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-RESEARCH ARTICLE-

MANAGEMENT ACTIVITY, TAX PRIVILEGE, AND PERFORMANCE PERSISTENCE OF THAI EQUITY FUNDS IN 2008-2017

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─Abstract─

This study aims to (1) categorize Thai mutual funds based on management activity using the two measures, tracking error and Active Share; (2) find the movement of management activity over a decade; and (3) find the persistence of fund performance reflected in net cash flow to funds and associated with the prior period return, category of management activity, and characteristics of tax-incentivized funds, i.e., long-term equity funds (LTFs) and retirement mutual funds (RMFs). We calculated tracking error and Active Share for 112 Thai equities funds across 20 semiannual periods between 2008 and 2017 to classify them into four types of active funds. The paired-samples t-test analyzes the average change of the two variables over 190 different time intervals. In addition, we regress current net cash flow against prior cash flow, one-factor alpha, and return in the prior period, as well as dummy variables representing characteristics of actively managed funds and tax-exempt funds, to determine the persistence of fund performance as measured by net cash flows to the fund. We find that most funds are indexers despite being marketed as active. Movements of the two measures were heterogeneous during short time intervals, but over intervals of five years or more,

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Active Share increased, and tracking error decreased. Positive net cash flow to funds indicated continued performance based on early performance indicators. This association was stronger among concentrated and diversified stock pickers than among factor bettors and LTFs as opposed to RMFs or those without tax privilege.

Keywords: equity fund, Active Share, tracking error, fund management activity, tax incentives

1. INTRODUCTION

Mutual funds, one of the "advanced" financial instruments Khorana, Servaes, and Tufano (2005), offer institutional and individual investors several benefits. It assists them in overcoming limitations in their investment universe, such as capital size, investment experience, and local legislation. Mutual funds provide investors with more significant opportunities to diversify their portfolios, whether in terms of the types of securities, the number of securities within each type, or even on a geographical level, by combining the capital of multiple investors under the supervision of professional fund managers.

According to their management approach, there are two primary mutual funds groups: passive and active. Active funds try to outperform their benchmark indexes' return, while passive funds attempt to match it (Levy & Lieberman, 2016; Sharpe, 1991). Fund management is focused on stock selection – investing in different assets within a particular asset class – and market timing – holding an asset class with a different weight than the benchmark index to maximize return and minimize risk. Berk (2005); Brinson, Hood, and Beebower (1986); Daniel, Grinblatt, Titman, and Wermers (1997) stated that "management talents" are not reflected in the fund's net asset value or price, which fluctuate based on the fund's return and at which investors purchase units.

This study employs two metrics of portfolio activity: the conventional and widely-utilized tracking error and the more recent Active Share. Tracking error volatility, or tracking error for short is a conventional metric of portfolio management activity. It is defined as the time-series standard deviation of the excess return of the portfolio above its benchmark index Jorion (2003), as shown in equation [1]:

$$Tracking\ error = \sigma(R_{pt} - R_{bt}), \quad [1]$$

where R_{pt} = the portfolio returns at the time *t*;

R_{bt} = the benchmark index returns at the time *t*.

K. J. M. Cremers and Petajisto (2009) proposed an alternative for measuring portfolio management activity dubbed "Active Share," which represents the stock selection of each fund and can be calculated as half of the sum of the differences between the weights

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of all assets in an individual fund and its benchmark index, as shown in equation [2a]. The total is divided by two to avoid counting the long and short locations multiple times:

$$Active\ Share = \frac{1}{2}\sum_{i=1}^{N}\left|w_{pi} - w_{bi}\right|, \quad [2a]$$

where = weight of asset *i* in the portfolio
w_{bi} = weight of asset *i* in the benchmark index
N = the number of assets

M. Cremers (2017) later provided an alternate Active Share computation as one minus the sum of the product of a dummy variable and the lower of the weight of each asset in the portfolio or the weight of each asset in the benchmark, as specified in equation [2b]. The dummy variable indicates if the weight of the security is positive for the portfolio, indicating that the portfolio is not short the security. The subtrahend represents the portfolio's and its benchmark's overlapping weights.

$$Active\ Share = 1 - \sum_{i=1}^{N}\left[D_i \min\left(w_{pi},\ w_{bi}\right)\right], \quad [2b]$$

where = weights of asset *i* in the portfolio
w_{bi} = weights of asset *i* in the benchmark index
N = the number of assets
D_i = 1 if $w_{pi} > 0$, 0 otherwise

The long-term equity funds (LTFs) and the retirement mutual funds (RMFs), which were created to encourage long-term personal savings, particularly for retirement, give unitholders tax exemptions in Thailand. The tax incentive for LTF unit purchases is contingent on the units held for at least seven calendar years (a fraction of a year counts as one year). In contrast, RMF unit purchasers must meet stricter conditions: the units must be purchased at least once a year for at least five consecutive years and until the unitholder reaches age 55.

This study aims to determine the direction of movement of management activity as measured by both the classic one, tracking error, and Active Share proposed and named by K. J. M. Cremers and Petajisto (2009) in the Thai mutual fund industry for the most recent economic cycle; and to identify persistence in fund performance as reflected in net cash flow to funds, as well as other effects of cash flows such as funds' management activity and tax-privileged characteristics of LTFs and RMFs. Individual investors, asset management firms, and regulatory bodies are anticipated to profit from this development in the mutual fund market. Both Active Share and tracking error would be effectively reported and referenced as accurate measurements for comparing fund management activities, which would provide individual investors with extra quantitative data for investment decision-making. The two measures could be used to clarify the investment policies of both existing and new mutual fund products provided by asset management

firms. Based on the two approaches, regulatory bodies such as the Securities and Exchange Commission (SEC) would be able to establish regulations regarding the recommendation of mutual funds, particularly for those investors identified by Gruber (2011) as "unsophisticated investors."

2. LITERATURE REVIEW

2.1 Management Activity of Mutual Funds

As indicated in Figure 1, tracking error and Active Share classify "actively-managed" funds into four categories (K. J. M. Cremers & Petajisto, 2009; Muthitacharoen & Burong, 2022; Petajisto, 2013). K. J. M. Cremers and Petajisto (2009) determined the Active Share cutoff as 60 percent. The funds with an Active Share and tracking error of less than 20% are classified as "pure indexers" in the lower-left corner. This classification supports the notion that "passive" funds may not necessarily be "passive," and the activity level of "active" funds may vary based on the proportion of securities held in their portfolios and their benchmark index (Sharpe, 1991):

1. Concentrated stock pickers, who have both a high Active Share and tracking error due to combining the two characteristics of stock selection and systematic factor; 2. Diversified stock pickers, who have a high Active Share but a low tracking error due to some diversification, benefit from holding a large enough number of securities even in a few industries.

