Equity Term Structure of Property Funds and REITs in Thailand

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An Independent Study Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Finance
Department of Banking and Finance
FACULTY OF COMMERCE AND ACCOUNTANCY
Chulalongkorn University
Academic Year 2019

Equity Term Structure of Property Funds and REITs in Thailand

นายเชนชัย โชติช่วงนาวา

สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาการเงิน ภาควิชาการธนาคารและการเงิน
คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2562

Independent Study Title	Equity Term Structure of Property Funds and REITs in Thailand
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Field of Study	Finance
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Accepted by the FACULTY OF COMMERCE AND ACCOUNTANCY, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Science

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เชนชัย โชติช่วงนาวา : Equity Term Structure of Property Funds and REITs in Thailand. (Equity Term Structure of Property Funds and REITs in Thailand) อ.ที่ปรึกษาหลัก : ผศ. ดร.รุ่งเกียรติ รัตนบานชื่น

The equity term structure of property funds and REITs in Thailand is upward-sloping. This result contradicts with various studies suggesting that the term structure of risk premia is decreasing. A tenet of those studies is that, by holding long-term equity, investors are willing to forego a part of the compensation to avoid immediate risks which seems to be reverse for property funds and REITs in Thailand. There is evidence that the correlation between size and return is positive. Unlike U.S. REIT, the momentum factor has no application to explain the difference in excess returns. High turnover property funds and REITs perform better in asset duration factor. The explainability of systematic risk factors also improves when adding the interaction term to specify the above-average turnover ratio group. This concrete result suggests that funds and trusts which have long asset duration earn higher excess return than the shorter asset duration giving a hint of investment strategy for investing property funds and REITs in Thailand.

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ปีการศึกษา 2562 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

6181885126 : MAJOR FINANCE
KEYWOR
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Chenchai Chotchuangnava : Equity Term Structure of Property Funds and REITs in Thailand. Advisor: Asst. Prof. ROONGKIAT RATANABANCHUEN, Ph.D.

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Field of Study:	Finance	Student's Signature .....
Academic Year:	2019	Advisor's Signature .....

ACKNOWLEDGEMENTS

This independent study would not be possible without the guidance and help of several individuals who in one way or another contributed and extended their valuable assistance in the completion of this study.

First and foremost, I would like to thank Ajarn Roongkiat Ratanabanchuen, Ph.D., my independent study advisor. He has been very kind and patient explaining to me all the economic logic and theory every time I am curious. His guidance has been very valuable from the beginning until the completion of my independent study. His course, Financial Risk Management for Pension Plans, is one of my favorite master's degree courses, its content and knowledge educates me nicely for real-life application.

I would like to thank my independent study committees, Ajarn Ruttachai Seelajaroen, Ph.D., and Ajarn Nathridee Suppakitjarak, Ph.D., for their precious comments. They are also very first teachers during I was studying a bachelor's degree. They and other teachers had educated me on the principles of financial literacy and encourage me to study finance until today. I am heartily thankful for all of their time and effort.

Thanks are also given to my MSF teachers for all knowledge they taught me, MSF staff, financial laboratory, and all MSF friends for all kinds and supports.

Last but not least, I wish to thank my family who always beside and motivate me to achieve my goal and they are the reason to make me a better person every day in order to take care of them.

Chenchai Chotchuangnava

TABLE OF CONTENTS

Page

1) INTRODUCTION

There are various studies on firms' and stocks' characteristics that can explain differences in equity returns. For example, the Fama-French three-factor and five-factor model, Fama and French 1992 and 2015, are the asset pricing models that expand from the 1990 Nobel Prize capital asset pricing model (CAPM) by adding size premium, value premium, profitability premium, and firm investment discount. The Fama-French five-factor model shows that there are patterns in an average return of all NYSE, AMEX, and NASDAQ stock returns, July 1993 – December 2013, related to those factors and the model explains between 71% - 94% of cross-section variance of expected returns for size, value, profitability, and firm investment factor. Since then, multi-factor models have been studied and examined with numerous factors that could potentially explain the differences in equity returns in time and event variations.

In addition to those studies, the term structure of equity returns is also another perspective that has been examined. Several empirical literatures suggest that the term structure of risk premia is decreasing but being suggested that it is flat or increasing also. This puzzle is interesting to further examine as it could be beneficial for an investment decision. Lettau and A. Wachter (2011) finds that the upward-sloping yield curve for bond indicates that investors require compensation in the form of a positive risk premium for holding high-duration assets. Conversely, their study on value and growth stocks implies the opposite direction that investors require compensation for holding value stocks, which are considered as short-horizon equity thane growth stocks which are long-horizon equity. This duration factor shows that there is also the value of dividends and benefits that materialize in the distant future.

On the opposite side, Gollier (2016) finds that in some situation the term structure of risk premia can also be increasing. For example, when the uncertainty of log consumption is independent. However, he suggests that this condition is quite rare to occur in general. This finding reminds us that time and event variations are another essential aspect to be aware of, similarly to the term structure of interest rates that appear to be inverted during worrying and/or unfavorable economic condition.

