0.321)
L3.Rnav	0.237***	0.201
	(0.082)	(0.313)
L.Rpre	-0.009	0.146*
	(0.022)	(0.084)
L2.Rpre	0.008	-0.141*
	(0.022)	(0.083)
L3.Rpre	-0.009	0.121
	(0.022)	(0.083)
Constant	0.002	0.001
	(0.001)	(0.004)
Observations	101	101
R-squared	0.196	0.058

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

$Rnav_t = \alpha + \beta Rnav_{t-n} + \gamma Rpre_{t-n} + \varepsilon_t$

$Rpre_t = \alpha + \beta Rnav_{t-n} + \gamma Rpre_{t-n} + \varepsilon_t$ where n = 1,2,3

The result in Table 4.1 is consistent with Figure 4.1 that there is no lead-lag relationship between premium and NAV in any lags. This result implies that premium is not useful in explaining NAV return. In addition, the R-square value of both regressions at 19.6 % and 5.8% reflect a high unexplainable data. Nevertheless, it can be seen that premium return is influenced by its own lags; likewise, NAV return is also related to its own lags.

Although we follow Chiang (2009) method, our preliminary results is inconsistent with his studies that indicate lead-lag relation in premium and NAV return. This is also inconsistent with previous finding by Barkham & Geltner (1995), Liow (1996), and Chau et al. (2001) that showed information flow from public property

market to private property (i.e. NAV) in US, Singapore, and Hong Kong respectively. Evidence of no lead-lag relationship might be cause by disappearing of informed trader or premium changes are dominated by uninformed investors who trade on market sentiment.

Institutional trading and REIT return

Table 4.2: Monthly vector autoregressive estimates of REIT return (Rreit) and fund flow to REIT mutual fund as percentage to REIT sector capital (RFlowr) from November 2009 to August 2017.

VARIABLES	RFlowr	Rreit
L.Rreit	0.024**	0.157*
	(0.011)	(0.105)
L2.Rreit	0.030***	0.072
	(0.011)	(0.107)
L3.Rreit	0.012	0.187*
	(0.012)	(0.111)
L.RFlowr	0.250**	0.486
	(0.105)	(0.994)
L2.RFlowr	-0.040	0.376
	(0.106)	(0.997)
L3.RFlowr	0.189*	-0.578
	(0.098)	(0.929)
Constant	0.001	0.005
	(0.000)	(0.003)
Observations	91	91
R-squared	0.314	0.106

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

$RFlowr_t = \alpha + \beta Rreit_{t-n} + \gamma RFlowr_{t-n} + \varepsilon_t$

$Rreit_t = \alpha + \beta Rreit_{t-n} + \gamma RFlowr_{t-n} + \varepsilon_t$ where n = 1,2,3

To study effect of institutional trading on REIT return, we perform and report our monthly VAR estimates of REIT return and fund flow in Table 4.2. From the first column, we find that current flow is significantly related to flow in month t-1 and t-3.

These result suggests a positive momentum in REIT mutual fund flows. Moreover, we also find that monthly fund flows are significantly driven by REIT return in previous months, suggesting that REIT mutual fund investors adjust and follow REIT return in first two months. This model is able to explain 31.4% of the variation in monthly fund flow. This result is consistent with the study by Fortune (1998) and Ling & Naranjo (2003) that showed correlation between current fund flow and previous REIT return.

Turning to our main study, we find that flows to REIT mutual fund does not affect subsequence REIT return even though flows to REIT mutual fund has a large amount, 32% compared to trading value in each period. We expect that REIT mutual fund managers have diversified investment strategy so that their trading does not affect REIT return. Our REIT return equation is able to explain little variation in REIT monthly return (R-squared is 10.6%) and our finding in this point is contradict to Fortune (1998) and Ling & Naranjo (2003) who found evidence of mutual fund flows and equity return effect.

From Gentry et al. (2004) and Clayton & MacKinnon (2002) discussion, property funds and REITs are highly owned by institutional investors and contain high inside ownership. Therefore, this type of fund should not deviate very far from its fundamental value. However, they still found price deviation from its current NAV which some variation makes sense, as price premium are positively to future NAV growth. They also provided an evidence that leading of price premium lasts for a short-term and premiums reverse back to its mean. In addition, they show little and no effect of market sentiment to REIT premium.