3. Factor wagers with a high tracking error but a low Active Share due to a high systematic risk that is not generated by a difference in the weight of holdings relative to the benchmark index.

Closet indexers, which have a low Active Share and tracking error, behave similarly to indexers despite their claim to be "active."

Using a measure they devised, K. J. M. Cremers and Petajisto (2009) discovered a significant decline in management activity in the US fund industry from 1980 to 2003, which was similar to what Kacperczyk, Sialm, and Zheng (2005) discovered, namely that holding a more concentrated portfolio in a few industries enhances fund performance as opposed to holding a diversified portfolio, which demonstrates superior management skills. In terms of total assets and management activity, the mutual fund business in France, Germany, Italy, the Netherlands, and the United Kingdom lagged behind that of the United States from 1991 to 1998, according to Otten and Bams (2002). Despite being marketed as "actively managed funds," Ratanabanchuen and Saengchote (2018) revealed that most Thai domestic equities funds behaved as indexers from 2005 to 2016, as indicated by tracking error.

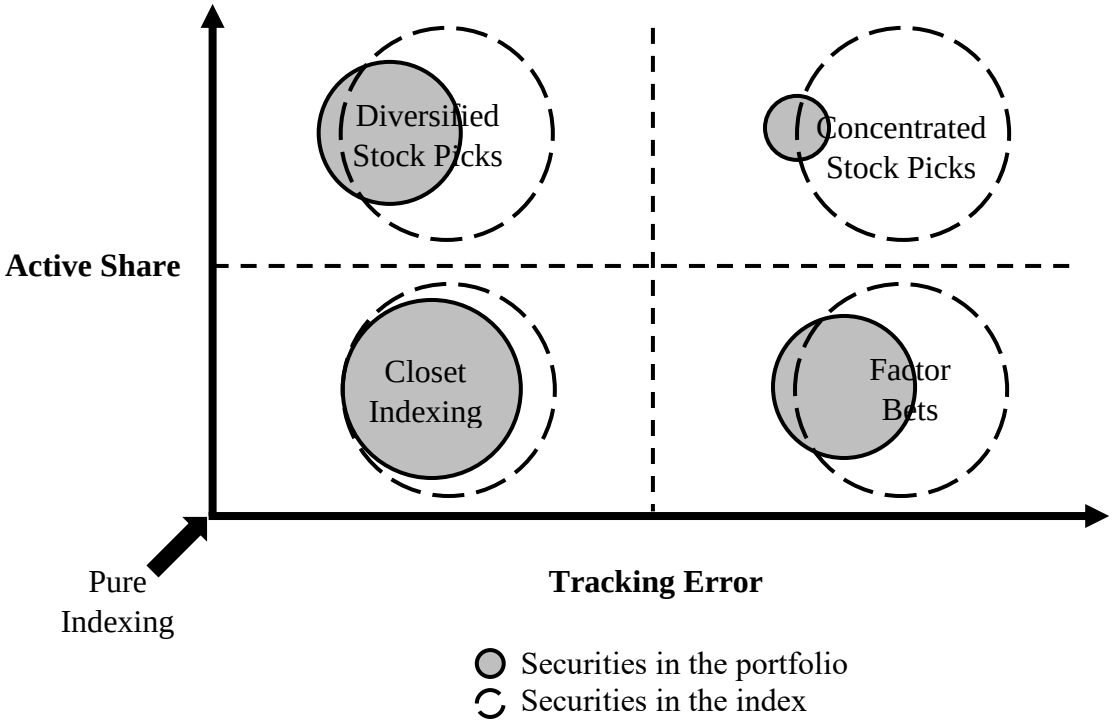

Figure 1. Types of actively managed funds are categorized by levels of Active Share and tracking error and components of the portfolio for each type (K. J. M. Cremers & Petajisto, 2009).

As depicted in Figure 1, portfolio management activity can be broken down into three components: (1) securities in the portfolio that are not in the benchmark, (2) securities in the benchmark that are not in the portfolio, and (3) securities in both the portfolio and the benchmark. Therefore, Active Share can be decomposed into three components, each of which can be calculated similarly to Equations [2a] and [2b], with the weight of securities existing in each component divided by two to eliminate the duplicate counting of long and short positions. It was also discovered that the total number of securities in a portfolio negatively relates to both Active Share and tracking error. In contrast, the fraction of stocks in component (1) increases Active Share and tracking error (K. J. M. Cremers & Petajisto, 2009). M. Cremers (2017) asserts that equation [2b] better reflects the reality because only securities that overlap on both the index and the portfolio, i.e., component (3), have a lower Active Share.

Although Frazzini, Friedman, and Pomorski (2016) cautioned that Active Share would work best in performance evaluation only when portfolios are compared using the same market-cap, mandate, and benchmark index, they supported that Active and tracking error helps assess the cost of active management when applied together. Using the two-dimensional categorization, Petajisto (2013) discovered that the performance of each category of active funds varied. Only the after-fee return of stock pickers exceeds that

of their benchmark. At the same time, factor bets track the index, and closet indexers are so expensive that their performance before fees, which was surprisingly close to the benchmark, falls short of the index after costs. However, this was not observed in the Thai mutual fund market, where relatively few actively managed funds outperform their benchmark index return (Nattawut Jenwittayaroje, 2017; Ratanabanchuen & Saengchote, 2018; Sukcharoensin & Sukcharoensin, 2013).

2.2 Performance Persistence of Funds

Gruber (2011) questioned why active mutual funds are so popular with investors despite their subpar performance relative to their benchmark (Bogle, 2016; Ferreira, Keswani, Miguel, & Ramos, 2013; Frino & Gallagher, 2001). According to Zheng (1999), mutual funds are purchased and sold at their net asset value, which is irrelevant to their management. Therefore, fund performance that indicates management ability should be predictable and reflected in the cash flow that investors who recognize such ability and are aware of future fund performance – sophisticated investors – use to invest in and withdraw from the fund, a phenomenon known as the "smart money" effect. This effect, which ties performance persistence to cash flows, was analyzed on an annual basis using Equation [3]:

$$CF_t = \gamma_0 + \gamma_1 \alpha_{t-1}^4 + \gamma_2 \alpha_{t-2}^4 + \gamma_3 CF_{t-1} + \gamma_4 \alpha_{t-1}^1 + \gamma_5 R_{t-1} + \varepsilon_t, \quad [3]$$

Where;

CF_t = the net cash flow of the fund for year *t*
α_t^4 = the fund's four-index alpha in year *t*
α_t^1 = the fund's single-index alpha in year *t*
R_t = the fund's return in the period *t*
ε_t = the error term

Equation (3) depicts annual net cash flow to funds that can be explained by four-factor alpha for the two preceding years; annual net cash flows, single-index alpha, and prior-year return. The four-index alpha is solved utilizing the excess returns of a small-cap portfolio over an extensive cap portfolio, a high growth index over a value index, and a bond index over the risk-free rate as independent variables in addition to the market return over the risk-free rate.