Unfortunately, equity durations are rarely to observe since companies are an infinite form attached to countless asset combinations. In this regard, Weber (2018) applies implied equity duration from M. Dechow, G. Sloan, and T. Soliman (2004), Implied Equity Duration: A New Measure of Equity Risk, by using stock prices as input and adding terminal value term to Macaulay duration formula in order to study the term structure of equity returns which again shows that the stocks with high cashflow duration earn 110 bps per month lower returns than short-duration stocks in the cross-section. In this paper, I examine the term structure of equity returns of property funds and REITs in Thailand and their duration can be observed from the remaining lease term of invested assets. Unlike other studies that focus on stock returns in general consisting of both value and growth stocks, property funds and REITs are in the property industry and in mature or value regime. This study will apply asset duration to assess the difference in equity returns as another factor since it is representative of the risk premium of claims to cashflows with difference maturities. According to M. Andries, T. Eisenbach, and M. Schmalz (2015), their study finds that investors appear to demand a lower expected excess return for holding longer investment horizons which represent risk aversion effect to prefer holding long investment horizon instead of facing immediate risks. This finding

influences us to expect the same result with an excess return of property funds and REITs in Thailand since a long duration could provide a cushion for future underperform periods and have longevity benefit from cumulative growth for the latter cashflow distributions.

Objectives and Contributions

In Thailand, Property fund was introduced in 2003 prior to the first establishment of REIT in 2014. Regarding market capitalization had been grown significantly, growing from 82 billion Baht to 461 billion Baht from 2010 to 2019, the property funds and REITs market capitalization is still small relatives to other countries. As of 31 December 2019, there were 60 listed property funds and REITs. Despite liquidity limitation, demand for property funds and REITs, including infrastructure funds, is continuously rising to be another favored asset class during the bull market as similar to gold.

The objectives of this study are to further examine the term structure of equity returns of securities that their underlying duration and classification are known. With this regard, the candidate of this study is property funds and REITs in Thailand which are regulated to invest at least 75% of the total value of units offered plus loan (if any) in real estate properties that are already generating revenue such as office, retail, hotel or hospitality, warehouse, and factory, and to distribute at least 90% of their adjusted net profit to unitholders. The revenue-generating asset can be classified as a mature or value regime. Investing in real estate properties has two types of ownership which are freehold and leasehold. In this case, above proxies should benefit us as superior

indicators than others, such as implied equity duration or cash duration, to examine the relationship of the term structure of equity returns among different asset durations.

Liquidity limitation can result in a difference in return characteristics. The institutional investors are known as sophisticated investors or informed investors, who usually being skilled and having more information to consider. Their trades tend to be rational to realize equilibrium returns, overweight when there is a positive alpha and vice versa, then cause correction per changes in the term structure from time to time. However, their investment universes can be limited by several factors, such as size, liquidity, and/or short-sell restriction. To tackle this aspect, a turnover ratio, one of the widely used liquidity indicators, shall be applied to sort property funds and REITs into two sample group, above- and below-average turnover ratio group, which could allow us the see whether there is significant variance in small and illiquid market condition.

This paper aims to benefit investors who consider investing in property funds and REITs in Thailand and also being the first that studies the equity term structure of property funds and REITs in Thailand which is one of emerging markets.

Research Hypothesis

- **Hypothesis 1:** The term structure of property funds and REITs' equity returns in Thailand is concave downward sloping.

  I hypothesize that Investors require a lower excess return for holding property funds and REITs which have high asset maturity which could provide a cushion for underperforming periods and longevity benefit from long-term growth. Additionally, since discounted cash flow is one of the widely used valuation measures, I hypothesize that the term structure also has concave in slope as a reflection of compounded discount rates assigned to future cash flows.

- **Hypothesis 2:** Property funds and REITs which have above-average turnover ratio provide a higher excess return for asset maturity factor.

  I hypothesize that intuitional investors who are considered as an informed party can realize equilibrium returns, to overweight when there is a positive alpha and vice versa, leading excess return explained by asset duration factor to be higher.

2) LITERATURE REVIEW

The 1990 Nobel Prize capital asset pricing model (CAPM) is the most well-known and classic asset pricing model which has been widely used until nowadays, especially of corporate finance. However, Campbell and Vuolteenaho (2004) show that CAPM has weak applications to explain the modern sample period. Further from arguments on CAPM application, Fama and French (2015) expand the capital asset pricing model by adding size premium, value premium, profitability premium, and firm investment discount and the model explains between 71% - 94% of cross-section variance of expected returns for size, value, profitability, and firm investment factor. Although, the five-factor model still has low power to explain small stocks' returns due to intensive investing and low profitability. Apart from CAPM and the Fama-French multi-factor models, the expanded asset pricing model which has been used to examine property funds and REITs' return is the Carhart four-factor model.

The risk-adjusted return measure how much return expects to realize due to amount risk. Investing in stocks that have different characteristics should not provide the same expected return even their volatility in relation to the market is the same. Derwall, Huji, Brounen, and Marquerng (2009) find that the momentum effect has a strong application to explain U.S. REIT returns with both validities of common factor models and portfolio performance attribution. Prior to this study, Lee and Swaminathan (2000) and Chui, Titman, and Wei (2003) find that momentum profits are higher for stocks with higher turnover and the momentum effect is much better fit to explain returns of large REIT and liquid REIT by examining the cross-sectional data both pre- and post-1990 periods.

