

INVESTOR'S HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF TAX SAVING MUTUAL FUNDS

Mr. Krittapon Chaleoykitti



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

A Thesis 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 2018
Copyright of Chulalongkorn University

ผลกระทบจากการมองย้อนกลับและความสามารถที่แท้จริงของนักลงทุนในกองทุนลดหย่อนภาษี



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

สาขาวิชาการเงิน ภาควิชาการธนาคารและการเงิน

คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2561

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

INVESTOR'S HINDSIGHT EFFECT AND TRUE TIMING A
BILITY OF TAX SAVING MUTUAL FUNDS



Mr. Krittapon Chaleoykitti

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

A Thesis 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 2018
Copyright of Chulalongkorn University

Thesis Title	INVESTOR'S HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF TAX SAVING MUTUAL FUNDS
By	Mr. Krittapon Chaleoykitti
Field of Study	Finance
Thesis Advisor	Assistant Professor Anirut Pisedtasalasai, Ph.D.

Accepted by the FACULTY OF COMMERCE AND ACCOUNTANCY,
Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of
Science

..... Dean of the FACULTY OF
COMMERCE AND
ACCOUNTANCY
(Associate Professor Pasu Decharin, Ph.D.)

THESIS COMMITTEE

..... Chairman
(Assistant Professor Pornpitchaya Kuwalairat, Ph.D.)

..... Advisor
(Assistant Professor Anirut Pisedtasalasai, Ph.D.)

..... Examiner
(Assistant Professor Kanis Saengchote, Ph.D.)

..... External Examiner
(Assistant Professor Nattawut Jenwittayaroje, Ph.D.)

CHULALONGKORN UNIVERSITY

กฤตพล เฉลยภักดี : ผลกระทบจากการมองย้อนกลับและความสามารถที่แท้จริงของนักลงทุนในกองทุนลดหย่อน
ภ ๑ ยี .

(INVESTOR'S HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF
TAX SAVING MUTUAL FUNDS) อ.ที่ปรึกษาวิทยานิพนธ์หลัก : ผศ. ดร.อนิรุต พิเศษฐศลาชัย

บทวิจัยเล่มนี้วิเคราะห์ความสามารถของนักลงทุนในการจับจังหวะการลงทุนมรดกกองทุนรวมทั้งกองทุนที่สามารถลดหย่อนภาษีไม่ได้และได้ซึ่งประกอบด้วยข้อจำกัดในการลงทุนเช่นระยะเวลาที่ไม่สามารถถอนเงินคืนได้ส่งผลให้นักลงทุนไม่สามารถจับจังหวะในการลงทุนได้หลังจากควบคุมด้วยผลกระทบจากการลงทุนตามผลตอบแทนในอดีต ที่วิจัยได้ใช้ตัวอย่างจากปี 2006 ถึง 2017 ที่วิจัยพบว่านักลงทุนไม่มีความสามารถในการจับจังหวะในการลงทุนส่งผลให้มีผลตอบแทนที่ต่ำกว่าที่ควรจะเป็น การที่มีข้อจำกัดในการลงทุนจากกองทุนลดหย่อนภาษีส่งผลให้นักลงทุนไม่สามารถจับจังหวะการลงทุนได้และทำให้มีผลตอบแทนที่สูงกว่าที่ควรจะเป็น ความผันผวนของการลงทุนส่งผลกับผลตอบแทนของนักลงทุนขึ้นอยู่กับว่านักลงทุนมีความสามารถในการลงทุนหรือไม่ สุดท้ายกองทุนที่มีขนาดใหญ่ส่งผลให้นักลงทุนจับจังหวะการลงทุนที่ยากขึ้น

ภาควิชา ภาควิชาการธนาคารและการเงิน

ลายมือชื่อนิสิต

สาขาวิชา การเงิน

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก

ปีการศึกษา 2561



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

6082902226 : MASTER OF SCIENCE

HINDSIGHT EFFECTS, TRUE TIMING ABILITY, TAX SAVING FUNDS, LONG TERM EQUITY FUNDS, RETIREMENT MUTUAL FUNDS

Krittapon Chaleoykitti :
 INVESTOR'S HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF
 TAX SAVING MUTUAL FUNDS. ADVISOR: Asst. Prof. Anirut
 Pisedtasalasai, Ph.D.

This paper analyze the cash flow timing ability of mutual fund investors both non-tax-saving and tax-saving funds which have constraints such as lock-up period to block investor's ability to make cash flow timing, after controlling for the hindsight effect. We analyze the sample of Thai mutual funds in the period of 2006-2017.

We find that investors have bad timing ability and make return underperformance. The tax-saving funds that have investment constraints to block investor's timing ability have better timing ability and tends to have smart money effect and make return over performance. In addition, volatility affect investors to increase the return under or over performance based on investors have smart or dump money effects. Lastly, large asset under management affects investors are hard to make cash flow timing.

Department: Department of Banking and Finance Student's Signature

Field of Study: Finance Advisor's Signature

Academic Year: 2018

จุฬาลงกรณ์มหาวิทยาลัย
 CHULALONGKORN UNIVERSITY

ACKNOWLEDGEMENTS

I would like to express my sincere thanks to my thesis advisor, Asst. Prof. Anirut Pisedtasalasai, Ph.D. for his teaching, advice and recommendation throughout my thesis project. Also, I would like to thanks to my committee, Asst. Prof. Pornpitchaya Kuwalairat, Ph.D., Asst. Prof. Kanis Saengchote, Ph.D. and Asst. Prof. Nattawut Jenwittayaroje, Ph.D. who give useful recommendation during my defense. Without their constant and kind supports, I would not have achieved this far and the project would not have been completed.

Finally, I gratefully acknowledgement my parents and my friends for all their support throughout the period of this project.

Krittapon Chaleoykitti



TABLE OF CONTENTS

	Page
ABSTRACT (THAI)	D
ABSTRACT (ENGLISH).....	E
ACKNOWLEDGEMENTS	F
TABLE OF CONTENTS.....	G
CHAPTER I INTRODUCTION.....	1
1.1 BACKGROUND AND MOTIVATION.....	1
1.2 RESEARCH QUESTION.....	4
1.3 OBJECTIVES & CONTRIBUTIONS.....	7
1.4 RESEARCH HYPOTHESES.....	11
1.5 ORGANIZATION OF THE PAPER.....	13
CHAPTER 2 LITERATURE REVIEW	14
CHAPTER 3 DATA AND METHODOLOGY	23
3.1 DATA DESCRIPTION	23
3.2 DATA SCREENING AND EXPLANATION	24
3.3 METHODOLOGY	29
CHAPTER 4 EMPIRICAL RESULTS	40
CHAPTER 5 CONCLUSION.....	64
REFERENCES	66
VITA.....	68

CHAPTER I

INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

Mutual funds have been a driver to boost the capital market in both developing and developed countries which are noticed by increase of several literatures studying mutual fund evidences such as Germany, Japan and United Kingdom ([1]), Jordan (Al-Jafari, Salameh, and Asil (2013)), Malaysia ([2]), Hong Kong (Kun Chu (2010)).

As the emerging market of Thai economy, the mutual fund industry has grown in the increasing rate. Compared with Thai gross domestic product (GDP), the asset under management (AUM) as percentage of GDP has growth from 2.61 to 32.37 percent in 1992 to 2017. In term of growth rate, the asset under management has grown at 18.83 percent compared with Thai gross domestic product at 7 percent in 1992 to 2016. In addition, the growth of asset management company has grown from 8 to 23 companies in 1992 to 2017 and number of funds has increased from 37 to 1,513 funds including both closed-end and open-ended funds in 1992 to 2017.

After the end of ASEAN crisis, tax-saving funds were announced by Thai government to stimulate the economy including Retirement Mutual Funds' (RMFs) and Long-term Equity Funds (LTFs) by offering many benefits such as working people tax deduction and give return greater than the interest from commercial banks. Not only boost the economy, the tax-saving funds are another types of investment which is proper with beginner investors who want to invest in capital market in the long term but lack of time and experience because the diversification by the expertise fund managers is not only one offered to investor but also provide the opportunity to learn the investment knowledge thought monitoring the fund managers. In addition,

the long-term investment helps reducing government's responsibility with future aging society by convincing people to invest by themselves. Therefore, this type of vehicle is another popular vehicle with high growth and contribute to Thai capital market. For Retirement Mutual Funds, the number of funds increases from 42 to 180 funds in 2002 to 2017 and the asset under management increase from 2.84 to 251.44 billion baht in 2002 to 2017 or about 34.85% growth per year. For LTFs, the number of funds increases from 22 to 83 funds in 2004 to 2017 and the asset under management increase from 5.63 to 397.13 billion baht in 2004 to 2017 or about 38.73% growth per year. At the end of 2017, tax-saving funds contribute 3.69 percent of total Thai stock market and tend to increase every year.

Compared with general mutual funds and hedge funds, tax deduction benefits are not the only different characteristic of tax-saving funds. They also have different investor types, benefits, complicated investment condition and violations. Firstly, compared with other type of funds, tax-saving fund investors tend to have lower knowledge and experience. The main investment purpose is the retirement planning and the tax-deduction benefits up to the level of incomes. Secondly, the investors care less about the total return as the investment return does not only come from the capital gain and the dividend as same as general mutual funds but also come from the immediate tax benefit returns which increase by the level of taxable income. For example, people who have taxable income more than 5 million baht and invest in long term equity funds can get the immediate tax returns about 35 percent, according to 2017 Thai tax regulation. Those affects the investors do not care much about the capital gains and dividends. Thirdly, tax-saving funds are not able to invest in any types of investment universe. Due Thai regulation, long term investment funds are

only allowed to invest in listed common stock and retirement mutual funds are only allowed to invest more varieties of asset classes including fixed-income, listed equities and others such as commodities. Fourthly, there are minimum investment and maximum investment. For long term equity funds, there is no minimum investment but limit the maximum investment at 500,000 baht. For retirement mutual funds, the minimum investment is the larger of 5,000 baht of 3 percent of taxable income and the maximum investment is 500,000 baht which needed to be summed with provided funds and government retirement funds. Fifthly, tax-saving funds have lock-up periods which are the period that the investors are not allowed to withdraw capital early which are 7 calendar year for long term funds and 5 year minimum investment and older than 55 years old for retirement mutual funds. Lastly, in case that investors want to withdraw capital early, the violation is served by returning all tax deduction benefit plus interest.

Although getting the tax deduction benefit, some investors still care about the return from capital gain and dividends. Most investors believe that the total returns come from fund manager ability to manage the assets effectively but they do not notice that most of investors get lower return fund manager do, according to Gruber (1996) and [3] studies. The real investor returns do not only come from the fund manager ability but come from investor ability to invest more and withdraw capital from predicting the future fund performance which is called investor timing ability. If investors can get the total return more (less) than fund return, they are called good (bad) timing ability. However, most investors invest (withdraw) more before the funds making bad (good) performance which shows bad timing ability.

To study the investor timing ability, there are many vast paper in the mutual fund timing ability fields. Start with [4] study finds that the fund return do not indicate the actual investor return due to the timing and the magnitude of the cash flows in to securities. He also finds that cash flow-weighted return indicating the actual returns and the actual investors return are mostly lower than the buy-and-hold strategy. After that, there are many consistent studies with [4] such as [5] and [6]. [7] applied with the mutual funds evidence and find the impacts to timing ability. In addition, [8], [9] and Munoz applied with hedge funds, Taiwan equity funds and US socially responsible funds respectively.

Most of previous studies used performance gap (i.e. the different between cash flow weighted return and geometric return.) as the proxy of investor timing ability. With [10] study finds that the performance gap does not only show the pure investor true timing ability but also include the hindsight effect (i.e. the effects that investors buy because of fund good past performance but not the ability to predict the future return.). Therefore, he derived the method to separate these two effects but there has only [11] which applies Hayley method with US equity funds evidence. In addition, the tax saving funds have more complicated investment conditions such as different type of investors, tax-deduction benefits and lock-up periods which tends to have different effects to investor's true timing ability compared with general equity funds.

1.2 RESEARCH QUESTION

In this research, we focus on 3 research questions.

“Do Thai mutual fund investors have timing ability underperformance?”

We study all Thai mutual fund investor's timing ability by using Hayley (2014) method to derive investor's timing ability.

“Do investment constraints in tax-deduction funds affect investor's investment decision?”