As we find no evidence of price pressure from REIT mutual fund, we believe that institutional investors, at least REIT mutual fund managers, do not play a role in using information to predict future NAV growth even though REIT mutual fund trading is responsible for 32.15% (on average) of REIT sector trading value in each month. This result helps us clarify that why there is no lead-lag relationship in premium and NAV. Furthermore, we can also expect no mean-reversion in REIT premium and discount since institutional investors trading do not affect REIT price.

Beside above discussions, missing price pressure from REIT mutual fund might be caused by our data frequency. Due to a low frequent data as monthly interval, the result may not reflect an obvious effect of price pressure using higher frequency data as daily or weekly should give clearer result.

To be specific to REIT premium, we also do VAR analysis between REIT premium and REIT mutual fund flow as reported in Table 4.3.

Table 4.3: Monthly vector autoregressive estimates of REIT premium return (Rpre) and fund flow to REIT mutual fund as percentage to REIT sector capital (RFlowr) from November 2009 to August 2017.

VARIABLES	RFlowr	Rpre
L.Rpre	0.027**	0.185*
	(0.011)	(0.105)
L2.Rpre	0.029**	0.147
	(0.011)	(0.108)
L3.Rpre	0.011	0.085
	(0.012)	(0.110)
L.RFlowr	0.206**	0.271
	(0.104)	(0.988)
L2.RFlowr	-0.033	0.522
	(0.105)	(0.989)
L3.RFlowr	0.188*	-1.451
	(0.097)	(0.913)
Constant	0.001	0.004
	(0.000)	(0.003)
Observations	91	91
R-squared	0.332	0.099

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

$RFlowr_t = \alpha + \beta Rpre_{t-n} + \gamma RFlowr_{t-n} + \varepsilon_t$

$Rpre_t = \alpha + \beta Rpre_{t-n} + \gamma RFlowr_{t-n} + \varepsilon_t$ where n = 1,2,3

Table 4.3 shows vector autoregressive estimates of REIT premium return and fund flow to REIT mutual fund as percentage to REIT sector capital. In first column, fund flows to mutual fund show a correlation to previous fund flow in month t-3. Moreover, fund flows are significantly driven by change in premium in month t-1 and t-2 indicating that REIT mutual fund investors have "return chasing" behavior. Surprisingly, it seems that investors ignore the level of premiums in property fund and REIT as they chase REIT return even though there is an increasing in premium.

On the other hand, fund flows in prior months do not significantly affect REIT premium return. Whist, premium returns do have some autocorrelation with its own lag.

As an alternative to use REIT return, VAR estimates of fund flow and premium return give the same results that fund flows to REIT mutual fund insignificantly affect both REIT return and premium return. Again, from previous results, we expect that institutional investors play a little role in causing and solving price deviation in Thai REIT sector.

Market sentiment and REIT premium

Since we found no evidence that institutional investors affect REIT premium, we further investigate the cause that change premium level by study correlation between premium and market sentiment.

In general, changes of investors' expectation will result in market sentiment, which is difficult to measure in the financial market. In this paper, we then formulate an investor sentiment index following the method introduced by Baker & Wurgler (2006). Using the principal component analysis method, we select five proxy variables to measure the changes of investor sentiment: SET large-cap stock return (RSETL), SET mid-cap stock return (RSETM), market turnover (TURN), fund flow to stock mutual fund as percentage to SET market value in next period (RFlows_{t+1}), and change of consumer confidence index (RCCI).

Table 4.4: The result of principal component analysis

VARIABLES	Component 1	Component 2	Component 3	Component 4	Component 5
RSETL	0.663	-0.222	-0.061	0.124	0.701
RSETM	0.673	-0.154	-0.107	0.092	-0.710
Turn	0.177	0.221	0.958	0.033	-0.021
RFlows (t+1)	0.085	0.750	-0.209	0.621	0.030
RCCI	0.264	0.562	-0.150	-0.768	0.052
Eigen value	1.964	1.105	0.962	0.836	0.133
Proportion	39.28%	22.09%	19.24%	16.72%	2.67%

After all variables are normalized, as showed in Table 4.4, we select first principal component to create market sentiment index as components give a highest Eigen value at 1.946 and contribute to the entirety variance at 39.28%. As a result, we can calculate sentiment index (SENT) as follow and regress premium return on sentiment variable.

$$SENT_t = 0.66RSETL_t + 0.67RSETM_t + 0.18TURN_t + 0.09RFlows_{t+1} + 0.26RCCI_t$$

According to Table 4.5, the estimate coefficients of sentiment variable shows positive and significant correlation to premium changes at 99% confidence level. Premium return still has correlation to its own lag confirming a momentum in REIT premium while change of bond yield insignificantly correlates to premium change. Results from this regression indicate that price premium and discount in Thai REIT market are significantly caused by individual investor who trades on market sentiment.