Since the term structure of interest rates is usual upward-sloping in normal macroeconomic conditions but inverts in the adverse condition that rarely foresees the upcoming outcome especially of mid- and long-term. This could cause participants in the equity capital market question on the term structure of equity returns. Lettau and A. Wachter (2011) proposes another dimension to measure risk-based model to explain the term structure of interest rates, return of the aggregate market, and the risk and return characteristics of value and growth stocks. The critical finding from this paper is that equity holders require compensation to hold value stocks, which are classified as short-horizon equity, instead of longer maturity term like bondholders. M. Andries, T. Eisenbach, and M. Schmalz (2015), which finds that investors appear to demand lower expected excess returns for holding long investment horizons which represent risk aversion effect to prefer holding longer investment horizon instead of facing immediate risks. For long-horizon payoffs, it provides a cushion for underperforming periods to recover and converge to its mean. Also, during the upturn or expansion period, its longevity will be largely benefited from a rise in economic growth which will distribute across the distant future. Unlike bondholders that usually entitled to receive only fixed claims with respect to downside risk from the probability default. Further study from Weber (2016) confirms this evidence by using implied cash duration to perform slide tests with the indicative return of high cashflow duration stocks which earn 110 bps per month lower return than short cashflow duration stocks. On another hand, Gollier (2016), one of several studies which find an opposite direction, finds that in some situation the risk premia can also be increasing in term structure in some strict condition which rarely to occur.

In addition, Weber (2016) also examine return characteristic between intuitional and retail investor holding, institutional ownership is used as a proxy to indicate short-sale constraints and find that there is a negative relationship between cashflow duration and returns within short-sale constrained stocks. Chan, Leung and Wang (2005) find that, in the 1990s, the REIT market expanded and became more dominated by institutions. This change caused REITs with higher institutional holding to perform greater than REITs with lower institutional holding on Monday and behave more like other equities in the stock market. In addition, Wang, Erickson, Gau and Chan (1995) also finds that REITs with higher institutional investor holding tend to perform better than other REITs on a risk-adjusted basis. These findings help to confirm the proposition that ownership characteristic has a thing to do with size and liquidity. DeVault, Sias, and Starks (2019) reveals that institutional investors are strict to rational trade, unlike retail investors who are more likely to be sentiment traders causing mispricing. On another hand, Wang (2018) finds that institutional investors can instead be sentiment traders which adds to prior evidence that strongly indicates that investor sentiment does affect asset price movement. Lin, Chou, and H.K. Wang (2018) finds that the investor sentiment has a positive impact on price volatility and the bid-ask spread which causes higher arbitrage risk and trading costs during high sentiment periods. However, during high sentiment periods, informed investors rarely take their position per their information advantages on the futures market which has a role as to bring in the new information and contributions to price discovery. Based on the above finding on the impact of ownership characteristics on equity returns, it is interesting to examine how property funds and REITs perform differently in a small market and limited liquidity condition.

3) DATA

The sample group shall be from leasehold-based property funds and REITs which present during January 2015 – December 2019 and were listed in the Stock Exchange of Thailand at the end of December 2019 with at least 12 months of trading periods.

The monthly total returns of SET index and property funds and REITs come from the Thomson Reuters Datastream while a 1-month treasury bill yield comes from The Thai Bond Market Association (ThaiBMA).

Size, value, and momentum factor are prepared based on mythology per Kenneth R. French's website. Firstly, the size factor (SMB) is the total monthly return on the equal-weighted small stock portfolio minus the equal-weighted big stock portfolio. The small and big stock portfolio is rebalanced yearly and consist of stocks that are in the first 50^{th} percentile and above 50^{th} percentile market capitalization, respectively. Secondly, the value factor (HML) is the total monthly return on the equal-weighted high Book-to-Market portfolio minus the equal-weighted low Book-to-Market portfolio. The high and low Book-to-Market stock portfolio is rebalanced yearly and consists of stocks that are in the above 70^{th} percentile and the first 30^{th} percentile market capitalization, respectively. Third, momentum factor (UMD) is the total monthly return on the equal-weighted past 12-month winner stock portfolio minus the equal-weighted past 12-month loser stock portfolio. The winner and loser stock portfolio are rebalanced monthly and consist of stocks that are in the above 70^{th} percentile and the first 30^{th} percentile past 12-month total return, respectively.

Table 1 reports summary statistics of total return and standard deviation of risk factor portfolios including SMB, HML, and UMD from January 2015 – December 2019.

Table 1

	SMB	HML	UMD
Monthly			
Mean	-0.26%	0.93%	1.06%
Min	-3.78%	-6.02%	-8.28%
Max	5.76%	9.25%	8.77%
Std	1.66%	2.39%	3.13%
Annualized			
Mean	-3.03%	11.76%	13.52%
Std	5.73%	8.26%	10.83%

Lastly, the weighted average asset maturities or asset durations are intensively hand-collected from each property fund and REIT's financial statements and prospectus which is the main factor to examine in this paper.