In numerous places, the persistence of mutual fund performance has been investigated. Brown and Goetzmann (1995) found that fund performance in the United States was consistent between 1976 and 1988, regardless of whether an absolute or relative benchmark was utilized. Analyzed every year, this persistence changes with time and between managers. Elton, Gruber, and Blake (1996) discovered that risk-adjusted return in the United States was generally negative. Still, as assessed by risk-adjusted return,

funds with prior solid performance tended to outperform in the subsequent one- and three-year periods.

Carhart (1997) emphasized the short-term permanence of return. The fund's excess return over the risk-free rate was regressed in his four-factor model, which utilized the market's excess return and the returns of the zero-investment portfolios as explanatory variables. The market value and momentum of securities owned by funds, expense ratios, and transaction expenses can explain the one-year persistence. In addition, Detzel and Weigand (1998) discovered that performance persistence peaked between the late 1970s and early 1980s. However, they noted that the market capitalization, book-to-market ratio, earnings yield, and cash flow yield of the securities owned by each fund had a more significant impact on returns than the fund's own market risk or expense ratio.

Otten and Bams (2002) discovered fund performance persistence from 1991 to 1998 only in the United Kingdom, even though this could not be explained by Carhart (1997) model, but not in France, Germany, Italy, or the Netherlands. Keswani and Stolin (2008) discovered the "smart money" impact in the UK and the US post-1991, arguing that this was only due to investment and not disinvestment. Still, Jiang and Yuksel (2017) stated the "smart money" effect in the US fund sector in the last decade resulted from cash outflow. Su, Zhao, and Dutta (2012), the first researchers to directly examine annual domestic fund performance relative to the benchmark index in China, concluded that long-term persistence did not exist from 2002 to 2009, as most winning funds tended to maintain their good performance in down market conditions, while the opposite was true for losing funds.

According to Glode (2011), the popularity of actively-managed funds is driven by fund managers focusing on providing strong performance only when the economy is in a bad situation in response to rational investors, leading to an active return that positively correlates with the price kernel. N Jenwittayaroje (2018) cited this to support fund investors' similar conduct in the Thai mutual fund market and asserted that there was no consistency in the performance of Thai domestic equity funds from 2005 to 2014. Before the 2008 economic crisis, Sukcharoensin and Sukcharoensin (2013) and Nattawut Jenwittayaroje (2017); N Jenwittayaroje (2018) found that the return on Thai equity funds persisted. After the occurrence, the three-year performance consistency of Thai equities funds was obscure.

Sapp and Tiwari (2004) added the stock return momentum aspect to the impact and suggested that investors seek funds based only on historical returns, regardless of the momentum investing approach. Friesen and Sapp (2007) discovered that investors' ability to time the market decreased their annual return by approximately one percent from 1991 to 2004. They suggested that losses from failing to time the market, which was found to be more prominent in load funds and funds with higher risk-adjusted

returns, could potentially offset potential profits from funds performing well, consistent with the behavior of investors who chase returns Sapp and Tiwari (2004). Keswani and Stolin (2008) investigated the causes of mutual fund flows. They found that one-year "relative" performance affects cash inflows from unit purchases, but one-year "absolute" performance affects cash outflows from unit redemptions. This is because investors maintain units of funds gaining in value and sell units of losing funds.

Additionally, they discovered that although front-end loads hinder redemption, expense ratios increase redemption. In a recent study, Muñoz and Vicente (2018) examined investors' cash flow timing skills from 1990 to 2016. They found that timing decisions negatively impacted investor returns by approximately one percent per year, confirming what Friesen and Sapp (2007) discovered in the 1990s and early 2000s. In addition, they asserted that fund age, size, and characteristics of intelligent investors are favorably correlated with timing skills.

However, Daniel et al. (1997); Detzel and Weigand (1998) challenged the notion that only actively managed funds sold through brokers underperform index funds. In contrast, those offered directly to clients outperform index funds because they have a more significant motivation to achieve an abnormal return. In a global setting, (M. Cremers, Ferreira, Matos, & Starks, 2016); Daniel et al. (1997)) discovered that an increasing number of index funds intensifies market competition, putting pressure on active funds to demonstrate more excellent active management methods and lower investor fees to achieve superior performance. Recent research by Crane and Crotty (2018) indicates that only active funds with median performance above the index can outperform index funds. Those with median performance below the benchmark underperform their index.

January has the most significant net cash flows to domestic equities funds in the United States, while December has the lowest. This pattern was attributed to an increase in redemptions at the end of the year and an increase in purchases after the new year. This means that most investors make decisions on asset allocation around the new year. In contrast to the tax-incentivized funds market in Thailand, private investors aim to minimize the effective mandatory unit holding time to which the tax privilege is subject by purchasing the most units in December and selling the most units in January (Ratanabanchuen & Saengchote, 2018).

2.3 Tax-privileged Funds in Thailand

Ratanabanchuen and Saengchote (2018) asserted that the lower effective minimum holding duration of long-term equity funds (LTFs) relative to that of retirement mutual funds (RMFs) contributed to the more significant rise in popularity of LTFs over RMFs. Muthitacharoen and Burong (2022) discovered that tax incentive encourages investors to invest more in LTFs and RMFs, as demonstrated by the fact that middle-income and unsophisticated taxpayers responded to the 2013 tax benefit reduction by reducing their

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contribution to LTFs more than high-income and sophisticated investors. This was consistent with the findings of Sialm and Starks (2012), who discovered that taxable investors in the United States tend to employ investment strategies that reduce their effective tax burden.

2.4 Conceptual Framework

Based on earlier research on fund management activity and performance persistence, and for research reasons, we developed the conceptual framework shown in Figure 2.