We also study whether the constraints in tax-deduction fund such as lock up period will affect the investor's timing ability.

“Which determinants affect investors to have more investor's timing under-performance or over-performance?”

We study the fund characteristics which affect the investor's ability including investment condition, investment types, fund's age, fund's size, expense ratio, turnover ratio, level of cash flow, volatility, fund return and its loading factors.

Therefore, we can conclude the scope of the study as below

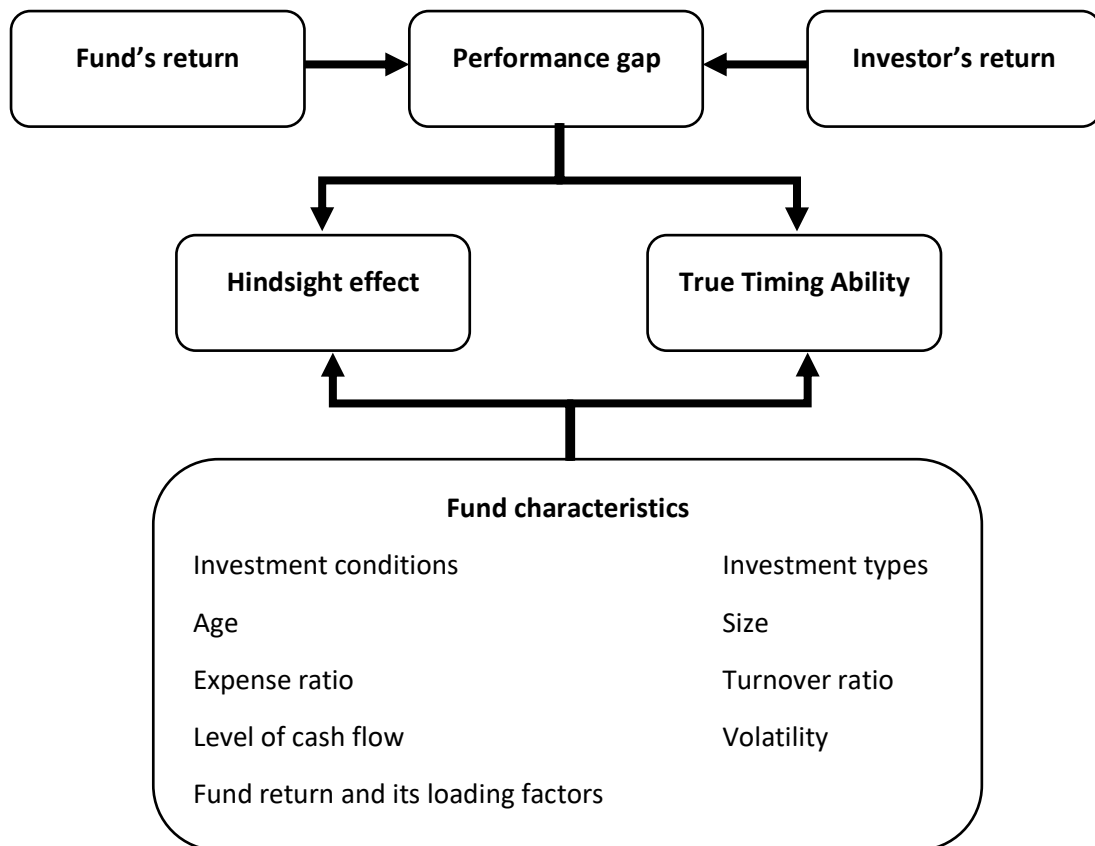


Figure 1 Scope of study

The scope of this research is to study the constraints in tax-deduction funds affect investor's investment decision with the Thai mutual fund sample. The tax-deduction has more investment constraints such as lock-up period than non-tax-saving funds which will affect to the investor ability to make timing decision. The investor ability is measured by the difference between fund's real return and investor's real return which is called performance gap. Then, [10] finds that the performance gap is affected by hindsight and true timing effects. In addition, we analyze the fund characteristic which affect the investor's ability including investment condition, investment types, fund's age, fund's size, expense ratio, turnover ratio, level of cash flow, volatility, fund return and its loading factors.

1.3 OBJECTIVES & CONTRIBUTIONS

This research paper expands [11] study of US equity mutual fund evidence with tax-saving fund evidence which has more complicated investment condition than general mutual funds. Although our paper focus on tax-saving fund evidence, we also study the investor's true timing ability in Thai general mutual funds due lack of researches which study true timing ability of investors in Thai general mutual fund evidence.

1.3.1 To study the performance gap, hindsight effect and true timing ability of investors in Thai mutual funds.

According to [10], the study finds that performance gap can be adjusted into hindsight effect and true timing ability. Therefore, we want to study these effect with Thai mutual funds. The method used is adopted from [10] with both tax-saving and non-tax-saving. Firstly, the geometric returns and cash flow-weighted returns are calculated and find the performance gaps. Then both hindsight effects and true timing ability are separated before using t-test and Wilcoxon to test whether there are statistical significance.

1.3.2 To compare between true timing ability and hindsight effects of Thai mutual funds.

According to [10], the study finds that investors invest because of the past return more than the previous return with US mutual funds. Therefore, we want to study these effect with Thai mutual funds. To compare between true timing ability and hindsight effects, the data of timing ability and hindsight effects from hypothesis 1 are used. Both tax-saving and non-tax-saving funds are compared the hindsight effect and true timing ability by using t-test to find whether there are statistically significance.

1.3.3 To study the performance gap, hindsight effect and true timing ability of investors in different investment types of Thai mutual funds.

According to [11] study, they find that funds with different investment types have different effect to performance gap, true timing ability and hindsight effects. To study the true timing ability in different type of funds, the data of timing ability and hindsight effects from hypothesis 1 are used. Firstly, I separate both tax-saving and non-tax saving into types of funds including fixed income, equity and allocation (i.e. using the data from Morningstar database). The commodity fund are not studied due to small size of sample. Then, I use t-test and Wilcoxon from hypothesis 1 to study whether there still have statistically significance true timing ability in every type of funds.

1.3.4 To compare the performance gap, hindsight effect and true timing ability of investors between tax-saving funds and non-tax-saving funds with the same fund types.

According to [12] study about investor's dump money effect, they find that investor have bad ability to do market timing. Therefore, we want to study that whether timing constraints in tax-saving funds will affect investor's timing ability. To compare the true timing ability of investors between tax-saving funds and non-tax-saving funds, the data of timing ability and hindsight effects from hypothesis 1 and 2 are used. Both tax-saving and non-tax-saving funds with same types of investment are compared by using t-test to test whether there are statistically significance.

1.3.5 To study the impacts of the performance gap, true timing and true timing ability of investors by expense ratios, turnover ratios, ages, size, expense, turnover, level of cash flow, volatility of return and a measure of overall performance with Thai mutual funds by using regression.

To study impact each determinants, both tax-saving and non-tax-saving funds' true timing ability and hindsight effects are run in the models to find the impacts from determinants by using regression models. Four-factor model is used due to higher ability to capture excess return than CAPM and 3-factor model (Nicklas (2016) study). Also, the result from using 3 and 4 factor models give the same result by [7] study. Firstly, 4-factor models are run and loading factors, alpha and standard deviation of tracking error are obtained. Then, we run the regression in 2 models to find impact from determinants before t-test is used to find whether there are statistically significance.

To create contribution to academic research, we are the first paper which not only expand [11] study which adopt [10] method to separate true timing ability and hindsight effect with Thai mutual fund industry but also study the tax-saving funds which have more complicated investment conditions such as different type of investors, tax-deduction benefits and lock-up periods. Secondly, we study in more deeply the true timing ability by each types of funds. Thirdly, we study Thai investor behavior whether their underperformances come from hindsight effects or true timing ability. Fourthly, we analyze the different hindsight and true timing ability between tax-saving funds and non-tax saving funds. Lastly, the regression models are used to find the impacts of ages, size, expense, turnover, level of cash flow, volatility and a measure of overall performance to the true timing ability and the hindsight effects.

Not only contributing in term of academic but also creating in term of practical. As researcher observation, most of financial advisors used fund returns or asset class returns as the proxy of investor ability to make return but mostly they do underperformance by literatures. For example, a client wants to retire with 100 millions baht in 20 years. Assuming that SET return average is 12% and thus the financial planner will advice the clients to save 101,086.13 baht per month. However, the problem occurs when the clients save 101,086.13 baht monthly but they are underperformed by 2 percent under indexes and the client will have 76.76 million when he retires which is less than expectation by 23.24%. Therefore, this research paper helps financial advisors to create more accurate plans to clients.

1.4 RESEARCH HYPOTHESES

1.4.1 There are statistically significant performance gap, hindsight effect and true timing ability underperformance in both tax-saving funds and non-tax-saving funds.

According [13] and [3] studies, they find that investors tend to have dumb money effects which do underperformance compared with fund returns. Therefore, we expect that there are the true timing ability underperformance in both tax-saving funds and non-tax-saving funds.

1.4.2 There are statistically significant more effects from hindsight effects than true timing ability in performance gap in both tax-saving funds and non-tax-saving funds.

According to [10] study, he finds that investors mostly invest more because of the confidence that the previous good fund performance will continue to perform well in the following period. Therefore, I expect that there are more hindsight effects more than the true timing ability.

1.4.3 There are statistically significant performance gap, hindsight effect and true timing ability underperformance in each type of investment funds in both tax-saving funds and non-tax-saving funds.

According to [11] study, they find that the true timing ability occur in every type of funds. Therefore, we expect that there still have significant true timing ability underperformance in every type of investment funds.

1.4.4 There are statistically significant worse performance gap, hindsight effect and true timing ability underperformance in both tax saving funds more than non-tax-saving funds.

According to more complicated investment conditions such as different type of investors, tax-deduction benefits and lock-up periods in tax-saving funds that reduce the ability to manage the fund flow effectively which mostly investors have dumb money effect[12]. Therefore, we expect that tax-saving funds will have better true timing ability underperformance than non-tax-saving funds.

1.4.5 There are statistically significant ages, size, level of cash flow, expense ratios, turnover ratios, volatility of return and measure of overall performance have positive relationship with investor's performance gap, hindsight effect and true timing ability underperformance in both tax saving funds and non-tax-saving funds.

According to Tony [9] study, we expect that ages, size, volatility of return and measure of overall performance will have positive relationship with investor's true timing ability underperformance in both tax saving funds more than non-tax-saving funds. Firstly, the investors in funds with more ages tend to perform more true timing ability underperformance due dumb money effects. Secondly, the size shows the lower ability to manage fund flow effectively and investor in larger size of funds tend to have more true timing ability underperformance. Thirdly, due to investors have dumb money effects, the higher level of cash flow tends to have more true timing ability underperformance. Fourthly, according to [11] study, investors in fund with lower mean net expense ratio have less true timing ability underperformance compared with higher mean net expense ratio and lower fund's turnover ratios have

less true timing ability underperformance. Fifthly, the volatility of return affects investors be harder to predict the fund performance and we expect that higher volatility tend to have more true timing underperformance. Lastly, the return-chasing can be costly endeavor, in well-perform funds which the investors tend to perform more underperformance with the well perform funds.

1.5 ORGANIZATION OF THE PAPER

Chapter 1 explains background and motivation, research question, objective and contribution and research hypothesis.

Chapter 2 explains the past literatures about investor's timing ability studies, how the performance gap and hindsight effect are found.

Chapter 3 explains data description and screening which show how we select the data sample, explanation and screening the data. Also, we include the methodology or the method used to find the result following the objectives.

Chapter 4 describes the result and finding we get in each objectives.

Chapter 5 concludes the result of the study and offer recommendation for improvements to this work.

CHAPTER 2

LITERATURE REVIEW

In the past, there are many studies that attempt to analyze the investor timing ability among stocks, mutual funds and alternative investment such as hedge funds to draw a conclusion on whether investors have smart timing ability which means they can manage cash flow to make superior return when funds can make positive returns and withdraw back when funds tend to make negative returns. In addition, many literature further studies which types of fund which investors have more good timing ability. Also, they study the causes which affect the timing ability of investors.

In this section, we aim to give you an overview of past literature with respect to the past literatures about investor's timing ability studies, how the performance gap and hindsight effect are found.

2.1 INVESTOR TIMING ABILITY

Investor timing ability is the ability of investor to manage the cash flow to invest more before funds making positive performance and quit before funds making negative performance which makes investors get superior returns than fund managers do.