Descriptive Statistic

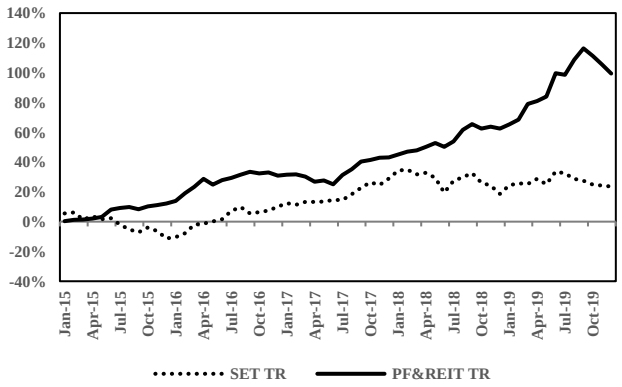
Table 2 reports summary statistics compared between SET index and PF&REIT index, including an arithmetic average of total return and standard deviation in a monthly basis, and annualized to be a yearly basis. *Figure 1* plots the price performance of SET and PF&REIT total return index.

During January 2015 – December 2019, property funds and REITs had outperformed SET index in both return and risk aspects, higher average return with lower volatility.

Table 2

	SET TR	PF&REIT TR
Monthly		
Mean	0.40%	1.18%
Min	-7.58%	-3.05%
Max	6.82%	8.42%
Std	3.15%	2.36%
Annualized		
Mean	4.94%	15.18%
Std	10.92%	8.19%

Figure 1



Apart from capital gain or loss, unitholders who hold property fund and/or REIT shall be entitled to receive the distribution in two forms, dividend income and capital reduction. While dividend income is straight forward as being paid from retained earnings, the capital reduction is the excess cash flow from an operation which cannot be distributed as a dividend because there are non-cash expenses such

as unrealized loss on investments since property funds and REITs are required to appoint an appraisal valuer to reappraise the investment properties annually.

Figure 2 plots arithmetic average of property funds and REITs' total return which were listed in the Stock Exchange of Thailand at the end of December 2019 with at least 12 months trading periods while *Figure 3* plots standard deviation of those monthly total returns. From the left- to the right-hand side, leasehold-based property funds and REITs are sorted by asset maturity and freehold-based property funds and REITs are sorted by market capitalization as at the end of December 2019.

Figure 2

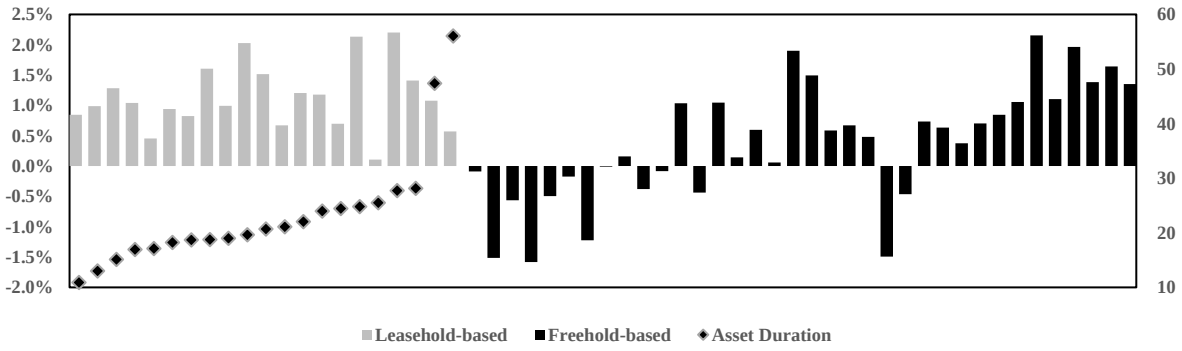
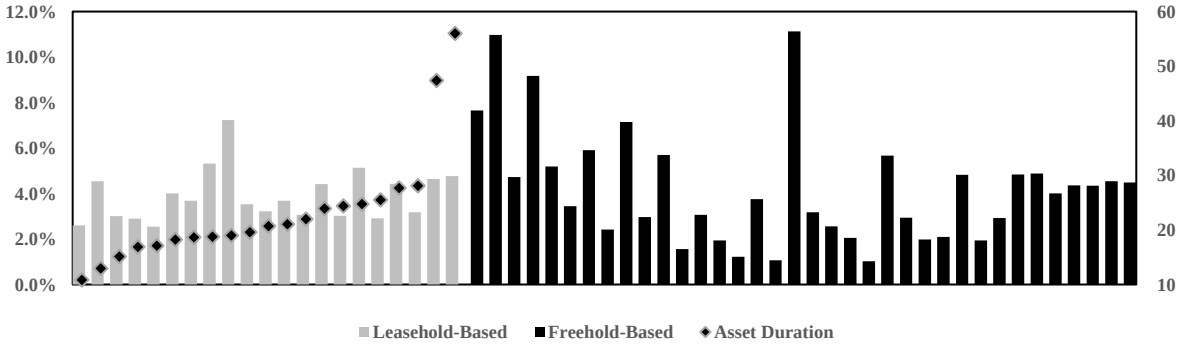


Figure 3



Large freehold-based property funds and REITs tend to perform better with an increasing trend at the very end. The equity term structure of property funds and REITs doesn't show the strong direction in time-series average monthly total return. Leasehold-based and large freehold-based property funds and REITs have volatility in a range of 2% - 7% while volatilities of small-medium freehold-based property funds and REITs vary in a range of 1% to 11%.