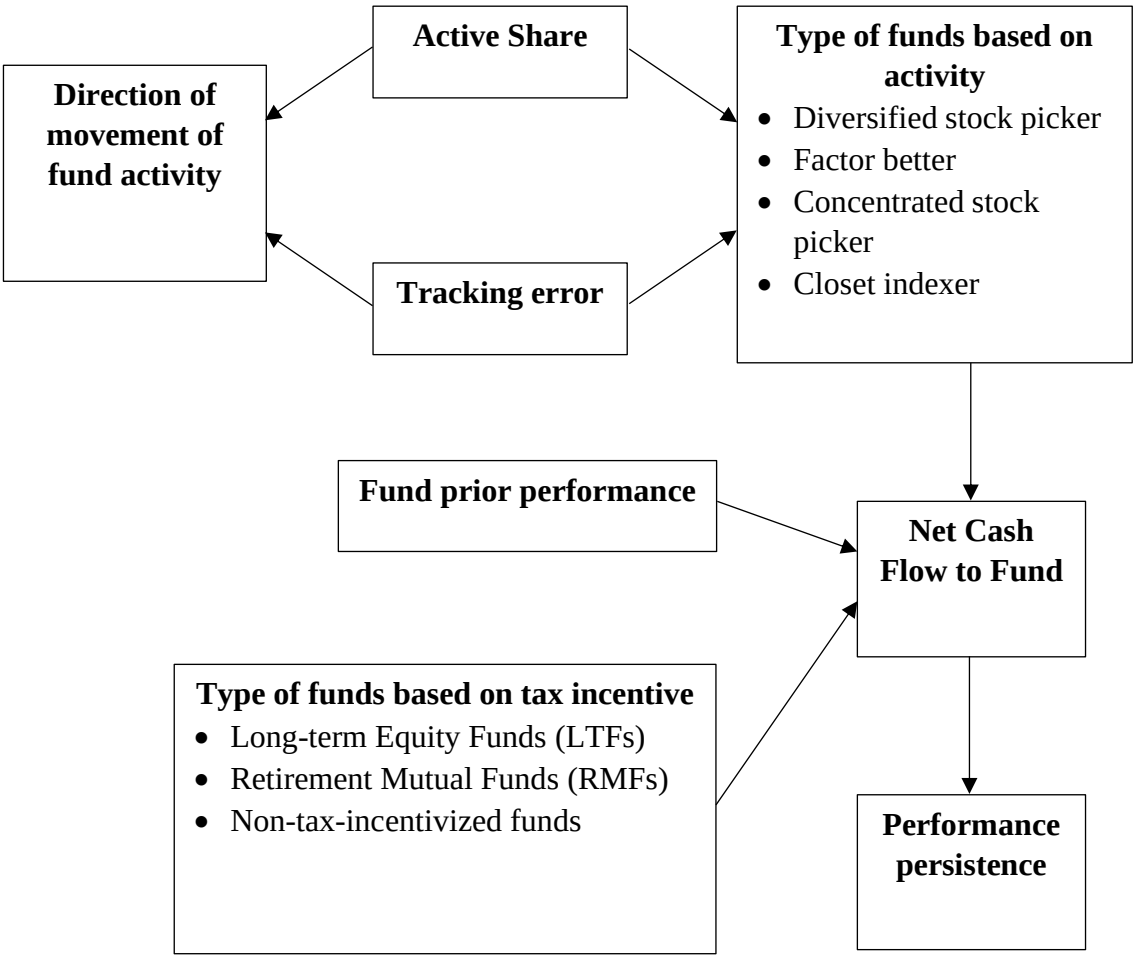

Figure 2. Conceptual Framework

3. RESEARCH DESIGN

3.1 Data

This study examines Thai equity funds on a semiannual basis from the six months ending in the first half of 2008 to the six months ending in the second half of 2016. This is in

line with previous research on domestic or global equity markets in different countries (Brown & Goetzmann, 1995; A. F Burns, 1951; Arthur F. Burns & Mitchell, 1946; Friesen & Sapp, 2007; Frino & Gallagher, 2001; Glode, 2011; Kacperczyk et al., 2005; Su et al., 2012). Only funds registered before January 1, 2008, and still in existence as of December 31, 2017, are retrieved. Excluded are funds with total or partial foreign investment for whom using the Stock Exchange of Thailand total return index (SET TRI) as a benchmark would be less accurate; index funds and exchange-traded funds (ETFs) that are expected to be passive despite recent claims of being less diversified (Bogle, 2016). These criteria were met by 112 funds from 18 asset management organizations.

Table 1. Number of Funds Examined in This Study

	Year of Registration				
	1992-1995	**1996-1999**	**2000-2003**	**2004-2007**	**Total**
Long-term equity fund (LTF)				40	**40**
Retirement mutual fund (RMF)			7	7	**14**
Regular fund	31	4	8	15	**58**
Total	**31**	**4**	**15**	**62**	**112**

The number of tax-privileged funds (LTFs and RMFs) and the year of registration are characterized by the sample size in Table 1. 2004 and 2001, respectively, saw the introduction of these two forms of tax-advantaged funds.

Each stock's weight in the index corresponds to the fraction of its market capitalization to the total. Each stock's market capitalization is determined by multiplying its market price by the number of outstanding shares after the period. The daily continuously compounded return of each fund is computed using the net asset value and unit holder dividends (if any). The daily benchmark index return is also calculated as constantly compounded from the Stock Exchange of Thailand total return index (SET TRI), which is retrieved from the SET's website and assumes that all dividends paid on equities are reinvested. As data are reviewed semiannually, the continuously compounded yield on a six-month zero-coupon bond is employed as the risk-free rate of return. The equations [4a] through [4c] demonstrate return computations:

$$R_{i,t} = \ln\left(\frac{NAV_t}{NAV_{t-1}}\right) + \frac{D_t}{NAV_{t-1}}, \quad [4a]$$

$$R_{m,t} = \ln\left(\frac{SET\ TRI_t}{SET\ TRI_{t-1}}\right), \quad [4b]$$

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$$R_{f,t} = \ln\left(\frac{6m\ ZRRI_t}{6m\ ZRRI_{t-1}}\right), \quad [4c]$$

where $R_{i,t}$ = the fund *i*'s return in day *t*
$R_{m,t}$ = the benchmark index return in day *t*
$R_{f,t}$ = the risk-free rate in day *t*
NAV_t = net asset value per unit of fund *i* at the end of day *t*
D_t = dividend per unit fund *i* paid to unit holders in day *t* (if any)
$SET\ TRI_t$ = the Stock Exchange of Thailand total return index at the end of day *t*
$6m\ ZRRI_t$ = the six-month zero rate return index at the end of day *t*

3.2 Methodologies

This study's initial section employs the two-dimensional categorization previously provided by K. J. M. Cremers and Petajisto (2009), which consists of tracking error and Active Share. Equation [1] is used to calculate tracking error based on daily returns derived from Equations [4a] and [4b] in each semiannual period, multiplied by the square root of the number of operating days in the period to yield the figure for the period, whereas equation [2b] is used to calculate Active Share rather than equation [2a] because it more accurately reflects a reduction in Active Share due to overlapping weights of securities holdings (M. Cremers, 2017). The calculation of the two metrics yields 20 half-year values for each metric for each fund.