To study investor's timing ability, the literature starts by "Smart or Dump money" effects which there are many studies including [13], Aheng (1999), [14], Keswani and Stolin (2008). Gruber try to study that the active manager cannot add value to investors because there is costs of investors to follow. He finds that the evidence that the group of sophisticated investor can identify and invest in the out performing funds and he call this phenomenon as "Smart money effect". After that

Aheng (1999) confirms the study and shows the evidence that the fund with positive new money flow significantly outperform the negative new money fund flows and the new flow into the small greater than bigger funds can be used to make risk-adjusted returns. In addition, [14] assign the outperformance to the momentum effect (Jegadeesh and Titman (1993)) and find that the smart money effect is a return continuation. In 2008, Keswani and Stolin re-study the smart money effect by use the data set from US and find the evidence that the new money portfolio weighted by inflows is significantly beat the portfolio weighted by outflow. They also show that the smart money effect in UK appear with the fund buying only (not selling) of both individual and institutional investors. They finally find the insignificant of smart money effect in [14] to use of quarterly data weight. In 2014, Feng et. Al has studied the smart money effect by separate the group of investor in institutional investor and individual investor. They find the evidence in China that institutional investors are the smart investor and the individual investors are the dumb investors.

2.2 PERFORMANCE GAP

According to pros and cons of using geometric versus fund flow-weighted returns by Zvi Bodies et al. (1996), [4] examines the sample of 19 major international stock exchanges and find that security returns doesn't show the investor's return due the different if timing and magnitude of investor fund flows into the securities. This indicates that fund flow-weighted average reflects the effects of capital flows more accurate that geometric. The result indicates that actual investor returns are systematically lower than buy-and-hold returns. He also tests the correlation of the distribution and contribution of investors with the past stock return and future return

of the major exchanges and finds that there are negative relationship between past return and the distribution and positive relationship between future return and the distribution which indicates that investor invest more after the stock appreciation and withdraw before the stock declining which indicates investors decrease their return by fund flow timings. In addition he finds that historical equity premium and the cost of equity are lower than previous thought due the manager raises the capital when the prices are high and redeem the capital when the prices are low which investors cannot observe this behavior as long as the stocks are attractive on a risk-adjusted return basis (Baker and Wurgler (2000)). Further research by Nesbitt (1995) suggests that investor's fund flow-weighted average returns are 1.08% less than geometric returns for the sample of 17 categories of mutual funds over the 1984-1994 period. Also, Braverman et al. (2005) finds that annual fund flow-weighted return is significantly lower than the geometric return over multiple time periods for mutual fund evidence.

In the area of mutual fund studies, [7] study the timing ability of mutual funds investors using fund flow data at the individual level for the sample of 7,125 funds equity mutual funds over 1991-2004 and find that investor's decisions reduce average return by 1.56% annually. He finds that growth-oriented funds tend to have performance gap greater than income-oriented funds. Also, he finds the relationship between performance gap with 3-factor alpha ([15]) and 4-factor alpha[16]) and find that there are negative relationship between performance gap and the alphas which funds with higher positive alpha tends to have significantly lower performance gap. Furthermore, he studies the determinants of the performance gaps and finds that the size of performance gap increases in funds load fees, turnover and the age of funds. He also examines separately the fund flow-weighted returns on positive and negative

fund flows and finds that bad investor withdrawal decisions hurt investors more than poor purchase decisions which are consistent with [17] which investors withdraw money after negative returns which irrationally selling assets that are in fact undervalued.

To understand the concept and theory of [7], we conclude the theory as below:

Geometric returns are used as proxy of fund returns which the returns following the buy-and-hold strategy which investors buy and hold over the horizontal period. Fund flow-weighted returns are used as proxy the investor's real returns that show investors ability to predict the future fund performance. Therefore, we call the gap between geometric and fund flow-weighted returns that "performance gap" or "timing ability".

To understand how the performance gap occurs between fund flow-weighted average and geometric returns. Consider the following investment situation, an investor buys a funds (100 units) at 100 baht per unit at time 0. Following the figure 1, the initial investment is 10,000 baht. If the return is 100% in the first year, the investor will have 20,000 baht at time 1. After that the investor biasly predict that the next year return will equal to this year and they invest more 20,000 baht. So, they have 40,000 at the beginning of year 2. However, the return in year 2 drops by 50%. The investors have 20,000 left in the portfolio. When we use geometric mean (buy-and-hold return), we get 0% return. But if the fund flow-weighted return is used, we get -27% return. This is called "bad timing ability" or "dumb money" investors.

In the same situation as above (following figure 2), if the year 1 return become -50% return and year 2 return is 100% return. Also, investors invest more 20,000 baht

at the end of year 2. Therefore, they will have 50,000 baht left in the end of year 2. When we use geometric mean (buy-and-hold return), we also get 0% return. But if the fund flow-weighted return is used, we get 45% return. This is called “bad timing ability” or “dumb money” investors. This is called “good timing ability” or “smart money” investors.

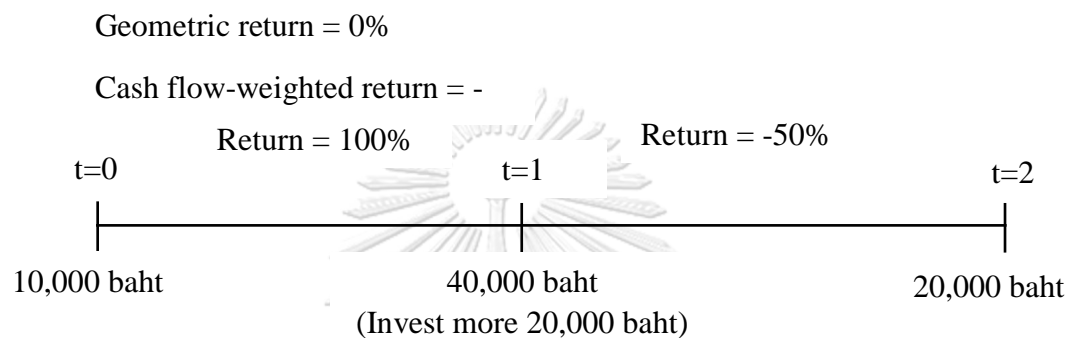


Figure 2 Bad timing ability or dumb money effects

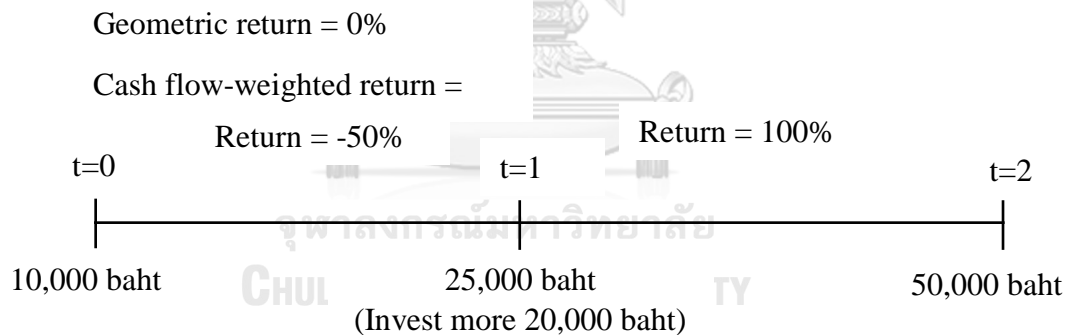


Figure 3: Good timing ability or smart money effects

According to the both cases, we can notice that investor ability to predict the future returns affect the “smart money” or “dumb money” effects. According [12] and [3] studies, they find that many investors have smart money effects in the short term but dumb money effect in the short term because investors tend to buy the assets after the price has gone up with the expectation that the price will continue growing up. However, the price mostly have already overvalued and the investors have bad ability

in the long term. In addition, we can notice that the geometric return is the return of manager ability to generate the fund profit, but the fund flow-weighted return affects the real investor return because it adjusts with the contribution and withdrawal by investors.

Table 1: The weighted return adjustment of fund flow-weighted returns.

	1	2	3	4	5	6	7	8	9	10
1. No any change.	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10	1/10
2. Invest more after period 1.	1/19	2/19	2/19	2/19	2/19	2/19	2/19	2/19	2/19	2/19
3. Invest more after period 9.	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11	2/11
4. Withdrawal in period 2.	2/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11	1/11

To understand more about the weighted-dollar return, following table 1, we present that how the weights are adjusted in the fund flow-weighted average after investor's contribution and withdrawal. In the first case, assuming investors have no change of portfolio (ie. They buy and hold until period 10.). We can notice that the weights are equal in every period and the geometric return and fund flow-weighted return are equal. In the case 2, we assuming that investors double invest more at the end of period 1, we can notice that the weights after period 1 are double from the period 1 due to the capital inflow. In the case 3, we assuming that investors double invest more at the end of period 9, we can notice that the weights are doubled after in the period 10 but no change in the period 1 to 9. In the last case, we assuming that investors withdraw a half at the end of period 1, we can notice that the weight of the period 1 double of the period 2 because of the money outflow.

After that, there are many studies which adopt [7] approach with the different sample. [8] use fund flow-weighted returns to analyze the properties of actual investor returns on hedge funds and compare with geometric return. The result shows that the return experience of hedge fund is worse than the previous thought which fund flow-weighted returns are 3% to 7% lower than geometric returns. He also uses factor models of risk including 3-factor model ([15]) and 8-factors model ([18]) and the fund flow-weighted performance gap and finds that real alpha of hedge fund investors is close to zero. He also finds that hedge funds with higher fees tend to have lower performance gap. In addition, he studies the causes the different fund flow-weighted and buy and hold returns from time-series and cross sectional effects and find that time-series effect is always between 50% to 75% of the total fund flow-weighted effects.

[9] also studies with the sample of 200 domestic equity mutual funds in Taiwan in the period 1996 and 2009 and find that the funds that have good (bad) in the previous year tend to perform good (bad) in the following year and the investor's timing ability is negatively with fund performance. He also studies the relationship with fund's characteristics and finds that the timing ability has negative relationship related to fund size, age, momentum-style of funds but positive with value-style funds which shows the investors are loss-averse and demonstrate return-chasing behavior in good performance funds. He still further studies the determinant of timing ability and finds that the performance gap increases when fund size, fund age, raw return, and 4-factor model ([16]) increases.

Munoz studies with the sample of 194 US socially responsible mutual funds in the period of 1991-2015 and finds that investors neither decrease nor increase the returns by fund flow timing decisions, although they show good timing for net purchase and perverse timing for net withdrawal decisions. He also controls for the characteristics and finds that the funds with larger, institutional, with longer manager tenure, low expense ratio, no load, low turnover ratio and low management fee show better timing ability. In addition, sophisticated and better informed investors make better fund flow timing ability. When controlling for SR strategy, green fund investors had the worst ability and the religious fund investors had the most different ability from the conventional investors.

2.3 HINDSIGHT EFFECT AND TRUE TIMING ABILITY

However, the performance gap between fund flow-weighted returns and geometric returns do not show the real investor's timing ability because there is also relationship between past performance and the distribution or contribution of investors,[10]. He finds the hindsight effects are the effects that investors make contribution or withdrawing from funds up to the past performance which is different to investor's timing ability to predict the future good fund's returns. He derived the method to separate these two effects (Hindsight and timing ability effects). The result finds that bad timing ability accounts very little of the overall different geometric and fund flow-weighted returns with the sample of US equities trades on NYSE and AMEX exchanges. The great majority is just due to the hindsight effect. He finds that investors buy funds after making good performance and sell funds that make bad performance.