Time-series Regression Analysis

Since property funds and REITs are regulated to invest in revenue-generating assets and their intensive capital investments of property funds and REITs in Thailand are usually required capital increase to do so, unless the investment is funded by pure debt financing which is rarely and usually small. Profitability premium and firm investment discount in the Fama-French five-factor model would result in weak application to explain the difference in equity return. In this regard, I shall perform regression analysis based on (i) CAPM, (ii) Fama-French three-factor, and (iii) Carhart four-factor model which are as follows.

$$RI_t - RF_t = \beta_0 + \beta_1 (RM_t - RF_t) + \varepsilon$$

$$RI_t - RF_t = \gamma_0 + \gamma_1 (RM_t - RF_t) + \gamma_2 SMB_t + \gamma_3 HML_t + \varepsilon$$

$$RI_t - RF_t = \delta_0 + \delta_1 (RM_t - RF_t) + \delta_2 SMB_t + \delta_3 HML_t + \delta_4 UMD_t + \varepsilon$$

Where; RI_t is the total return of property fund or REIT time t

RF_t is the 1-month treasury bill yield at time t

RM_t is the total return of SET index at time t

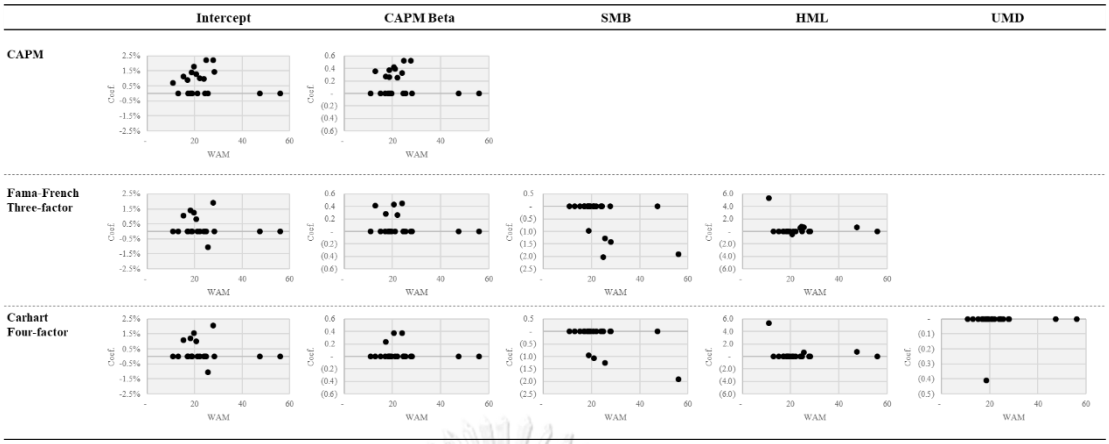
SMB_t is the total return on a diversified portfolio of small stocks minus the monthly total return on a diversified portfolio of big stocks

HML_t is the total return on a diversified portfolio of high book-to-market value stocks minus the monthly total return on a diversified portfolio of low book-to-market value stocks

UMD_t is the total return on a diversified portfolio of recent outperformed stocks minus the monthly total return on a diversified portfolio of recent underperformed stocks

Figure 4 plots leasehold-based property funds and REITs' regressed coefficients of each variable, including (i) intercept, (ii) CAPM beta, (iii) SMB, (iv) HML, and (v) UMD, with asset duration or weighted asset maturity (WAM) as at the end of December 2019. To incorporate statistical inference for further analysis, coefficients that have p-value not less than 10% are assigned as zero.

Figure 4



The result from time-series regression per above figure shows a quantitative expression of each risk factor and also intercept which can be considered as the risk-adjusted return controlled by main risk factor(s) in each model. Non-zero coefficients of intercept show upward-sloping trend in all models while the upward-sloping trend in CAPM beta seems to disappear when adding other risk factors. In terms of expanded risk factors, size factor tends to have the largest coefficients on average among four factors while most coefficients of momentum factor are insignificantly different from zero indicated that momentum effect has nothing to do with equity returns of property funds and REITs in Thailand.

4) METHODOLOGY

To examine all leasehold-based property funds and REITs together at once, I construct the data table in form of pooled time-series and cross-sectional table in order to test Hypothesis 1 and 2 with the ordinary least square (OLS) method.

To test Hypothesis 1, all leasehold-based property funds and REITs' time-series total monthly returns shall be stacked into pooled time-series and cross-section data including risk factors, per the Fama-French three-factor and the Carhart four-factor model, and asset duration factors, consisting of weighted average asset maturity (WAM) and weighted asset maturity squared (WAM2), which change from time to time and difference across each property fund or REIT. Further from independent variables, fixed effects that are assigned specifically to each property fund or REITs shall be included as control variables. The pooled time-series and cross-sectional models are as follows.