Using the paired-sample t-test, the direction and significance of the average change in Active Share and tracking error of all 112 funds over 190 different time intervals are investigated. The fluctuation in these numbers reflects the shift in the management activities of funds within an economic cycle, primarily attributable to the securities held by each fund (Detzel & Weigand, 1998; Muthitacharoen & Burong, 2022). Figure 1 categorizes the 2,240 fund-half-years into four types: diversified stock pickers, factor bets, focused stock pickers, and closet indexers. The thresholds of 60 percent for Active Share and 10 percent for tracking error are established to differentiate between "low" and "high."

This study also tests the persistence of fund success in terms of net investment into or disinvestment from the fund, which Gruber (2011) indicates results from investors following the performance. Positive (negative) net cash flows indicate reinvestment (disinvestment) when the fund's performance is favorable (bad). Three variables indicating past performance are obtained from this concept: prior cash flow, prior [one-factor] alpha, and prior fund return calculated from equation [4a]. For this study, the net cash flow for the semiannual period is defined as the difference between the values of units sold and redeemed over time (in thousands of baht). Also yielding the same conclusion as the net cash flow to the fund are equations [5a] and [5b]:

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$$CF_t = \Delta PC_t + \Delta ER_t, \quad (5a)$$

$$CF_t = \Delta NAV_t - ChgNAO_t + D_t, \quad (5b)$$

Where;

CF_t = the net cash flow for period t

ΔPC_t = $PC_t - PC_{t-1}$ = change in paid-in capital in period t

ΔER_t = $ER_t - ER_{t-1}$ = change in unit equalization reserve in period t

ΔNAV_t = $NAV_t - NAV_{t-1}$ = change in net asset value in period t

$ChgNAO_t$ = change in net assets resulting from operations in period t

D_t = dividend distributed to unit holders in period t (if any)

Alpha for each fund-half-year is solved using the daily fund, and benchmark returns figured out from Equations [4a] and [4b], as well as risk-free daily rates from equation [4c], by single index model as described in Equation [6]:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i\left(R_{m,t} - R_{f,t}\right) + \varepsilon_i, \quad [6]$$

where α_i = the fund i's excess return;

β_i = the fund i's beta coefficient indicating the sensitivity of the excess return;

ε_i = the error term.

Equation [3] presented by Gruber (2011) is slightly altered here for a few points: the semiannual data are applied in the models rather than annual data as the original model did to be in parallel with the first part of this study. In addition, two groups of dummy variables are entered to investigate the effect of fund characteristics on the management activity and tax-privileged aspects (i.e., LTFs and RMFs). Factor bet is set as the base for dummy variables indicating active funds. These three groups of independent variables are regressed against cash flow for a specific period three times: for one group separately, two groups, and then all of them together. This yields a variety of effects of these independent variables. The regression models are described as Equations [7a] to [7g]:

$$CF_t = \beta_0 + \beta_1 CF_{t-1} + \beta_2 \alpha_{t-1} + \beta_3 R_{t-1} + \varepsilon_t, \quad [7a]$$

$$CF_t = \beta_0 + \beta_4 CSP_t + \beta_5 DSP_t + \beta_6 FB_t + \varepsilon_t, \quad [7b]$$

$$CF_t = \beta_0 + \beta_7 LTF + \beta_8 RMF + \varepsilon_t, \quad [7c]$$

$$CF_t = \beta_0 + \beta_4 CSP_t + \beta_5 DSP_t + \beta_6 FB_t + \beta_7 LTF + \beta_8 RMF + \varepsilon_t, \quad [7d]$$

$$CF_t = \beta_0 + \beta_1 CF_{t-1} + \beta_2 \alpha_{t-1} + \beta_3 R_{t-1} + \beta_4 CSP_t + \beta_5 DSP_t + \beta_6 FB_t + \varepsilon_t, \quad [7e]$$

$$CF_t = \beta_0 + \beta_1 CF_{t-1} + \beta_2 \alpha_{t-1} + \beta_3 R_{t-1} + \beta_7 LTF + \beta_8 RMF + \varepsilon_t, \quad [7f]$$

$$CF_t = \beta_0 + \beta_1 CF_{t-1} + \beta_2 \alpha_{t-1} + \beta_3 R_{t-1} + \beta_4 CSP_t + \beta_5 DSP_t + \beta_6 FB_t + \beta_7 LTF + \beta_8 RMF + \varepsilon_t, \quad [7g]$$

Where

α_t	=	the fund's excess return in period *t*
R_t	=	the fund's return in period *t*
CSP_t	=	1 if the fund is a concentrated stock picker in period *t*, 0 otherwise
DSP_t	=	1 if the fund is a diversified stock picker in period *t*, 0 otherwise
FB_t	=	1 if the fund is a factor bet in period *t*, 0 otherwise
LTF	=	1 if the fund is a long-term equity fund, 0 otherwise
RMF	=	1 if the fund is a retirement mutual fund, 0 otherwise
ε_t	=	the error term

4. RESULTS

This section presents results from the study, separated into two parts: descriptive analysis of the two measures of management activity, Active Share and tracking error, and their movements within the ten-year horizon; and regressions with current net cash flow to the fund as the dependent variables. The symbols 20--/1 and 20--/2 indicate the year's first and second half, respectively.

4.1 Descriptive Analysis and Movements of Active Share and Tracking Error

Figures 3a and 3b depict descriptive analyses of Active Share and tracking error within the sample. Throughout the decade, both measurements fluctuated widely. The average Active Share was 55%, with a minimum of 16% in the first half of 2009 and a maximum of over 98% in the second half of 2013. The active share was high when the market turned incredibly bearish and low when it turned incredibly bullish. The average semiannual tracking error was about six percent, with a minimum of just over one percent in the second half of 2017 and a maximum of 84 percent in the first half of 2010. Table 2 displays the two-dimensional categorization of 2,240 fund-half-years based on the two management activity metrics established by (K. J. M. Cremers & Petajisto, 2009).