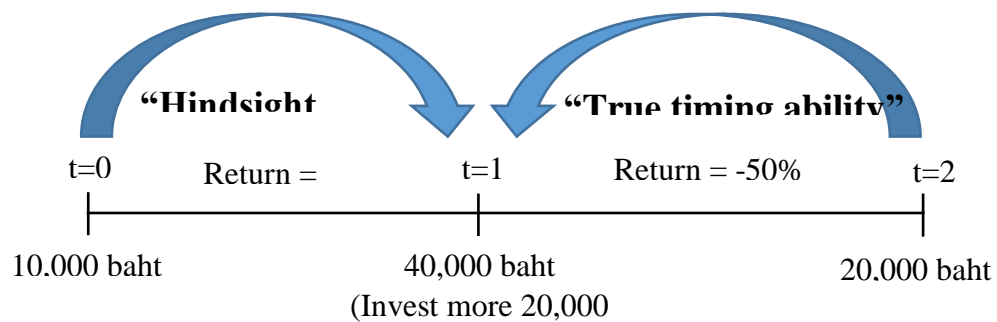


Figure 4: True timing ability and hindsight

[10]study find that the performance gap does not only show the true timing ability but hindsight effects are also included. He find that the performance gap have two simultaneous effects, which both decrease fund flow-weighted returns. Firstly, the decrease in weight before the return increases later (true timing ability effects). Secondly, the decrease in weight after the bad previous fund performance (hindsight effects). For example, from figure 3, the investors do underperformance by 23 percent (i.e. the geometric return is 0 percent and cash-flow weighted is -23 percent) which show investors have bad true timing ability due they invest more 20,000 baht in time 1 because of the good previous fund performance but the following funds do the bad performance in the following time.

In term of mutual fund study, [11]follow [10] approach with the 6,056 sample of US domestic equity mutual funds in the period of 1990-2016. The result find that mutual fund investor timing ability affects returns by 1.80%. When controlling for the hindsight effect, the actual prejudice is 0.71% annually. He also further studies the characteristics of funds and finds that more sophisticated and informed investors have better timing ability. Ho also finds that the hindsight effect have more relevant to less sophisticated investors and the incubation bias do not significantly affect the results.

CHAPTER 3

DATA AND METHODOLOGY

3.1 DATA DESCRIPTION

To examine the investor's timing ability, we use a sample of Thai domestic mutual funds in the period of January 2006 – December 2017. The data are obtained from Morningstar database. Therefore, we get the sample of 1,035 funds including 77 LTFs and 179 RMFs funds which we obtain the additional information about monthly unit prices, monthly total asset values, investment style allocated by Morningstar and AIMC, turnover ratios and net expense ratios.

Turnover ratio is the percentage of a mutual fund have been replaced in a given period. For example, a mutual fund invests in 100 stocks and replaces 50 stocks during one year and thus the turnover ratio is 50%.

$$\text{Turnover ratio} = \frac{\text{Total amount of new securities}}{\text{Total net asset value}} \quad (1)$$

Net expense ratio is the measurement of fund's cost from fund's expense divided by the total asset under management.

$$\text{Net expense ratio} = \frac{\text{Total expense raio}}{\text{Total net asset value}} \quad (2)$$

Also, we use a sample of Thai domestic common equities in the period of January 2006-December 2017. The data are obtained from Bloomberg database. We also exclude from the sample the funds with fewer than 12 month observations. Therefore, we get 548 stocks which we also obtain the additional information about monthly total return, total market capital and price to book value.

In addition, we use a sample of Thai BMA 1-month T-bill rate in the period of January 2006-December 2017. The data are obtained from Bloomberg database. Therefore, we get the average rate is 2.34 percent annually.

3.2 DATA SCREENING AND EXPLANATION

3.2.1 MUTUAL FUND SCREENING AND EXPLANATION

To screen the mutual fund data, we eliminate the observation that have net asset value and fund's return less than 12 period or 1 year.

Table 2 reports the main descriptive statistics of our mutual funds sample which displays the mean, median, twenty-fifth percentile, seventy-fifth percentile and standard deviation of the total net assets, fund ages, average returns, turnover ratios, net expense ratios and Morningstar ratings which we separate in to Panel A-F following the tax-deduction benefits.

Table 2: Mutual fund's data explanation.

Explanation of fund's sample data separated into all Thai mutual funds, non-tax-saving fixed income funds, non-tax-saving allocation funds, non-tax-saving equity funds, tax-saving fixed income funds, tax-saving allocation funds and tax-saving equity funds.

	Mean	Median	25 th percentile	75 th percentile	Standard Deviation
Panel A: All Thai mutual funds (1,008 funds)					
Total net assets (\$ millions)	2,257.89	382.80	129.56	1,218.78	9,074.00
Age (months)	93.01	72.23	31.40	140.36	70.59
Monthly return (%)	0.54%	0.44%	0.17%	0.96%	0.53%
Turnover ratio (%)	411.33	237.11	120.19	472.45	501.06
Net expense ratio (%)	1.47%	1.37%	0.94%	1.91%	0.80%
Panel B: Non-tax-saving fixed income funds (138 funds)					
Total net assets (\$ millions)	9,984.65	1,760.88	656.50	7,812.26	22,412.11
Age (months)	100.16	82.68	48.13	150.37	68.36
Monthly return (%)	0.19%	0.17%	0.14%	0.23%	0.12%
Turnover ratio (%)	843.07	622.83	233.22	1,226.53	826.13
Net expense ratio (%)	0.67%	0.49%	0.40%	0.93%	0.41%
Panel C: Non-tax-saving allocation funds (105 funds)					
Total net assets (\$ millions)	1,471.35	408.97	151.51	1,142.78	3,110.44
Age (months)	93.39	63.20	30.67	146.37	76.53
Monthly return (%)	0.53%	0.44%	0.29%	0.74%	0.33%
Turnover ratio (%)	357.61	257.40	158.77	421.58	323.96
Net expense ratio (%)	1.59%	1.37%	1.15%	1.96%	0.71%

	Mean	Median	25 th percentile	75 th percentile	Standard Deviation
Panel D: Non-tax-saving equity funds (321 funds)					
Total net assets (\$ millions)	901.55	342.60	136.16	917.31	1,629.31
Age (months)	102.52	70.97	34.63	150.93	82.84
Monthly return (%)	0.85%	0.93%	0.50%	1.13%	0.49%
Turnover ratio (%)	280.41	193.52	111.72	301.27	337.43
Net expense ratio (%)	1.67%	1.74%	1.29%	1.98%	0.53%
Panel E: Tax-saving fixed income funds (47 funds)					
Total net assets (\$ millions)	977.43	207.56	79.74	964.44	1,667.30
Age (months)	143.97	180.13	109.15	185.07	56.73
Monthly return (%)	0.17%	0.17%	0.14%	0.19%	0.06%
Turnover ratio (%)	878.46	740.93	370.89	1,205.70	579.00
Net expense ratio (%)	0.84%	0.83%	0.61%	1.02%	0.33%
Panel F: Tax-saving allocation funds (28 funds)					
Total net assets (\$ millions)	896.70	119.31	32.86	868.81	1,792.29
Age (months)	114.99	133.05	61.06	181.44	65.27
Monthly return (%)	0.71%	0.75%	0.38%	1.05%	0.39%
Turnover ratio (%)	372.10	341.00	238.77	399.96	252.60
Net expense ratio (%)	2.04%	1.81%	1.34%	2.05%	1.82%
Panel G: Tax-saving equity funds (147 funds)					
Total net assets (\$ millions)	1,585.43	245.76	61.60	1,214.80	3,723.41
Age (months)	85.22	61.93	25.75	147.85	61.84
Monthly return (%)	0.92%	0.94%	0.67%	1.11%	0.45%
Turnover ratio (%)	313.16	236.01	118.18	425.80	270.08
Net expense ratio (%)	1.91%	1.89%	1.65%	2.10%	0.63%

Panel A displays all of the Thai mutual funds including 1,035 funds which the average total net assets are 2,493.54 million baht, the average ages are 7.69 years, the average monthly returns are 0.53%, the average turnover ratios are 423.26, the net expense ratios are 1.46% and the average Morningstar ratings are 3.02.

Panel B displays all of the Thai LTFs funds which all of them invest in equity instruments including 77 funds which the average total net assets are 2,232.85 million

baht, the average ages are 8.46 years, the average monthly returns are 1.01%, the average turnover ratios are 360.90, the net expense ratios are 1.87% and the average Morningstar ratings are 2.87.

Panel C displays all of the Thai RMFs funds which all of them invest in equity instruments including 83 funds which the average total net assets are 640.49 million baht, the average ages are 5.90 years, the average monthly returns are 0.79%, the average turnover ratios are 237.73, the net expense ratios are 1.9% and the average Morningstar ratings are 2.92.

Panel D displays all of the Thai RMFs funds which all of them invest in fixed income instruments (i.e. Treasury bills, corporate bonds, etc) including 47 funds which the average total net assets are 867.33 million baht, the average ages are 12.09 years, the average monthly returns are 0.18%, the average turnover ratios are 857.55, the net expense ratios are 0.88% and the average Morningstar ratings are 2.62.

Panel E displays all of the Thai RMFs funds which invest in equity instruments with aggressive investment strategy including 36 funds which the average total net assets are 665.07 million baht, the average ages are 9.37 years, the average monthly returns are 0.62%, the average turnover ratios are 316.66, the net expense ratios are 1.63% and the average Morningstar ratings are 3.11.

Panel E displays all of the Thai RMFs funds which invest in equity instruments with aggressive investment strategy including 36 funds which the average total net assets are 665.07 million baht, the average ages are 9.37 years, the average monthly returns are 0.62%, the average turnover ratios are 316.66, the net expense ratios are 1.63% and the average Morningstar ratings are 3.11.

Panel E displays all of the Thai RMFs funds which invest in equity instruments with aggressive investment strategy including 36 funds which the average total net assets are 665.07 million baht, the average ages are 9.37 years, the average monthly returns are 0.62%, the average turnover ratios are 316.66, the net expense ratios are 1.63% and the average Morningstar ratings are 3.11.

When we compare non-tax-saving and tax-saving funds with the same type of funds, we find that non-tax-saving fixed income and allocation funds have higher average fund's size but lower for equities funds. The returns of tax-saving allocation and equity funds have higher average return but lower for fixed income funds. In addition, tax-saving funds have higher expense ratio in every types of funds.

3.2.2 SET INDEX STOCK SCREENING AND EXPLANATION

Table 2 reports the main descriptive statistics of our mutual funds sample which displays the mean, median, twenty-fifth percentile, seventy-fifth percentile and standard deviation of the average return, book to market return and average market capital of the stock sample.

Table 3: Stock data explanation.

Explanation of stock's sample including mean, median, 25 and 75 percentile and standard deviation.

	Mean	Median	25th percentile	75th percentile	Standard Deviation
Average return (%)	1.38%	1.36%	0.69%	2.11%	2.23%
Book to market ratio (Times)	0.89	0.78	0.48	1.17	0.55
Average market capital (Millions)	20,531.97	3,823.15	1,540.52	12,202.75	63,635.78

We can see that the average return is 1.38% monthly, the average book to market is 0.89 times and the average market capital is 20,531.97 million baht. Also, we find that stocks with higher return have higher book to market ratio but they have lower market capital because the small stock tends to have higher return and volatility by the literatures.

3.3 METHODOLOGY

To understand the investor's timing ability, we adapt the methodology from [10] to adjust the hindsight effect and true timing ability. In this section, we will explain how we find the result by each objectives.

3.3.1 OBJECTIVE 1: TO STUDY THE PERFORMANCE GAP, HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF INVESTORS IN THAI MUTUAL FUNDS.

To study the true timing ability of investors in Thai mutual funds, we need to find true timing ability. Both tax-saving and non-tax-saving funds are used the methods adopted from [10] study. Firstly, the geometric returns and fund flow-weighted returns are calculated and find the performance gaps. Then both hindsight effects and true timing ability are separated before using t-test and Wilcoxon to test whether there are statistical significance.

3.3.1.1 CALCULATING THE GEOMETRIC RETURN (BUY-AND-HOLD STRATEGY)

Geometric returns are the return earned by investors following the stick buy-and-hold strategy with no contribution and withdrawal.

$$r_G = \left(\prod_{t=1}^T (1 + r_{i,t}) \right)^{1/T} - 1 \quad (3)$$

Where r_G is geometric mean return (%), $r_{i,t}$ is the fund's return in the period t and T is the total number of period.

3.3.1.2 CALCULATING DOLLAR-WEIGHTED RETURNS (REAL INVESTOR RETURNS)

Dollar-weighted returns (referred to in other contexts as internal rate of return (IRR)) are the returns earned by average investors following the real withdrawal and contribution to the funds.

According to [4] approach, the net withdrawal and contribution by the investors can be derived from the surplus and deficit of total net asset. In any period, the distribution is the difference between the total net asset and the previous total new asset applied by the monthly rate of return, assuming the distribution and contribution are made at the end of month. The positive distribution shows the withdrawal and the negative distribution shows the contribution to subscribe new investment units.

$$NCF_t = TNA_{t-1}(1 + r_t) - TNA_t \quad (4)$$

Where NCF_t is the net withdrawal or contribution by investors (Baht), TNA_t is the total net asset in the period t (Baht) and r_t is the return in the period t (%).