$$RI_{i,t} - RF_t = \beta_0 + \beta_1 (RM_t - RF_t) + \beta_2 FE_1 + \ldots + \beta_{X+1} FE_X + \beta_{X+2} WAM_{i,t} + \beta_{X+3} WAM2_{i,t} + \varepsilon$$

$$RI_{i,t} - RF_t = \gamma_0 + \gamma_1 (RM_t - RF_t) + \gamma_2 SMB_i + \gamma_3 HML_i + \gamma_4 FE_1 + \ldots + \gamma_{X+3} FE_X + \gamma_{X+4} WAM_{i,t} + \gamma_{X+5} WAM2_{i,t} + \varepsilon$$

$$RI_{i,t} - RF_t = \delta_0 + \delta_1 (RM_t - RF_t) + \delta_2 SMB_i + \delta_3 HML_i + \delta_4 UMD_i + \delta_5 FE_1 + \ldots + \delta_{X+4} FE_X + \delta_{X+5} WAM_{i,t} + \delta_{X+6} WAM2_{i,t} + \varepsilon$$

Where; FE_X is the fixed effect of each property fund or REIT

$WAM_{i,t}$ is the weighted average asset maturity of property fund or REIT i at time t

$WAM2_{i,t}$ is the weighted average asset maturity squared of property fund or REIT i at time t

Per Hypothesis 1, I hypothesize that Investors require a lower excess return for holding property funds and REITs which have high asset maturity which could provide a cushion for underperforming periods and longevity benefit from long-term growth. I expected that the coefficient of $WAM_{i,t}$ will be a negative and significantly different from zero. Additionally, since discounted cash flow is one of the widely used valuation measures, I hypothesize that the term structure also has concave in slope as a reflection of compounded discount rates assigned to future cash flows. I also expected that the coefficient of $WAM2_{i,t}$ will result in an opposite sign of $WAM_{i,t}$ or in this case, being a positive and significantly different from zero.

To test Hypothesis 2, the above methodologies will be repeated, but the sample will be divided to (i) above-average turnover group, and (ii) below-average turnover group based on turnover ratio during 2015 – 2019. Furthermore, interaction terms which indicate above-average turnover ratio group shall be incorporated into three asset pricing models in order to expand understanding of the relationships among the independent variables. The expanded pooled time-series and cross-sectional models are as follows.

$$RI_{i,t} - RF_t = \beta_0 + \beta_1 (RM_t - RF_t) + \beta_2 (RM_t - RF_t) * HT_i + \beta_3 FE_1 + \ldots + \beta_{X+2} FE_X + \beta_{X+3} WAM_{i,t} + \beta_{X+4} WAM2_{i,t} + \varepsilon$$

$$RI_{i,t} - RF_t = \gamma_0 + \gamma_1 (RM_t - RF_t) + \gamma_2 (RM_t - RF_t) * HT_i + \gamma_3 SMB_i + \gamma_4 SMB_i * HT_i + \gamma_5 HML_i + \gamma_6 HML_i * HT_i + \gamma_7 FE_1 + \ldots + \gamma_{X+6} FE_X + \gamma_{X+7} WAM_{i,t} + \gamma_{X+8} WAM2_{i,t} + \varepsilon$$

$$RI_{i,t} - RF_t = \delta_0 + \delta_1 (RM_t - RF_t) + \delta_2 (RM_t - RF_t) * HT_i + \delta_3 SMB_i + \delta_4 SMB_i * HT_i + \delta_5 HML_i + \delta_6 HML_i * HT_i + \delta_7 UMD_i + \delta_8 UMD_i * HT_i + \delta_9 FE_1 + \ldots + \delta_{X+8} FE_X + \delta_{X+9} WAM_{i,t} + \delta_{X+10} WAM2_{i,t} + \varepsilon$$

Where; HT_i donates above-average turnover ratio property funds and REITs which contains value 1 and 0 for above-average turnover ratio and below-average turnover ratio fund, respectively

In this hypothesis, I hypothesize that intuitional investors who are considered as an informed party can realize equilibrium returns, to overweight when there is a positive alpha and vice versa, leading excess return explained by asset duration factor to be higher. I expected that the coefficient of $WAM_{i,t} * HT_i$ will be a positive and significantly different from zero.

5) EMPIRICAL RESULT

In this paper, a total of 21 leasehold-based property funds and REITs is examined during January 2015 – December 2019. CAPM, Fama-French three-factor, and Carhart four-factor model are applied to compare the different applications from each risk factor. Asset duration factors that are hand-collected based on financial statements and prospectuses of each property fund or REIT shall be used to indicate the shape of the equity term structure. I construct pooled time-series and cross-section dataset and include fixed effects specific to each property fund or REIT, aiming to make coefficients of independence variable cleaner for interpretation.

Pretesting with time-series regression gives preliminary results that coefficients of intercept and CAPM beta have an increasing trend towards long weighted average asset maturity. Leasehold-based property funds and REITs' total returns are mainly explained by size factor which aligns with *Figure 2* that large freehold-based property funds and REITs tend to perform better than the small-medium funds. This observation on size factor shall be emphasized in Hypothesis 2 testing in the latter section.

Table 3 reports coefficients of independent variable including risk factors and asset duration factors. The result for CAPM, Fama-French three-factor, and Carhart four-factor model is sorted into three panels which are *Panel A*, *Panel B*, and *Panel C*, respectively.