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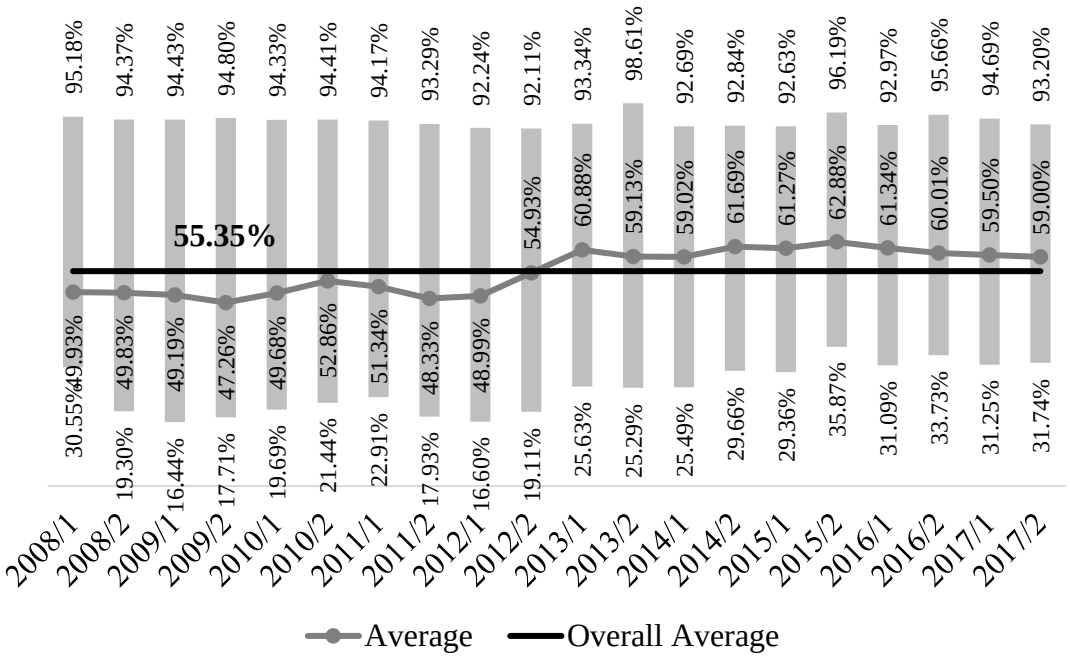

Figure 3a. Descriptive analysis of Active Share for Each Semiannual Period

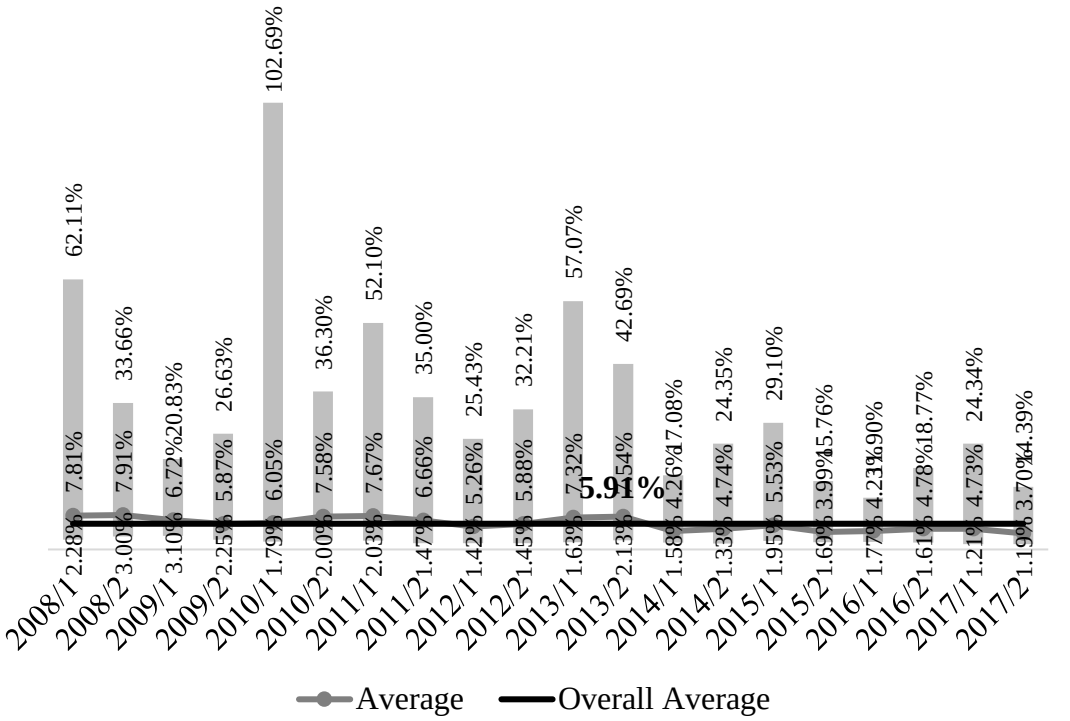

Figure 3b. Descriptive Analysis of Tracking Error for Each Semiannual Period

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Table 2. Number of Fund-Half-Year Data Categorized by Active Share and Tracking Error

Period	Concentrated Stock Picks (High AS, High TE)	Diversified Stock Picks (High AS, Low TE)	Factor Bets (Low AS, High TE)	Closet Indexing (Low AS, Low TE)
2017/2	3	46	1	62
2017/1	3	46	6	57
2016/2	7	45	2	58
2016/1	1	56	1	54
2015/2	0	63	5	44
2015/1	0	56	9	47
2014/2	7	53	1	51
2014/1	2	46	4	60
2013/2	12	36	11	53
2013/1	10	47	8	47
2012/2	8	36	6	62
2012/1	2	31	11	68
2011/2	7	22	10	73
2011/1	3	21	18	70
2010/2	6	22	17	67
2010/1	2	20	7	83
2009/2	8	8	6	90
2009/1	9	8	8	87
2008/2	9	8	11	84
2008/1	4	15	16	77
Overall	**103**	**685**	**158**	**1294**

According to Table 2, only 103 and 158 fund-half-years are concentrated stock pickers and factor bets, respectively. This suggests that only 261 fund-half-years, or less than 12 percent, have substantial tracking error. The remaining 685 fund-half-years are stock pickers. This indicates that 788 fund-half-years, or almost 35 percent, have a high Active Share. The remaining 1,294 fund-half-years, or 58 percent of the sample, are secret indexers despite the term "active" being used to describe the management style of the funds. The low active share of 1,979 out of 2,240 fund-half-years suggests that the majority of funds weighted their stock holdings in near proportion to the index.

Figure 4a and Table 3a illustrate the change in Active Share for 190 periods over the decade. The fluctuations range from a decrease of 4.53 percent to an increase of 15.62 percent. Active share has decreased 134 of 190 times or almost 70 percent of the time.

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Changes in Active Share are statistically significant over intervals of 10 or more semiannual periods. Active share changes heterogeneously for brief time intervals, particularly between one and six half-years. For one-period intervals, it has a greater tendency to decline than to rise, but for longer intervals, it tends to progressively reverse direction.