This approach for deriving distribution or contribution has several important advantages. First, it is simple and easy to use. Second, it has minimal data requirements. Lastly, it automatically adjusted for all possible capital contributions and distributions, with no need to identify their specific components.

From equation (2), then we can compute dollar-weighted return by the present value of future fund flows and the final liquidation value will equal to the initial investment.

$$TNA_0 = \sum_{t=1}^T \frac{NCF_t}{(1 + r_{i,DW})^t} + \frac{TNA_T}{(1 + r_{i,DW})^T} \quad (5)$$

Where $r_{t,dw}$ is the dollar-weighted return in the period t.

Therefore, we can substitute equation (2) into equation (3) and rearrange further to show that the differences between dollar-weighted return and each period returns equal to zero after weighting.

$$\sum_{t=1}^T \left(\frac{TNA_{t-1}}{(1 + r_{t,DW})^{t-1}} \times (r_t - r_{t,DW}) \right) = 0 \quad (6)$$

3.3.1.3 CALCULATING THE PERFORMANCE GAP.

Following[7], we can measure of investor timing ability for a fund as the difference between the dollar-weighted return and the geometric fund return.

$$PG = r_{dw} - r_G \quad (7)$$

Where PG is performance gap (%).

3.3.1.4 ADJUSTING THE PERFORMANCE GAP WITH HINDSIGHT EFFECTS

$$\sum_{t=1}^m \left(\frac{TNA_{t-1}}{(1+r_{t,DW})^{t-1}} \times (r_t - r_{t,DW}) \right) + (1 - d) \sum_{t=m+1}^T \left(\frac{TNA_{t-1}^*}{(1+r_{t,DW})^{t-1}} \times (r_t - r_{t,DW}) \right) = 0 \quad (8)$$

Where d is portion to reducing portfolio value (%) and K^* is the portfolio value they would have been.

According to [10], equation 6 is derived from equation 4 to show the effects from both distribution and each period returns.

To separate between hindsight effects and true timing ability, the method starts by assuming that the expected returns of investors in each period equals to the geometric returns which the withdrawal and contribution equals to zero. Then, the dollar-weighted returns initially equal to geometric returns. Next, he substitute the historical return in the first period and recalculate the dollar-weighted returns and get the hindsight effects. Also, he substitutes the historical withdrawal or contribution and recalculate the dollar-weighted returns again and get the true timing skills. Then we roll over in every period and funds. (see appendix 6 for example of the adjustment.)

To analyze the true timing ability, timing skills and hindsight effects which the t-test and Wilcoxon test are used to test whether the gaps and the two effects have the significant difference between dollar-weighted and geometric returns.

To construct t-test, firstly, we calculate the difference between dollar-weighted and geometric returns. Then we find average and standard error of difference and use t-test to test the significance.

Ho: There is no significant effect of performance gap/hindsight effect/true timing ability.

Ha: There is significant effect of performance gap/hindsight effect/true timing ability.

Wilcoxon test is similar to t-test because t-test analyzes whether the average difference of the two repeated measure is zero which requires interval or ratio and normally distributed data. The Wilcoxon test can use ranked or ordinal data.

To construct the Wilcoxon test, we need a sample more than 10 to make the observation approximates a normal distribution. Firstly, we calculate the difference of the measurements and to calculate the absolute differences. Then, we rank the absolute difference and we ignore the case of difference equal to zero. Next, we calculate signed ranks, for example, if the rank are 10 and the difference is less than zero, the signed rank will be -10. Therefore, we calculate z-score by

Ho: There is no significant effect of performance gap/hindsight effect/true timing ability.

Ha: There is significant effect of performance gap/hindsight effect/true timing ability.

3.3.2 OBJECTIVE 2: TO COMPARE BETWEEN TRUE TIMING ABILITY AND HINDSIGHT EFFECTS OF THAI MUTUAL FUNDS.

To compare between true timing ability and hindsight effects, the data of timing ability and hindsight effects from hypothesis 1 are used. Both tax-saving and non-tax-saving funds are compared the hindsight effect and true timing ability by using t-test to find whether there are statistically significance.

Ho: Hindsight effect has not more effect than true timing ability.

Ha: Hindsight effect has more effect than true timing ability.

3.3.3 OBJECTIVE 3: TO STUDY THE PERFORMANCE GAP, HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF INVESTORS IN DIFFERENT INVESTMENT TYPES OF THAI MUTUAL FUNDS.

To study the true timing ability in different type of funds, the data of timing ability and hindsight effects from hypothesis 1 are used. Firstly, I separate both tax-saving and non-tax saving into types of funds including fixed income, equity and allocation (i.e. using the data from Morningstar database). The commodity fund are not study due to small size of sample. Then, I use t-test and Willcoxon from hypothesis 1 to study whether there still have statistically significance true timing ability in every type of funds.

3.3.4 OBJECTIVE 4: TO COMPARE THE PERFORMANCE GAP, HINDSIGHT EFFECT AND TRUE TIMING ABILITY OF INVESTORS IN DIFFERENT INVESTMENT TYPES OF THAI MUTUAL FUNDS.

To compare the true timing ability of investors between tax-saving funds and non-tax-saving funds, the data of timing ability and hindsight effects from hypothesis 1 and 2 are used. Firstly, F-test is used to tested whether both distribution have the

same variance. Then, both tax-saving and non-tax-saving funds with same types of investment are compared by using t-test to test whether there are statistically significance.

Ho: Tax saving funds have not better performance gap/hindsight effect/true timing ability than non-tax-saving funds.

Ha: Tax saving funds have better performance gap/hindsight effect/true timing ability than non-tax-saving funds.

3.3.5 OBJECTIVE 5: TO STUDY THE IMPACTS OF THE PERFORMANCE GAP, TRUE TIMING AND TRUE TIMING ABILITY OF INVESTORS BY DETERMINANTS.

To study impact each determinants, both tax-saving and non-tax-saving funds' true timing ability and hindsight effects are run in the models to find the impacts from determinants by using regression models. Four-factor model is used due to higher ability to capture excess return than CAPM and 3-factor model (Nicklas (2016) study). Also, the result from using 3 and 4 factor models give the same result by [7] study. Firstly, 4-factor models are run and loading factors, alpha and standard deviation of tracking error are obtained. Then, we run the regression in 2 models to find impact from determinants before t-test is used to find whether there are statistically significance.

3.3.5.1 CALCULATING SMB, HML AND UMD IN EACH PERIOD FOR USING IN 3 AND 4 FACTOR MODELS.

Due to [15] study, we can calculate SMB and HML portfolio returns which are the returns on zero-investment factor-mimicking portfolios. Firstly, we compute the mean of market capital for all stocks in the horizontal period. Then, I divide into two groups including big and small size by comparing each stocks with the mean. If the stock market capital greater than the mean, they are put into the big size group. If the stock market capital less than the mean, they are put into the small size group. Therefore we got two groups which separate between big and small capital stocks. Secondly, in each groups, we again divide them into three sub-groups including high book-to-market (top 30%), moderate book-to-market (30-70%) and low book-to-market (bottom 30%). Hence, we have 6 sub-groups including small-high (S/H), small-moderate (S/M), small-low (S/L), big-high (B/H), big-moderate (B/M) and big-low (B/L).

	Small	Big
High B/M	S/H	B/H
Moderate B/M	S/M	B/M
Low B/M	S/L	B/L

After getting 6 groups of zero initial investment portfolio. Then, we calculate weighted average return for all stocks in each groups.

$$SMB = \frac{[(S/L + S/M + S/H) - (B/L + B/M + B/H)]}{3} \quad (14)$$

$$HML = \frac{[(S/H + B/H) - (S/L + B/L)]}{2} \quad (15)$$

Due to [16] study, we can calculate UMD portfolio returns which are the returns on zero-investment factor-mimicking portfolios similar with [15] approach. Firstly, we divide into two groups including big and small size by comparing each stocks with the mean. Then, we again divide them into three sub-groups including high prior return (top 30%), moderate prior return (30-70%) and low prior return (bottom 30%). Hence, we have 6 sub-groups including small-high (S/H), small-moderate (S/M), small-low (S/L), big-high (B/H), big-moderate (B/M) and big-low (B/L).

Table 5: Six sub-group for UMD mimicking portfolio construction.		
	Small	Big
High prior returns	S/H	B/H
Moderate prior returns	S/M	B/M
Low prior returns	S/L	B/L

After getting 6 groups of zero initial investment portfolio. Then, we calculate weighted average return for all stocks in each groups.

$$UMD = \frac{[(S/H + B/H) - (S/L + B/L)]}{2} \quad (16)$$

3.3.5.2 CALCULATING THREE AND FOUR FACTOR ALPHAS AND THE TRACKING ERRORS.

To calculate 4-factor alpha, [15] study finds that the market premium cannot fully explain the stock returns and finds that value stocks tends to outperform growth stocks and small cap stocks tend to outperform large-cap stocks. In 1997, Cahart's study finds that momentum factor which is the stocks tend to increase if it is increasing and decrease if it is decreasing. Recently, Nicklas (2016) study finds that 4-factor model can capture excess return better than CAPM and 3-dactor models.

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{1,i}(r_{m,t} - r_{f,t}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{i4}UMD_t + \varepsilon_{i,t} \quad (17)$$

Where $r_{i,t}$ is the monthly fund returns in time t, $r_{f,t}$ is the monthly risk free return in time t and $r_{m,t}$ is the SET monthly return in time t.

3.3.5.3 RUNNING THE REGRESSION TO FIND THE IMPACTS TO INVESTOR TIMING ABILITY.

We set up 2 models to exam the impact of each determinates to the investor timing ability which each models will include number of returns, average total net asset, average fund expense, average turnover, average net cash flow (% of TNA).

Model 1 is added mean return of the funds and the standard deviation of returns,

$$\begin{aligned} \text{True timing ability underperformance}_i &= \beta_0 + \\ &\beta_1 \text{Average Morningstar ratings}_i + \beta_2 \text{Average expense ratios}_i + \\ &\beta_3 \text{Average turnover ratios}_i + \beta_4 \text{Number of returns}_i + \end{aligned}$$

$$\beta_5 \text{Average total net asset}_i + \beta_6 \text{Average net cash flow (\% of TNA)}_i + \beta_7 \text{Average return}_i + \beta_8 \text{Standard deviation of return}_i + \varepsilon_i \quad (18)$$

Model 2 replaces the raw return in model 1 with 4-factor alpha and each loading factors to find the effect from excess return.

$$\begin{aligned} \text{True timing ability underperformance}_i = & \beta_0 + \\ & \beta_1 \text{Average Morningstar ratings}_i + \beta_2 \text{Average expense ratios}_i + \\ & \beta_3 \text{Average turnover ratios}_i + \beta_4 \text{Number of returns}_i + \\ & \beta_5 \text{Average total net asset}_i + \beta_6 \text{Average net cash flow (\% of TNA)}_i + \\ & \beta_7 \text{Standard deviation of return}_i + \beta_8 \text{SMB loading factor}_i + \\ & \beta_9 \text{HML loading factor}_i + \beta_{10} \text{UMD loading factor}_i + \beta_{11} 4 - \text{factor alpha}_i + \\ & \varepsilon_i \quad (19) \end{aligned}$$

To further study, we also apply the equation (18) to (19) to find the determinants of the hindsight effects and pure timing skills of investors.

Lastly, we analyze each determinants and t-test is used to determine whether each factors have significant effects on the performance gap, timing skills and the hindsight effects.

Ho: There is no significant effect of the determinant.

Ha: There is significant effect of the determinant.

CHAPTER 4

EMPIRICAL RESULTS

To understand investor's timing ability, we get the result after following the methodology in each objectives as below:

4.1 To study the performance gap, hindsight effect and true timing ability of investors in Thai mutual funds.

Table 6: Hypothesis1 result.

This table provides information about dollar-weighted return (DW), the geometric mean return (GM), the performance gap (Computed as the difference between DW and GM), the hindsight effect adjusted using Haylay (2014) method and the true timing ability of investors. We compute all these measures for each fund over the sample period. For each of these measures, we provide the mean, the twenty-fifth percentile, the seventy-fifth percentile and the standard deviation. The t-test and Wilcoxon test are provided to check the significance of the gap, hindsight effect and true timing ability. ** Significant at 1% * Significant at 5% respectively.