Table 4.5: Multivariate time-series regression of premium return (Rpre) on sentiment index (SENT) where change in monthly bond yield (RBond) and lag premium return (L.Rpre) are controlled for fundamental and autocorrelation.

VARIABLES	Rpre
SENT	0.218***
	(0.031)
RBond	-0.046
	(0.033)
L.Rpre	0.053*
	(0.077)
Constant	-0.003
	(0.003)
Observations	103
R-squared	0.282

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Our finding is inconsistent to prior literature by Gentry et al. (2004) and Clayton & MacKinnon (2002) who found weak evidence of sentiment effect to price deviation in the US. In addition, they proposed that investors' sentiment should have no or little effect to price deviation in efficient market.

However, research by Clayton et al. (2009) gave us the same result that market sentiment measuring by survey-based method has a significant impact to price deviation in US market. In addition, N. J. Lee et al. (2013) also show the significant correlation between PNAV and market sentiment in Singapore REIT.

Although Thai property fund and REIT sector are composed of institutional investor and inside ownership, their trading is not large enough to eliminate the effect of uninformed trading unlike REIT markets in developed market such as US and UK market which are mainly dominated by institutional investor and show no price deviation from market sentiment.

REIT premium reversion

As REIT premiums are found to be correlated with market sentiment, we further study price reversion cause by market sentiment using Fama-French model. We expect that REIT traded on premium should give negative excess return (negative alpha) while discount REIT should generate excess return (positive alpha).

Table 4.6: Time-series regression of REIT return of each premium portfolio.

VARIABLES	Portfolio 1 (highest premium)	Portfolio 2	Portfolio 3	Portfolio 4 (lowest premium)
Rm-Rf	0.399***	0.314***	0.256***	0.278***
	(0.071)	(0.067)	(0.055)	(0.080)
SMB	0.333***	0.329***	0.092	-0.007
	(0.115)	(0.106)	(0.087)	(0.126)
HML	0.293*	0.151	0.079	0.105
	(0.151)	(0.138)	(0.116)	(0.166)
Rnav	0.293	0.705**	0.697**	0.358
	(0.316)	(0.107)	(0.303)	(0.384)
Constant	0.003	0.004	-0.002	0.001
	(0.003)	(0.003)	(0.002)	(0.004)
Observations	104	104	104	104
R-squared	0.357	0.558	0.317	0.184

Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

From Table 4.6, the estimated coefficients show a significant and positive relation to REIT return at 99% confidence level. This results are consistent with all previous researches that show correlation between REIT and stock market. Nevertheless, we find no evidence of price reversion to its mean as constant shows no significant result. We further add dummy variable (Up) to represent positive market return in order to capture premium in upward market and discount in downward market.

Table 4.7: Time-series regression of REIT return of each premium portfolio adding upward market dummy variable (Up).

VARIABLES	Portfolio 1 (highest premium)	Portfolio 2	Portfolio 3	Portfolio 4 (lowest premium)
Rm-Rf	0.359***	0.266***	0.266***	0.246**
	(0.068)	(0.067)	(0.059)	(0.070)
SMB	0.303**	0.253**	0.121	-0.006
	(0.107)	(0.104)	(0.093)	(0.109)
HML	0.244*	0.111	0.151	0.028
	(0.141)	(0.136)	(0.124)	(0.146)
Rnav	0.316	0.711**	0.709**	0.569
	(0.242)	(0.106)	(0.312)	(0.365)
Up	0.018***	0.014**	0.012*	0.010
	(0.006)	(0.006)	(0.005)	(0.006)
Constant	-0.006	-0.003	-0.004	-0.005
	(0.004)	(0.004)	(0.003)	(0.004)
Observations	104	104	104	104
R-squared	0.445	0.567	0.426	0.272

Standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1

Table 4.8: Descriptive data of REIT portfolio by premium level including premium (PNAV), stock turnover (TURN), market capital (Mkt Cap), and institution ownership (INST).