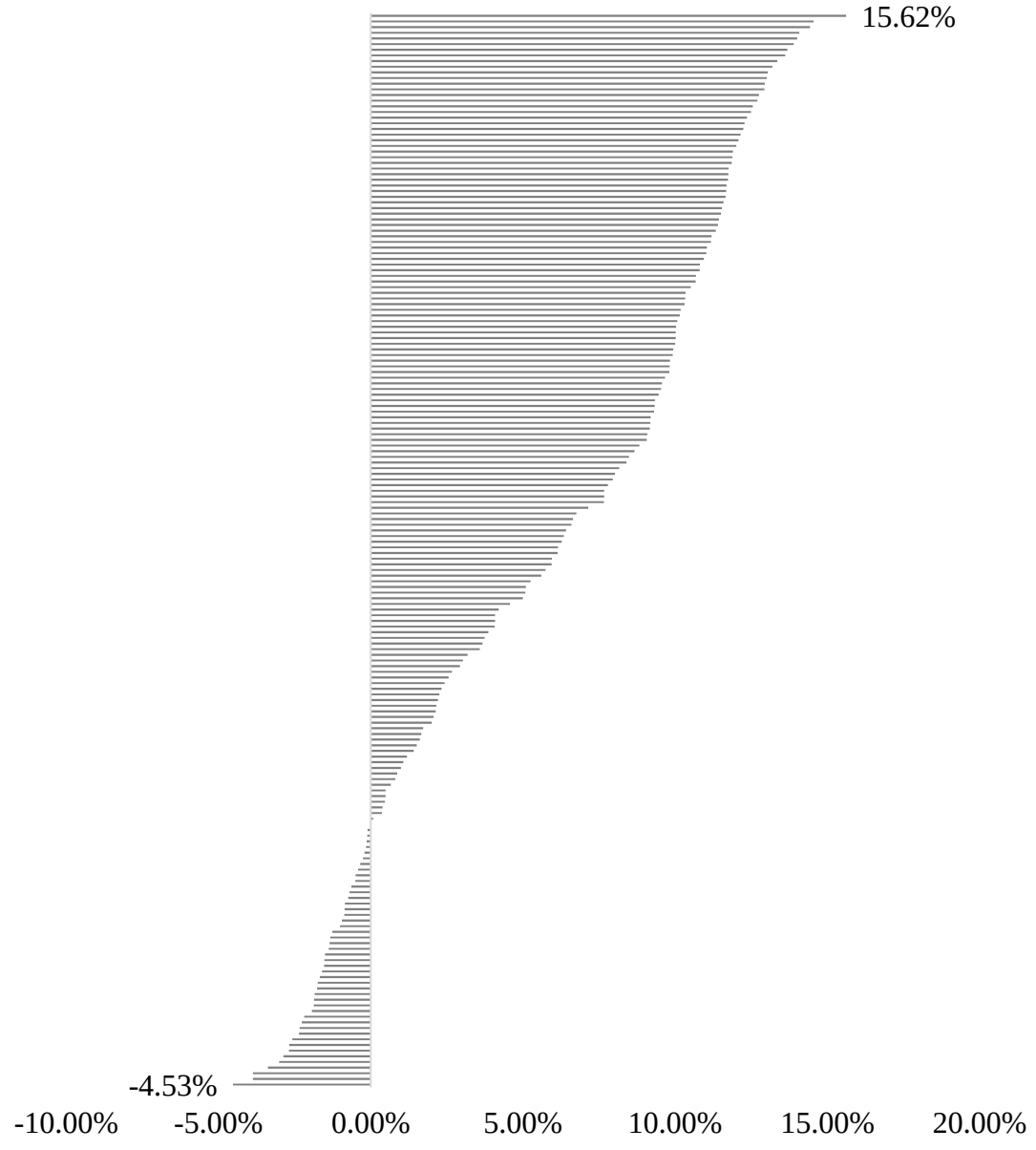

Figure 4a. Distribution of average movement in Active Share for 190 different time intervals.

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Table 3a. Time Intervals with Significant* Change in Active Share

Time Interval (Period(s))	Number of Interval(s)				
	Significantly Decreased	Insignificantly Decreased	Insignificantly Increased	Significantly Increased	Total
1	6	6	1	6	19
2	6	2	4	6	18
3	4	4	1	8	17
4	2	3	4	7	16
5	2	1	4	8	15
6	1	2	4	7	14
7		4	1	8	13
8		3		9	12
9		1		10	11
10				10	10
11				9	9
12				8	8
13				7	7
14				6	6
15				5	5
16				4	4
17				3	3
18				2	2
19				1	1
Total	**11**	**26**	**19**	**134**	**190**

* At 5% level.

Figure 4b and Table 3b illustrate the evolution of tracking error for 190 intervals during the past decade. In two ways, the movements are distinct from those of Active Share. First, the most significant downward change in tracking error is bigger than the maximum upward change, which is 2.28 percent. Second, tracking error has increased over 108 intervals, or approximately 57%, in the opposite direction of Active Share's movement for most intervals. Nonetheless, disparities in tracking inaccuracy appear to be comparable to those in Active Share, but in the other direction. The shift in tracking error is significant at intervals of 15 or more semiannual periods. Similar to Active Share, it varies its behavior during brief intervals. Over one-period intervals, it tends to rise rather than decline, and its direction changes slightly for intervals of two to eight semiannual periods.

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Figure 4b. Distribution of average movement in tracking error for 190 different time intervals.

Table 3b. Time Intervals With Significant* Change in Tracking Error

Time Interval (Period(s))	Number of Interval(s)				
	Significantly Decreased	Insignificantly Decreased	Insignificantly Increased	Significantly Increased	Total
1	6	2	11		19
2	8	4	2	4	18
3	7	4	4	2	17
4	6	6	3	1	16
5	4	10	1		15
6	8	2	3	1	14
7	7	4	1	1	13
8	9	1	1	1	12
9	7	3	1		11
10	6	4			10
11	7	2			9
12	7	1			8
13	6	1			7
14	5	1			6
15	5				5
16	4				4
17	3				3
18	2				2
19	1				1
Total	**108**	**45**	**27**	**10**	**190**

* At 5% level.

4.2 Cash Flow to Funds Representing Performance Persistence

Table 4 displays the outcomes of regressions against the fund's net cash flow for the present period using 2,240 fund-half-years. The eight explanatory factors are organized into three categories: variables representing prior performance, dummy variables indicating actively managed funds, and dummy variables indicating tax incentive fund characteristics. Models I, II, and III each utilize a single set of independent variables. Models IV, V, and VI each have two independent variables. All eight independent variables are regressed jointly in Model VII. Models I, V, VI, and VII demonstrate the effect of the first group of explanatory variables, which indicate earlier performance. It is demonstrated that one percentage point of alpha for one prior period — the only one of the three variables evaluating former performance that is not significantly related to present net cash flow — corresponds to between two and four hundred thousand baht in current net cash flow.