All the funds (1,008 funds)	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Dollar-weighted monthly return (%)	0.4250%	0.3283%	0.1453%	0.7772%	0.6264%
Geometric monthly return (%)	0.4678%	0.3865%	0.1601%	0.8308%	0.5230%
Performance gap (%)	-0.0428%	-0.0150%	-0.1314%	0.0277%	0.3090%
T-statistic/Wilcoxon test	(-8.208**/-4.3978**)				
True Timing effect (%)	-0.0119%	-0.0030%	-0.0485%	0.0148%	0.1306%
T-statistic/Wilcoxon test	(-5.810**/-2.8853**)				
Hindsight effect (HE) (%)	-0.0309%	-0.0102%	-0.0861%	0.0114%	0.2364%
T-statistic/Wilcoxon test	(-9.625**/-4.1551**)				

According to Hayley (2014), the study finds that performance gap can be adjusted into hindsight effect and true timing ability. Therefore, this objective want to study these effect with Thai mutual funds. The method used is adopted from Hayley (2014) with both tax-saving and non-tax-saving.

Table 1 shows the result of all mutual fund's performance gap ,hindsight and true timing effects which indicate that the average fund return is 0.4678% monthly but investors make underperformance with timing effect and get the average return is 0.4250% monthly. This shows the performance gap is -0.0428% monthly. After we control for hindsight effect, we find that investor still make underperformance by -0.0119% monthly and the effect of hindsight is -0.0309%.

The result shows that there are significant effects of performance gap which can be separated into hindsight effect and true timing ability. Also, investors make underperformance by timing ability from hindsight effect and true timing ability which means investors have bad ability to make good timing decision by using the previous period return and predicting future return. The result is consistent with Monoz and Vicente (2018).

Therefore, we can conclude that investors have dump money effect by their timing ability both ability to make good timing decision by using the previous period

return and predicting future return. In addition, the performance gap includes 2 components. Firstly, the hindsight effect is the effect that investors invest because of the past return. Secondly, the true timing ability is the real ability of investors to invest by their future return prediction.

4.2 To compare between true timing ability and hindsight effects of Thai mutual funds.

Table 7: Hypothesis2 result.

This table provides information about true timing ability, hindsight effect adjusted using Hayley (2014) method and the difference. For each of these measures, we provide the mean, the twenty-fifth percentile, the seventy-fifth percentile and the standard deviation. The t-test test is provided to check the significance of the gap, hindsight effect and true timing ability. ** Significant at 1% * Significant at 5% respectively.

All the funds (1,008 funds)	Mean	Median	25 th percentile	75 th percentile	Standard deviation
True Timing effect (%)	-0.0119%	-0.0030%	-0.0485%	0.0148%	0.1306%
T-statistic/Wilcoxon test			(-5.810**/-2.8853**)		
Hindsight effect (HE) (%)	-0.0309%	-0.0102%	-0.0861%	0.0114%	0.2364%
T-statistic/Wilcoxon test			(-9.625**/-4.1551**)		
Hindsight-True Timing effects	-0.0191%	-0.0022%	-0.0539%	0.0197%	0.2245%
T-statistic test			-2.6968**		

According to Hayley (2014), the study finds that investors invest because of the past return more than the previous return with US mutual funds. Therefore, this hypothesis wants to study these effect with Thai mutual funds.

Table 1 shows the difference between all mutual funds investor true timing ability and hindsight effects. We find that the average difference is -0.0191 percent monthly.

We find that hindsight effect has significantly higher effects than true timing ability which we conclude that investors mostly make timing decision because of the

past return more than predicting the previous return which is consistent with Monoz and Vicente (2018) study.

4.3 To study the performance gap, hindsight effect and true timing ability of investors in different types of Thai mutual funds.

Table 8: Hypothesis3 result.

This table provides information about dollar-weighted return (DW), the geometric mean return (GM), the performance gap (Computed as the difference between DW and GM), the hindsight effect adjusted using Haylay (2014) method and the true timing ability of investors for each types of investment types between non-tax-saving and tax-saving funds. We compute all these measures for each fund over the sample period. For each of these measures, we provide the mean, the twenty-fifth percentile, the seventy-fifth percentile and the standard deviation. The t-test and Wilcoxon test are provided to check the significance of the gap, hindsight effect and true timing ability. ** Significant at 1% * Significant at 5% respectively.

	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel A: Non-tax-saving fixed income funds. (134 funds)					
Dollar-weighted monthly return (%)	0.1531%	0.1531%	0.1298%	0.1831%	0.1410%
Geometric monthly return (%)	0.1800%	0.1641%	0.1401%	0.2263%	0.1235%
Performance gap (%)	-0.0268%	-0.0115%	-0.0426%	0.0029%	0.0645%
T-statistic/Wilcoxon test	(-5.511**/-4.8202**)				
True Timing effect (%)	-0.0085%	-0.0044%	-0.0187%	0.0024%	0.0345%
T-statistic/Wilcoxon test	(-4.043**/-2.8490**)				
Hindsight effect (HE) (%)	-0.0184%	-0.0076%	-0.0219%	-0.0010%	0.0431%
T-statistic/Wilcoxon test	(-6.7179**/-4.9346**)				
Panel B: Non-tax-saving allocation funds. (103 funds)					
Dollar-weighted monthly return (%)	0.3710%	0.3456%	0.2052%	0.6034%	0.3498%
Geometric monthly return (%)	0.4760%	0.4096%	0.2703%	0.7005%	0.3123%
Performance gap (%)	-0.1050%	-0.0514%	-0.1780%	-0.0019%	0.1822%
T-statistic/Wilcoxon test	(-5.807**/-5.8476**)				
True Timing effect (%)	-0.0292%	-0.0142%	-0.0512%	0.0050%	0.0722%
T-statistic/Wilcoxon test	(-4.221**/-4.1055**)				

	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Hindsight effect (HE) (%)	-0.0758%	-0.0324%	-0.1258%	-0.0016%	0.1364%
T-statistic/Wilcoxon test	(-6.445**/-5.6391**)				
Panel C: Non-tax-saving equity funds. (321 funds)					
Dollar-weighted monthly return (%)	0.6316%	0.6630%	0.2920%	0.9202%	0.5934%
Geometric monthly return (%)	0.7368%	0.8115%	0.4182%	1.0125%	0.5005%
Performance gap (%)	-0.1053%	-0.0770%	-0.2458%	0.0150%	0.2801%
T-statistic/Wilcoxon test	(-7.940**/-6.7335**)				
True Timing effect (%)	-0.0305%	-0.0181%	-0.0949%	0.0258%	0.1336%
T-statistic/Wilcoxon test	(-4.671**/-4.0926**)				
Hindsight effect (HE) (%)	-0.0747%	-0.0559%	-0.1370%	-0.0007%	0.1859%
T-statistic/Wilcoxon test	(-9.384**/-7.2025**)				
Panel D: Tax-saving fixed income funds. (45 funds)					
Dollar-weighted monthly return (%)	0.1553%	0.1592%	0.1294%	0.1822%	0.0542%
Geometric monthly return (%)	0.1639%	0.1613%	0.1345%	0.1909%	0.0644%
Performance gap (%)	-0.0086%	-0.0024%	-0.0125%	0.0006%	0.0199%
T-statistic/Wilcoxon test	(-3.155**/-2.8950**)				
True Timing effect (%)	-0.0040%	-0.0008%	-0.0053%	0.0007%	0.0104%
T-statistic/Wilcoxon test	(-2.681**/-2.6016**)				
Hindsight effect (HE) (%)	-0.0045%	-0.0014%	-0.0059%	0.0004%	0.0112%
T-statistic/Wilcoxon test	(-2.986**/-2.7176**)				

	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel E: Tax-saving allocation funds. (28 funds)					
Dollar-weighted monthly return (%)	0.6697%	0.6074%	0.3761%	0.9106%	0.4309%
Geometric monthly return (%)	0.5996%	0.6424%	0.3741%	0.8986%	0.3293%
Performance gap (%)	0.0701%	0.0053%	-0.0171%	0.0348%	0.2725%
T-statistic/Wilcoxon test	(0.911/1.3610)				
True Timing effect (%)	0.0700%	-0.0020%	-0.0087%	0.0198%	0.2768%
T-statistic/Wilcoxon test	(0.8022/1.3372)				
Hindsight effect (HE) (%)	0.0001%	0.0050%	-0.0183%	0.0145%	0.0435%
T-statistic/Wilcoxon test	(0.342/0.0163)				
Panel F: Tax-saving equity funds. (147 funds)					
Dollar-weighted monthly return (%)	0.9296%	0.8595%	0.6147%	1.0728%	0.7670%
Geometric monthly return (%)	0.8100%	0.7966%	0.5702%	0.9671%	0.4561%
Performance gap (%)	0.1196%	0.0599%	-0.0169%	0.1409%	0.5388%
T-statistic/Wilcoxon test	(4.931**/2.6912**)				
True Timing effect (%)	0.0391%	0.0121%	-0.0169%	0.0477%	0.1899%
T-statistic/Wilcoxon test	(3.146**/2.4967*)				
Hindsight effect (HE) (%)	0.0805%	0.0384%	0.0011%	0.0837%	0.4681%
T-statistic/Wilcoxon test	(5.140**/2.0851*)				

According to [11] study, they find that funds with different investment types have different effect to performance gap, true timing ability and hindsight effects. In this hypothesis, we separate each types of investment in to fixed income, allocation and equity because different types of investment products will affect different size of investor's timing ability.

Table 1 panel A to F shows result of investor's timing ability dollar-average return, geometric return, performance gap, hindsight effect and true timing ability by the characteristics of fund investment styles including non-tax-saving fixed income funds, non-tax-saving allocation funds, non-tax-saving equity funds, tax-saving fixed income funds, allocation fixed income funds and tax-saving equity funds.

Panel A shows funds and investor's timing ability and its components of non-tax saving fixed income funds. The result shows that the average fund return is 0.1800% monthly, investor ability to timing is 0.1531% monthly, the performance gap is -0.0268% monthly. After controlling for hindsight effect, the result shows that the true timing ability is +0.0085% monthly and the hindsight effect is -0.0184% monthly.

Panel B shows funds and investor's timing ability and its components of non-tax saving allocation funds. The result shows that the average fund return is 0.4760% monthly, investor ability to timing is 0.3710% monthly, the performance gap is -0.1050% monthly. After controlling for hindsight effect, the result shows that the true timing ability is -0.0292% monthly and the hindsight effect is -0.0758% monthly.

Panel C shows funds and investor's timing ability and its components of non-tax saving equity funds. The result shows that the average fund return is 0.7368 monthly, investor ability to timing is 0.6316% monthly, the performance gap is -0.1053% monthly. After controlling for hindsight effect, the result shows that the true timing ability is -0.0305% monthly and the hindsight effect is -0.0747% monthly which is consistent with Hayley (2014) study with US equity fund.

Panel D shows funds and investor's timing ability and its components of tax saving fixed income funds. The result shows that the average fund return is 0.1639% monthly, investor ability to timing is 0.1553% monthly, the performance gap is -0.0086% monthly. After controlling for hindsight effect, the result shows that the true timing ability is -0.0040% monthly and the hindsight effect is -0.0045% monthly.

Panel E shows funds and investor's timing ability and its components of tax saving allocation funds. The result shows that the average fund return is 0.5996% monthly, investor ability to timing is 0.6697% monthly, the performance gap is 0.0701% monthly. After controlling for hindsight effect, the result shows that the true timing ability is 0.0700% monthly and the hindsight effect is 0.0001% monthly.

Panel F shows funds and investor's timing ability and its components of non-tax saving fixed income funds. The result shows that the average fund return is 0.8100% monthly, investor ability to timing is 0.9296% monthly, the performance gap is 0.1196% monthly. After controlling for hindsight effect, the result shows that the true timing ability is 0.0391% monthly and the hindsight effect is 0.0805% monthly.

After separating funds with investment types, we find that mostly there are significant effect of investor's performance gap, true timing ability and hindsight effect. Also, hindsight effect is larger than true timing ability which is consistent with Monoz and Vicente (2018) study.