Table 3

Independent Variable	Coef.	Std. Err	t-stat	p-value	Number of obs	Adj. R-Squared
Panel A - Capital Asset Pricing Model (CAPM)					**1,063**	**3.82%**
- INTERCEPT ***	-0.1089	0.0369	-2.95	0.30%		
- RMRF ***	0.2408	0.0388	6.21	0.00%		
- WAM **	0.0061	0.0025	2.45	1.40%		
- WAM2	-0.0001	0.0000	-1.62	10.50%		
Panel B - Fama-French Three-factor Model					**1,063**	**6.23%**
- INTERCEPT ***	-0.1088	0.0373	-2.91	0.40%		
- RMRF ***	0.2192	0.0469	4.67	0.00%		
- SMB ***	-0.5021	0.0999	-5.02	0.00%		
- HML ***	0.2972	0.0742	4.01	0.00%		
- WAM **	0.0060	0.0025	2.39	1.70%		
- WAM2	-0.0001	0.0000	-1.62	10.60%		
Panel C - Carhart Four-factor Model					**1,063**	**6.16%**
- INTERCEPT ***	-0.1100	0.0374	-2.94	0.30%		
- RMRF ***	0.2081	0.0518	4.02	0.00%		
- SMB ***	-0.5056	0.1002	-5.05	0.00%		
- HML ***	0.2900	0.0756	3.84	0.00%		
- UMD	-0.0216	0.0428	-0.50	61.50%		
- WAM **	0.0060	0.0025	2.41	1.60%		
- WAM2	-0.0001	0.0000	-1.62	10.60%		

A number of stars indicate the significant level of the coefficient to be different than zero. One star represents a significant level of 10%, two stars represent a significant level of 5%, and three stars represent a significant level of 1%.

Panel A show the result from CAPM that coefficient of intercept and CAPM beta are highly significantly different from zero at 1% level. The intercept's coefficient results negative value and this negative sign appears across all considered models. The weighted average asset maturity's coefficient is positive at a significant level of 5% suggests that the excess returns have increasing term structure which contradicts with what I expected. Also, the coefficient of squared term results in an opposite sign with the non-squared term, but its p-value is higher than 10%. I cannot conclude that the equity term structure has a concave slope. The asset duration factors provide identical results in all panel, coefficient value, sign, and p-value.

This result aligns with the pretesting result for time-series regression that the equity term structure of property funds and REITs are upward-sloping that funds which have 1 year higher in asset duration could provide 0.6% more return in monthly basis.

Panel B shows both coefficients of added risk factors, size and value premium, are highly significantly different from zero at 1% level. This model also provides the highest adjusted R-squared suggests that the momentum factor has weak application to explain the difference in equity returns of property funds and REITs, which show extremely high p-value in *Panel C*. Nonetheless Fama-French three-factor model provides the highest adjusted R-squared among three-factor models, the predictability is quite low.

The coefficients of CAPM beta are in the range of 0.21 – 0.24 which are quite low. This result shows that property funds and REITs in Thailand have slightly less market sensitivity than researches in U.S. stock market. Connors, D. N., & Jackman, M. L. (2000) study REITs which are listed in the New York Stock Exchange, the American Stock Exchange or the NASDAQ National Market List, and find that the capital asset pricing model (CAPM) results in the average beta of circa 0.35, the lowest value is 0.05 while the highest value is 0.80. This study uses data over a 27-year period during 1973 – 1999 and suggests that the Fama-French model is the best fit model among CAPM and another multi-factor model which is added two additional macroeconomic factors. The number and equity market capitalization of REITs in U.S. are significantly higher and larger than in Thailand. At the end of December 1999, there were 203 REITs which have equity market capitalization of

118,233 million dollars in total. In addition, Corgel, J. B., & Djoganopoulos, C. (2000) show their review of financial services firms compute and estimate U.S. REIT betas and the betas are less than 0.40 in most case. This study also emphasizes that the excess return of board market indexes has a weak application to explain the difference in REITs' returns. Due to a unique entity of REITs, a type of "trust" where a trustee is determined its true owner on behalf of its beneficiary and does not have a juristic person status, and being regulated to invest in revenue-generating assets, REITs' returns could be actually less sensitive to the market because of its specified characteristic as a yield instrument.

A turnover ratio, as one of the widely used liquidity indicators, is applied here to represent a degree of institutional investors' participation. Sorting property funds and REITs into two sample groups, above- and below-average turnover ratio group, could allow us to observe the difference in return characteristics.

Table 4 reports the same format with *Table 3* but the interaction terms to indicate above-average turnover ratio group are added as HT for each independent variable to expand understanding of the relationships among those independent variables.

Table 4

Independent Variable	Coef.	Std. Err	t-stat	p-value	Number of obs	Adj. R-Squared
Panel A - Capital Asset Pricing Model (CAPM)					**1,063**	**4.39%**
- INTERCEPT ***	-0.1767	0.0521	-3.39	0.10%		
- RMRF *	0.1210	0.0729	1.66	9.70%		
- RMRF x HT **	0.1693	0.0860	1.97	4.90%		
- WAM	0.0030	0.0035	0.87	38.70%		
- WAM x HT **	0.0101	0.0053	1.89	5.90%		
- WAM2	0.0000	0.0001	-0.06	95.30%		
- WAM2 x HT **	-0.0002	0.0001	-2.26	2.40%		
Panel B - Fama-French Three-factor Model					**1,063**	**6.71%**
- INTERCEPT ***	-0.1818	0.0522	-3.48	0.10%		
- RMRF *	0.1604	0.0858	1.87	6.20%		
- RMRF x HT	0.0832	0.1024	0.81	41.70%		
- SMB **	-0.3785	0.1781	-2.13	3.40%		
- SMB x HT	-0.1669	0.2150	-0.78	43.80%		
- HML ***	0.3473	0.1286	2.70	0.70%		
- HML x HT	-0.0730	0.1573	-0.46	64.30%		
- WAM	0.0023	0.0035	0.67	50.20%		
- WAM x HT **	0.0107	0.0053	2.03	4.30%		
- WAM2	0.0000	0.0001	-0.03	98.00%		
- WAM2 x HT **	-0.0002	0.0001	-2.30	2.20%		
Panel C - Carhart Four-factor Model					**1,063**	**6.64%**
- INTERCEPT ***	-0.1844	0.0523	-3.53	0.00%		
- RMRF **	0.1816	0.0921	1.97	4.90%		
- RMRF x HT	0.0357	0.1114	0.32	74.90%		
- SMB **	-0.3773	0.1782	-2.12	3.40%		
- SMB x HT	-0.1794	0.2154	-0.83	40.50%		
- HML ***	0.3660	0.1320	2.77	0.60%		
- HML x HT	-0.1069	0.1609	-0.66	50.70%		
- UMD	0.0496	0.0784	0.63	52.70%		
- UMD x HT	-0.0975	0.0936	-1.04	29.80%		
- WAM	0.0022	0.0035	0.64	52.50%		
- WAM x HT **	0.0110	0.0053	2.07	3.90%		
- WAM2	0.0000	0.0001	-0.02	98.10%		
- WAM2 x HT **	-0.0002	0.0001	-2.29	2.20%		

Table 4 shows the result of incorporating interaction terms to indicate the above-average turnover ratio group into the three-factor models. Among CAPM beta, size factor, value factor, and momentum factor, only coefficient of CAPM beta with the interaction term that is significantly different from zero is from *Panel A*, at 5% level, while there is no significant value in *Panel B* and *Panel C*. In this regard, *Panel B* and *Panel C* in *Table 4* show identical result when comparing with the same panel in *Table 3*, lower intercept's coefficients and CAPM beta's coefficients while size factor and value factor's coefficients are increased. This insignificant result suggests that those four risk factors, CAPM beta, size factor, value factor, and momentum

factor, have nonsignificant difference application to explain excess returns of property funds and REITs which have above- and below-average turnover ratio.

On another hand, asset duration factors without interaction term turn to be insignificant but asset duration factors with interaction terms are significant at 5% level. This reversion result aligns with the expectation per Hypothesis 2 that the coefficients of weighted average asset maturity with interaction term shall be a positive and significantly different from zero. Interestingly the coefficients of weighted average asset maturity squared with interaction term also result a significant difference from zero at 5% level. I expected a concave slope as it represents discounted cashflow, as one of the widely used valuation measures. This appears in only the above-average turnover ratio group as a representative of intuitional investors who are informed and sophisticated. And the result seems to confirm those properties in the above-average turnover ratio group.

Size factor continues its strong application with the largest absolute coefficient value among independent variables. Once more, there is no change for the momentum factor which still does not show its explainability. The adjusted R-squared is improved across all panel compared to *Table 3* while, again, the Fama-French three-factor model provides the highest adjusted R-squared among three-factor models at 6.71%.

6) CONCLUSION

Equity term structure of property funds and REITs in Thailand appears to be upward-sloping indicate that investors require compensation for holding a long investment horizon which is similar to the term structure of interest rates or bonds in normal macroeconomic conditions. This contradictory result suggests that property funds and REITs are attached with bond-like characteristic, more stable, less risky, but also less upside gain compared to stocks.

High turnover property funds and REITs show characteristics that align with the expectation that institutional investors are an informed party who tend to trade rationally. The result shows that the coefficient of CAPM beta and size premium are larger while the low turnover group has less coefficient value on size factor but more coefficient value on value factor. Interestingly that concave in equity term structure appears only in the high turnover group with a significant level at 1% while other tests result insignificant. The concave in slope represents the consideration by the discounted cash flow method as compounded discount factors will be penalized more and more for distant future cashflow.

The upward-sloping in equity term structure suggest to invest in property funds and REITs which have high asset duration and turnover ratio since funds which have 1 more year asset duration provide 1% more monthly excess return when holding other variables constant while the excess return per asset duration is declining when asset duration is higher. *Panel B* in *Table 3* also suggests that leasehold-based property funds and REITs in Thailand are quite similar to a portfolio that invests in 50% of large-cap stocks, 30% of high Book-to-Market value stock, and 20% cash but

with low CAPM beta of circa 0.22. This indication could benefit investors who are interested to invest in large stocks and high Book-to-Market value stock but would like to limit some risk from broad market movements. Momentum effect has nothing to do with property funds and REITs' excess returns in Thailand, unlike U.S. REIT per previous studies, as its coefficients are insignificant in all tests.

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