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Table 4. Coefficients from Regressions

Model	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**
Equation	**(7a)**	**(7b)**	**(7c)**	**(7d)**	**(7e)**	**(7f)**	**(7g)**
Intercept	60,451* (10,823)	48,881* (14,178)	50,149* (15,024)	-18,592 (17,974)	20,462 (13,612)	24,485 (14,402)	-23,285 (17,098)
CF_{t-1}	0.3733* (0.0199)				0.3601* (0.0200)	0.3592* (0.0201)	0.3442* (0.0202)
α_{t-1}	3.7714*e*7 (2.3937*e*7)				2.4132*e*7 (2.3927*e*7)	4.4043*e*7 (2.3885*e*7)	3.0808*e*7 (2.3851*e*7)
R_{t-1}	230,280* (59,902)				217,545* (59,682)	236,670* (59,683)	222,037* (59,394)
CSP_t		202,581* (52,216)		230,403* (51,916)	184,317* (48,873)		202,400* (48,868)
DSP_t		168,819* (24,099)		175,672* (23,863)	107,507* (22,783)		113,999* (22,714)
FB_t		-12,080 (42,981)		14,670 (42,956)	-1,253 (40,278)		16,444 (40,490)
LTF			154,739* (23,516)	164,249* (23,386)		98,248* (22,240)	108,384* (22,263)
RMF			28,452 (34,070)	28,404 (33,953)		19,272 (31,794)	22,434 (31,890)
R^2	14.05%	2.63%	1.95%	4.80%	15.29%	14.81%	16.20%
$\bar{R}^2$	13.93%	2.50%	1.86%	4.59%	15.06%	14.62%	15.90%

* Significant at 1% level.

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However, one thousand baht of net cash flow of funds in a preceding period drastically reduces the net cash flow of funds in the present period to roughly three hundred baht. One percentage point of return in the previous period has a favorable impact on the net cash flow of the current period by approximately two million baht.

Models II, IV, V, and VII demonstrate whether characteristics of active funds other than closet indexers impact the fund's net cash flow. The models demonstrate that being stock pickers, i.e., funds with a high Active Share, whether concentrated or diversified, greatly benefit the period's net cash flow. The net cash flows of concentrated stock pickers are around 200 million baht more than those of closet indexers. In comparison, the net cash flows of diversified stock pickers vary from 107 to 175 million baht per semiannual period. The outcomes of factor wagers vary between models, but none are statistically significant. When factor bets are compared to closet indexers based on the active fund or non-indexer characteristics, with or without prior performance, factor bets generate between one and twelve million baht less in net cash flows. The effect of factor bets' characteristic becomes positive for 14 to 16 million Thai Baht when regarded alongside the characteristic of tax-incentivized funds.

Models III, IV, VI, and VII exhibit the effect of tax-incentivized funds, such as LTFs and RMFs. The four models indicate that LTFs are the only type of tax-privileged funds whose cash flows are significantly greater than ordinary funds, by approximately 98 to 164 million Thai Baht per period. Although tax incentives are also granted for LTFs, the net cash flows of RMFs are around 19 to 28 million baht greater. However, this correlation is not statistically significant.

5. DISCUSSION, CONCLUSION, AND SUGGESTIONS

Although they were marketed as actively managed funds, most funds in this analysis were found to be "closet indexers" with low two-measure correlations. Both Active Share and tracking errors altered in disjointed directions and significance during brief durations of time. The active share increased during intervals longer than ten semiannual periods, although tracking inaccuracy decreased. Ratanabanchuen and Saengchote (2018) revealed that most Thai domestic equities funds behave as de facto indexers due to their deficient tracking error. This study bolsters their claim by demonstrating that it holds when measured using Active Share and when the two measures are combined.

All three indicators of historical fund performance result in positive net cash flows to funds, indicating consistency in fund performance, except the last alpha. This contradicts Nattawut Jenwittayaroje (2017); N Jenwittayaroje (2018); Sukcharoensin and Sukcharoensin (2013), who found no persistence in Thai domestic equity funds after the 2008 financial crisis, and contradicts Glode (2011), who attributed the negative effect of a prior return to fund managers' concentration on delivering good performance only in a poor economic environment. Similar to what Gruber (2011) discovered in equity funds in the United States from 1985 to 1994, the present findings support his explanation that

prior cash flows include many other variables that may influence future cash flows. In contrast, funds are bought and sold at their NAV, which does not include management ability, and thus current net cash flow should be in line with predictable performance.

Despite being a minority in the neighborhood of active funds, stock pickers – concentrated and diversified – generated significantly larger positive net cash flows than factor bets and closet indexers. This study can answer the question posed by Nattawut Jenwittayaroje (2017) as to why equities funds, mainly actively managed ones, are so popular despite having negative alpha on average, which indicates that they barely outperform the market. This is because stock pickers, as measured by Active Share, invest assuming that their activity will increase their performance.

Long-term equity funds (LTFs), which offer tax-allowance privilege, tended to be more popular than retirement mutual funds (RMFs) or other ordinary funds. This is another solution to Gruber (2011) question regarding the popularity of actively managed funds, as their active characteristic and tax privilege drive investors to contribute more to the funds with the expectation of consistent performance, which Gruber termed the "smart money impact." This result is similar to what Sialm and Starks (2012) discovered in the United States. It is supported by Muthitacharoen and Burong (2022). They discovered that middle-income taxpayers responded strongly to the 2013 tax benefits reduction by decreasing their purchase of LTF units, as marginal propensity to save (MPS) among LTFs is positively related to the effective tax burden each unitholder bears. The study also confirms the findings of Ratanabanchuen and Saengchote (2018). They attributed investors' preference for LTFs over RMFs to the harsher requirements for tax allowance granted to RMF unitholders compared to LTF unitholders, including a much longer minimum holding time requirement.

A few suggestions for future research will be made. First, although only Thai equity funds with the total in-country investment are the subject of this article, future research may include domestic funds with either total or partial foreign investment in a particular nation. Second, as the time horizon examined here encompasses an entire economic cycle, the activity of fund management can be studied for the same stage(s) of different economic cycles, such as the crisis and recession stages as measured by specific economic indicators, in which Petajisto (2013) found the exact behavior of each type of actively managed funds. As a new type of tax-incentivized funds, the super-savings funds (SSFs), whose minimum necessary holding duration is longer than LTFs, will be launched in Thailand from 2020 to 2024. Their popularity may be compared to that of LTFs and RMFs.

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