Therefore, we can conclude that each types of fund's investment has investor's hindsight effect and true timing ability. In non-tax-saving funds, investors have dump money effect by their timing ability both ability to make timing decision by predicting future return and invest following the previous return. In tax-saving funds, investors tends to have smart money effects both ability to make timing decision by predicting future return and invest following the previous return.

4.4 To compare the performance gap, hindsight effect and true timing ability of investors between tax-saving funds and non-tax-saving funds with same fund types.

Table 9: Hypothesis 4 result.

This table provides information about the difference of performance gap, hindsight effect adjusted by Hayley (2014) method and true timing ability between tax-saving funds and non-tax-saving funds. For each of these measures, we provide the mean, the twenty-fifth percentile, the seventy-fifth percentile and the standard deviation. The t-test test is provided to compare the difference of the gap, hindsight effect and true timing ability. *** Significant at 1% ** Significant at 5% respectively.

All the funds (1,008 funds)	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel A: Compare the performance gap of fixed income funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0268%	-0.0115%	-0.0426%	0.0029%	0.0645%
T-statistic/Wilcoxon test	(-5.511**/-4.8202**)				
Tax saving funds					
Hindsight effect (HE) (%)	-0.0086%	-0.0024%	-0.0125%	0.0006%	0.0199%
T-statistic/Wilcoxon test	(-3.155**/-2.8950**)				

T-statistic test					
T-statistic test	-2.89767**				
Panel B: Compare the true timing ability of fixed income funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0085%	-0.0044%	-0.0187%	0.0024%	0.0345%
T-statistic/Wilcoxon test	(-4.043**/-2.8490**)				
Tax saving funds					
Hindsight effect (HE) (%)	-0.0040%	-0.0008%	-0.0053%	0.0007%	0.0104%
T-statistic/Wilcoxon test	(-2.681**/-2.6016**)				
T-statistic test					
T-statistic test	-1.32766585				
	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel C: Compare the hindsight effect of fixed income funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0184%	-0.0076%	-0.0219%	-0.0010%	0.0431%
T-statistic/Wilcoxon test	(-6.7179**/-4.9346**)				
Tax saving funds					
Hindsight effect (HE) (%)	-0.0045%	-0.0014%	-0.0059%	0.0004%	0.0112%
T-statistic/Wilcoxon test	(-2.986**/-2.7176**)				
T-statistic test					
T-statistic test	-3.3883709**				
Panel D: Compare the performance gap of allocation funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.1050%	-0.0514%	-0.1780%	-0.0019%	0.1822%
T-statistic/Wilcoxon test	(-5.807**/-5.8476**)				
Tax saving funds					
Hindsight effect (HE) (%)	0.0701%	0.0053%	-0.0171%	0.0348%	0.2725%
T-statistic/Wilcoxon test	(0.911/1.3610)				
T-statistic test					
T-statistic test	-4.0181586**				

	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel E: Compare true timing ability of allocation funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0292%	-0.0142%	-0.0512%	0.0050%	0.0722%
T-statistic/Wilcoxon test	(-4.221**/-4.1055**)				
Tax saving funds					
Hindsight effect (HE) (%)	0.0700%	-0.0020%	-0.0087%	0.0198%	0.2768%
T-statistic/Wilcoxon test	(0.8022/1.3372)				
T-statistic test					
T-statistic test	-3.2769314**				
Panel F: Compare hindsight effect of allocation funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0758%	-0.0324%	-0.1258%	-0.0016%	0.1364%
T-statistic/Wilcoxon test	(-6.445**/-5.6391**)				
Tax saving funds					
Hindsight effect (HE) (%)	0.0001%	0.0050%	-0.0183%	0.0145%	0.0435%
T-statistic/Wilcoxon test	(0.342/0.0163)				
T-statistic test					
T-statistic test	-4.8195849**				

	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel G: Compare performance gap of equity funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.1053%	-0.0770%	-0.2458%	0.0150%	0.2801%
T-statistic/Wilcoxon test	(-7.940**/-6.7335**)				
Tax saving funds					
Hindsight effect (HE) (%)	0.1196%	0.0599%	-0.0169%	0.1409%	0.5388%
T-statistic/Wilcoxon test	(4.931**/2.6912**)				
T-statistic test					
T-statistic test	-5.93305**				
Panel H: Compare true timing ability of equity funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0305%	-0.0181%	-0.0949%	0.0258%	0.1336%
T-statistic/Wilcoxon test	(-4.671**/-4.0926**)				
Tax saving funds					
Hindsight effect (HE) (%)	0.0391%	0.0121%	-0.0169%	0.0477%	0.1899%
T-statistic/Wilcoxon test	(3.146**/2.4967*)				
T-statistic test					
T-statistic test	-4.5549671**				

	Mean	Median	25 th percentile	75 th percentile	Standard deviation
Panel I: Compare hindsight effect of equity funds between tax-saving and non-tax-saving funds.					
Non-tax saving funds					
True Timing effect (%)	-0.0747%	-0.0559%	-0.1370%	-0.0007%	0.1859%
T-statistic/Wilcoxon test	(-9.384**/-7.2025**)				
Tax saving funds					
Hindsight effect (HE) (%)	0.0805%	0.0384%	0.0011%	0.0837%	0.4681%
T-statistic/Wilcoxon test	(5.140**/2.0851*)				
T-statistic test					
T-statistic test	-5.128555**				

According to [12] study about investor's dump money effect, they find that investor have bad ability to do market timing. Therefore, we want to study that whether timing constraints in tax-saving funds will affect investor's timing ability.

Table a Panel A to I shows result of compare of performance gap, hindsight effect and true timing between non-tax-saving funds and tax-saving funds.

Panel A shows compare performance gap between non-tax-saving funds and non-tax-saving funds of fixed income funds. The result shows non-tax saving fund average performance gap is -0.0268% monthly and tax saving fund average

performance gap is -0.0086% monthly. Also, there is significant that tax-saving funds have better performance gap than non-tax-saving funds. of fixed income funds

Panel B shows compare true timing ability between non-tax-saving funds and non-tax-saving funds of fixed income funds. The result shows non-tax saving fund average true timing ability is -0.0085% monthly and tax saving fund average true timing ability is -0.0040% monthly. Also, there is significant that tax-saving funds have better true timing ability than non-tax-saving funds.

Panel C shows compare hindsight effect between non-tax-saving funds and non-tax-saving funds of fixed income funds. The result shows non-tax saving fund average hindsight effect is -0.0184% monthly and tax saving fund average hindsight effect is -0.0045% monthly. Also, there is significant that tax-saving funds have better hindsight effect than non-tax-saving funds.

Panel D shows compare performance gap between non-tax-saving funds and non-tax-saving funds of allocation funds. The result shows non-tax saving fund average performance gap is -0.1050% monthly and tax saving fund average performance gap is 0.0701% monthly. Also, there is significant that tax-saving funds have better performance gap than non-tax-saving funds.

Panel E shows compare true timing ability between non-tax-saving funds and non-tax-saving funds of allocation funds. The result shows non-tax saving fund average true timing ability is -0.0292% monthly and tax saving fund average true timing ability is 0.0700% monthly. Also, there is significant that tax-saving funds have better true timing ability than non-tax-saving funds.

Panel F shows compare hindsight effect between non-tax-saving funds and non-tax-saving funds of allocation funds. The result shows non-tax saving fund average hindsight effect is -0.0758% monthly and tax saving fund average hindsight effect is 0.0001% monthly. Also, there is significant that tax-saving funds have better hindsight effect than non-tax-saving funds.

Panel G shows compare performance gap between non-tax-saving funds and non-tax-saving funds of equity funds. The result shows non-tax saving fund average performance gap is -0.1053% monthly and tax saving fund average performance gap is 0.1196% monthly. Also, there is significant that tax-saving funds have better performance gap than non-tax-saving funds. of fixed income funds

Panel H shows compare true timing ability between non-tax-saving funds and non-tax-saving funds of equity funds. The result shows non-tax saving fund average true timing ability is -0.0305% monthly and tax saving fund average true timing ability is 0.0391% monthly. Also, there is significant that tax-saving funds have better true timing ability than non-tax-saving funds.

Panel I shows compare hindsight effect between non-tax-saving funds and non-tax-saving funds of equity funds. The result shows non-tax saving fund average hindsight effect is -0.0747% monthly and tax saving fund average hindsight effect is 0.0805% monthly. Also, there is significant that tax-saving funds have better hindsight effect than non-tax-saving funds.

After comparing funds among investment types, we find that investors in tax-saving funds have better timing ability all of performance gap, hindsight effect and true timing ability.

Therefore, according to [12] study about dump money effect, we find that investment constraints in tax-saving mutual such as lock-up period will affect to investor ability to make timing decision which is consistent with literature that the more investors try to do market timing, the more underperformance gap.

4.5 To study the impacts of the performance gap, hindsight effect and true timing ability of investors by expense ratios, turnover ratios, ages, size, expense, turnover, level of cash flow, volatility of return and a measure of overall performance with Thai mutual funds by using regression.

Table 10: Hypothesis 5 result.

This table provides information of regression between performance gap, true timing ability and hindsight effect adjusted by Hayley (2014) method and determinants including ages, size, level of cash flow, expense ratios, turnover ratios, volatility of return and measure of overall performance which we separate into 2 models.

$$\begin{aligned} \text{True timing ability underperformance}_i &= \beta_0 + \beta_1 \text{Average Morningstar ratings}_i + \\ &\beta_2 \text{Average expense ratios}_i + \beta_3 \text{Average turnover ratios}_i + \beta_4 \text{Number of returns}_i + \\ &\beta_5 \text{Average total net asset}_i + \beta_6 \text{Average net cash flow (\% of TNA)}_i + \beta_7 \text{Average return}_i + \\ &\beta_8 \text{Standard deviation of return}_i + \varepsilon_i \quad \text{Model A} \end{aligned}$$

$$\begin{aligned} \text{True timing ability underperformance}_i &= \beta_0 + \beta_1 \text{Average Morningstar ratings}_i + \beta_2 \text{Average expense ratios}_i \\ &+ \beta_3 \text{Average turnover ratios}_i + \beta_4 \text{Number of returns}_i + \beta_5 \text{Average total net asset}_i \\ &+ \beta_6 \text{Average net cash flow (\% of TNA)}_i + \beta_7 \text{Standard deviation of return}_i \\ &+ \beta_8 \text{SMB loading factor}_i + \beta_9 \text{HML loading factor}_i + \beta_{10} \text{UMD loading factor}_i \\ &+ \beta_{11} 4 - \text{factor alpha}_i + \varepsilon_i \quad \text{Model B} \end{aligned}$$

The t-test and Wilcoxon test are provided to check the significance of the determinants.

** Significant at 1% * Significant at 5% respectively.

Panel A: Regression between non-tax-saving fund performance gap and the determinants. (442 funds)

	Model 1 (441)	Model 2 (441)
Intercept	-0.0133 (-0.39)	-0.03436 (-1.06)
Fund age	9.4×10^{-5} (0.59)	3.02×10^{-4} (1.64)
Average TNA	-6.63×10^{-7} (-1.53)	-6.07×10^{-7} (-1.63)
Average net cash flow (% of TNA)	-4.83×10^{-5} (-0.47)	-1.34×10^{-4} (-1.14)
Expense ratio	-2.4445 (-0.99)	-2.6497 (-1.06)
Turnover ratio	1.12×10^{-5} (0.45)	9.6×10^{-6} (0.40)
Volatility of return	-2.0872 (-2.99**)	-17.4258 (-2.01*)
Average return	0.2144 (0.06)	-
Alpha	-	2.0751 (0.53)
Market loading risk premium	-	-0.0586 (-1.1)
SMB loading factor	-	-0.2483 (-3.4**)
HML loading factor	-	-0.2748 (-2.32*)
UMD loading factor	-	0.4852 (0.68)

Panel B: Regression between non-tax-saving fund true timing ability and the determinants. (442 funds)

	Model 1	Model 2
Intercept	-0.0117 (-0.70)	-0.0157 (-0.94)
Fund age	0.0001 (1.75)	0.0001 (1.54)
Average TNA	-3.48×10^{-7} (-2.13*)	-3.14×10^{-7} (-1.99*)
Average net cash flow (% of TNA)	-2.16×10^{-5} (-0.29)	-2.94×10^{-5} (-0.37)
Expense ratio	0.1374 (0.12)	0.0511 (0.05)
Turnover ratio	-1.93×10^{-8} (-0.00)	-4.48×10^{-7} (-0.03)
Volatility of return	-0.7939 (-2.19*)	0.7851 (-1.76)
Average return	-1.7151 (-0.95)	-
Alpha	-	-1.1865 (-0.63)
Market loading risk premium	-	-0.0196 (-0.65)
SMB loading factor	-	-0.0761 (-2.04*)
HML loading factor	-	-0.1139 (-1.86)
UMD loading factor	-	-0.1709 (-0.49)

Panel C: Regression between non-tax-saving fund hindsight effect and the determinants.