VARIABLE		Portfolio 1 (high premium)	Portfolio 2	Portfolio 3	Portfolio 4 (low premium)
Premium	Mean	1.358	1.054	0.884	0.678
	S.D.	0.151	0.097	0.082	0.094
TURN	Mean	10.048	10.069	9.666	7.445
	S.D.	3.475	6.561	7.495	5.090
Mkt Cap	Mean	11,396.09	6,349.52	4,903.64	2,010.60
	S.D.	3,151.55	5,615.93	4,811.94	2,421.11
INST	Mean	17.76%	29.07%	35.38%	25.91%
	S.D.	5.86%	4.34%	14.83%	6.38%

Turning to premium and discount, from Table 4.7, portfolio 1 which has highest premium level significantly generate premium in an upward market at 99% confidence level. At the same direction, portfolio 2 and 3 also give an excess return but lower than the first portfolio while portfolio 4 shows no excess return. In downward market, however, none of them generates a discount or negative return as constants show no statistical significance. This might be an evidence indicating that there is no mean-reversion in REIT premium and discount. Moreover, we find that dummy variable (Up) can be used to explain REIT premium resulting in higher R-square.

According to Table 4.7 and 4.8, however, only portfolio 2 and 3 show a significant correlation between REIT and its NAV at 95 % confidence level which is likely to be a result of higher institutional proportion. As discussed by Gentry et al. (2004), having higher institutional proportion in REIT and close-end fund will make their returns move significantly close to its underlying assets. From overall result, REIT returns are more correlated to stock market than its underlying asset reflecting that property funds and REITs in aggregate are more like stock than real estate.

Supporting by Table 4.8, it can be clearly seen that premium levels are associated with market capital and institutional ownership of each REITs. REITs with larger size and small proportion of institution seem to have more room for individual investors making these REITs' return are more easily induced by market sentiment and move away from its NAV. Therefore, portfolio 1 which contains large capital REIT and low institution holding tends to follow market sentiment and trades at price premium. In the opposite, small capital REITs provide low liquidity making them unattractive to invest. As a result, small capital REITs have lower correlation to stock market and its NAV and are unaffected by market sentiment.

Conclusion

This study examine the price discovery in REIT sector in Thailand. Our study of lead-lag relationship between premium return and NAV return, using VAR model as a main tool, indicates that premium is not useful in predicting future performance and growth of REIT. That is, there is no information flow from public market to NAV appraisal. Our result is inconsistent to prior literatures that price discovery firstly occur in securitize market and transfer to outside market i.e. NAV appraisal.

We further investigate for causes of premium in REIT sector by studying price pressure from REIT mutual fund flow and effect of market sentiment to premium change. As a result, we cannot find any correlation between REIT mutual fund flow and REIT return when using monthly data. We then investigate for fund flow and REIT premium and still find no evidence of price pressure. Surprisingly, we find that current flows to REIT mutual fund are influenced by REIT return in previous periods up to two month even though that REITs are already traded at premium.

In market sentiment study, we construct sentiment index by using principal component analysis by selecting large-cap stock return, mid-cap stock return, market turnover, and flows to stock mutual funds as a proxy. Afterwards, we find that in our study period, 2009 to 2017, premium return is significantly and positively related to market sentiment.

We then conclude that price premiums in REIT sector are mainly caused by uninformed investors who trade on market sentiment while informed traders, represented by REIT mutual fund, do not affect both REIT return and premium. As informed traders play little role in REIT market, therefore; lead-lag relationship between premium and NAV disappears. In addition to this study, we find no evidence of mean-reversion in REIT price using Fama-French model.

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APPENDIX

Appendix 1: Test statistics of Augmented Dickey-Fuller unit root test. Test results show that all variables are stationary and can be used in VAR model.

Variable	Test Statistic	p-value
Rnav	-15.670	0.00
Rreit	-10.794	0.00
Rpre	-10.839	0.00
RFlowr	-6.222	0.00
RSETL	-10.204	0.00
RSETM	-8.707	0.00
Turn	-7.013	0.00
RFlows	-9.680	0.00
RCCI	-9.571	0.00

VITA

Nithikorn Piskanok, an ordinary student in bangkok, has an early interest in science since he was young. During his bachelor's degree in science, he started entering the stock market and fell in love with it. In his spare time, he enjoyed reading economics news and financial books and trained his trading skills through time. He also took extra courses in stock trading lesson. Although his trading skill was not excellent, he have been trying to earn more knowledge. By the time he graduated, his decision to study master degree in finance was an easy one. He believe that his knowledge would be useful in the future and he would like to align the passion towards finance with social benefits.