(442 funds)

	Model 1	Model 2
Intercept	-0.0015 (-0.07)	-0.0186 (-0.71)
Fund age	-3.57×10^{-5} (-0.33)	1.16×10^{-4} (1.08)
Average TNA	-3.15×10^{-7} (-1.03)	-2.93×10^{-7} (-0.36)
Average net cash flow (% of TNA)	-2.67×10^{-5} (-0.49)	-1.04×10^{-4} (-0.12)
Expense ratio	-2.5824 (-1.55)	-2.7008 (-2.05*)
Turnover ratio	0.0000 (0.84)	0.0000 (0.63)
Volatility of return	-1.2932 (-2.5*)	-0.9574 (-1.68)
Average return	1.9295 (0.91)	-
Alpha	-	3.2616 (1.74)
Market loading risk premium	-	-0.0389 (-1.04)
SMB loading factor	-	-0.1726 (-3.13**)
HML loading factor	-	-0.1614 (-2.31*)
UMD loading factor	-	0.6574 (1.91*)

Panel D: Regression between tax-saving fund performance gap and the determinants.

(172 funds)

	Model 1	Model 2
Intercept	-0.0173 (-0.38)	-0.0354 (0.71)
Fund age	-0.0002 (-0.95)	-0.0001 (-0.39)
Average TNA	-4.55×10^{-6} (-1.29)	-4.75×10^{-6} (-1.41)
Average net cash flow (% of TNA)	-0.0938 (-1.43)	-0.0724 (-1.44)
Expense ratio	0.2655 (0.23)	-0.1099 (-0.10)
Turnover ratio	3.448×10^{-5} (0.92)	3.29×10^{-5} (0.94)
Volatility of return	3.0025 (2.95**)	2.4133 (1.97*)
Average return	-	-
Alpha	-	-2.2393 (-0.56)
Market loading risk premium	-	-0.0228 (-0.36)
SMB loading factor	-	-0.2327 (-1.43)
HML loading factor	-	0.2269 (1.13)
UMD loading factor	-	-0.6246 (-0.78)

Panel E: Regression between tax-saving fund true timing ability and the determinants.

(172 funds)

	Model 1	Model 2
Intercept	-0.0055 (0.20)	-0.0284 (-0.93)
Fund age	-7.1×10^{-5} (-0.49)	9.28×10^{-7} (1.41)
Average TNA	-4.13×10^{-6} (-2.15*)	-4.16×10^{-6} (-2.08*)
Average net cash flow (% of TNA)	-0.0757 (-1.57)	-0.0633 (-1.77)
Expense ratio	0.3829 (0.95)	0.3172 (0.72)
Turnover ratio	5.02×10^{-6} (0.24)	4.03×10^{-6} (0.19)
Volatility of return	0.7919 (1.74)	0.9782 (1.41)
Average return	-2.0468 (-1.08)	-
Alpha	-	0.9894 (0.46)
Market loading risk premium	-	-0.0388 (-1.11)
SMB loading factor	-	-0.0559 (0.95)
HML loading factor	-	0.0378 (0.48)
UMD loading factor	-	0.0208 (0.05)

Panel E: Regression between tax-saving fund hindsight effect and the determinants.

(172 funds)

	Model 1	Model 2
Intercept	-0.0118 (-0.49)	-0.0069 (-0.28)
Fund age	-0.0001 (-1.13)	-0.0002 (-1.19)
Average TNA	-4.2 x 10 ⁷ (-0.24)	-5.85 x 10 ⁷ (-0.39)
Average net cash flow (% of TNA)	-0.0178 (-0.81)	-0.0091 (-0.50)
Expense ratio	-0.1174 (-0.13)	-0.4272 (-0.49)
Turnover ratio	2.98 x 10 ⁻⁵ (1.32)	2.89 x 10 ⁻⁵ (1.4)
Volatility of return	2.2105 (3.12**)	1.435 (2.13*)
Average return	-3.9719 (-1.43)	-
Alpha	-	-3.2288 (-1.41)
Market loading risk premium	-	0.0157 (0.44)
SMB loading factor	-	-0.1768 (-1.55)
HML loading factor	-	0.1890 (1.34)
UMD loading factor	-	-0.6454 (-1.29)

In this hypothesis, we want to study the effects of determinants including expense ratios, turnover ratios, ages, size, expense, turnover, level of cash flow, volatility of return and a measure of overall performance to investor's performance gap, hindsight effect and true timing ability.

Table 1 panel A to F shows result of regression of performance gap, hindsight effect and true timing ability with determinants including expense ratios, turnover ratios, ages, size, expense, turnover, level of cash flow, volatility of return and a measure of overall performance.

Panel A shows regression of non-tax saving performance gap with its determinants. The result shows there is significant negative relationship of volatility and when we breakout into its loading factor, there are significant negative relationship with SMB and UMD factor portfolios.

Panel B shows regression of non-tax saving true timing ability with its determinants. The result shows there is significant negative relationship of volatility and total net assets and when we breakout into its loading factor, there are significant negative relationship with SMB and UMD factor portfolios.

Panel C shows regression of non-tax saving hindsight effect with its determinants. The result shows there is significant negative relationship of volatility

and when we breakout into its loading factor, there are significant negative relationship with alpha, SMB, HML and UMD factor portfolios.

Panel D shows regression of tax saving performance gap with its determinants. The result shows there is significant positive relationship of volatility.

Panel E shows regression of tax saving true timing ability with its determinants. The result shows there is significant positive relationship of volatility and negative relationship with total net asset.

Panel F shows regression of tax saving hindsight effect with its determinants. The result shows there is significant positive relationship of volatility.

After running regression, for non-tax saving funds, we find that there are negative relationship between performance gap, hindsight effect and true timing ability and volatility of return. Also, there are negative relationship between performance gap, hindsight effect and true timing ability and loading factor. In addition, there is negative relationship between hindsight effect and average total net asset. In term of tax-saving funds, we find that there are positive relationship between performance gap, hindsight effect and true timing ability and volatility. Also, there is negative relationship between true timing ability and average total net asset.

Therefore we can conclude that volatility has effect directly to hindsight effect and true timing ability. In the case of non-tax saving funds, investors have bad timing ability, so higher volatility will affect investors are harder to make timing decision. On the other hand, tax saving funds, investors have good timing ability, so higher volatility will affect investors can make more money. For both type of funds, higher fund's asset will affect investors are harder to manage cash flow following the future

return prediction because if funds tends to make loss in the next period, investors will have more cost to move out the large amount of money.

CHAPTER 5

CONCLUSION

In our research, we study cash flow timing skills of mutual fund investors between non-tax-saving funds and tax-saving funds which have more constraints to invest including different investor types, lock-up period, benefits, complicated investment condition and violations.

When analyze the results of all mutual funds in our sample, we can observe that investors make cash flow timing both from the ability to predict future returns and invest because of the previous period return. In addition, we find that investors mostly have dump money effect or make return underperformance. After comparing the hindsight and true timing ability, we find that investors mostly invest because of the precious period return than predicting the future return.

To understand the effect of investment constraints, we separate both non-tax-saving and tax-saving funds. We also find that both investors make cash flow timing both from the ability to predict future returns and invest because of the previous period return. In addition, we find that investors in tax-saving funds which invest in allocation and equity have smart money effect which means they can make over performance than fund's return by making timing decision. When we compared both types of funds in each investment constraints, we find that investors have better

timing ability both the ability to predict future returns and the ability to invest because of the previous period return in all of investment types.

In addition, we find that volatility affect to investors timing ability both from the ability to predict future returns and invest because of the previous period return. With non-tax-saving funds, investors have dump money effects, higher volatility will affect higher return underperformance because investors will be harder to make timing decision. On the contrary, with tax-saving funds, investors have smart money effects, In thiasset will affect investors are harder to invest following the future period return prediction (true timing ability) because of harder to move large amount of money if investors expect the future period return will be better.

Therefore, based on investor has dump money effect, we can conclude that investors tends to have better cash flow timing which the main reason causes from investors are blocked from make timing decision. Then, they will decrease the loss from making cash flow decision and give chance to get better future return.

RECOMMENDATION FOR FURTHER RESEARCH

In this research, we use calculation to analyze the true timing of investors. With behavior finance, there also some aspects that we should study more. Firstly, investors continue to invest into the fund and the fund makes constant positive performance for past 10 years following the below graph because the stock market is on the recovery period after the US crisis. Secondly, we don't concern about seasonality. Investors mostly invest on December and withdraw on January which means that investors may not do timing skills but the regulation help them to do timing skills.

REFERENCES

1. Ben-Zion, U., J. Choi, and S. Hauser, *The price linkage between country funds and national stock markets: Evidence from cointegration and causality tests of Germany, Japan and UK funds*. Journal of Business and Economics, 1996. **23**: p. 1005-1017.
2. Low, S.W. and M.A. Ghazali, *The price linkages between Malaysian unitrust funds and the stock market: Short-run and long-run interrelationships*. Journal of Managerial Finance, 2007. **33(2)**: p. 89-101.
3. Zheng, L., *Is money smart? A study of mutual fund investors' fund selection ability*. Journal of Finance, 1999: p. 901-933.
4. Dichev, I.D., *What are stock investors' actual historical returns? Evidence from dollar-weighted returns*. The American Economic Review, 2007: p. 386-401.
5. Nesbitt, S., *Buy high, sell low: Timing errors in mutual fund allocations*. Journal of Portfolio Management, 1995: p. 57-60.
6. Braverman, O., S. Kandel, and A. Wohl, *The (Bad?) timing of mutual fund investors*. 2005.
7. Friesen, G.C. and T.R.A. Sapp, *Mutual fund flows and investor returns: An empirical examination of fund investor timing ability*. CBA Faculty Publications, 2007: p. 48.
8. Divhev, I.D. and G. Yu, *Higher risk, lower returns: What hedge fund investors really earn*. Journal of Financial Economics, 2011: p. 248-263.
9. Chieh-Tse Hou, T., *Return persistence and investment timing decisions in Taiwanese domestic equity mutual funds*. Journal of Managerial Finance, 2012: p. 873-891.
10. Hayley, S., *Hindsight effects in dollar-weighted returns*. Journal of Financial and Quantitative Analysis, 2014: p. 249-269.
11. Munoz, F. and R. Vicente, *Hindsight effect: What are the actual cash flow timing skills of mutual fund investors*. Journal of Empirical Finance, 2018: p. 181-193.
12. Frazzini, A. and O. Lamont, *Dumb money: Mutual fund flows and the cross-section of stock returns*. Journal of Financial Economics, 2008: p. 299-322.
13. Gruber, M., *Another puzzle: The growth in actively managed mutual funds*. Journal of Finance, 1996: p. 783-810.
14. Sapp, T. and A. Tiwari, *Does stock return momentum explain the "smart money" effect?* Journal of Finance, 2004: p. 2605-2622.
15. Fama, E., French, K., *Common risk factors in the return on bonds and stocks*. Journal of Financial Economics, 1993: p. 3-53.
16. Carhart, M., *On the persistence in mutual fund performance*. Journal of Finance, 1997. **52**: p. 57-82.
17. Shleifer, A., Vishny, R., *The limits of arbitrage*. Journal of Finance, 1997. **52**: p. 33-35.
18. Fung, W., Hsieh, D.A., *Hedge fund on industry in its adolescence*. Federal Reserve Bank of Atlanta Economic Review. **91**: p. 1-33.



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

VITA

NAME Krittapon Chaleoykitti

DATE OF BIRTH 14 May 1995

PLACE OF BIRTH Bangkok, Thailand

INSTITUTIONS ATTENDED Master of Science in Finance, Chulalongkorn University

HOME ADDRESS 8/71 Pradiphat15 alley, Pradiphat road, Phayathai, Bangkok, Thailand, 10400



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY