Essays on Open-Ended on Equity Mutual Funds in Thailand

Roongkiat Ratanabanchuen and Kanis Saengchote*

Chulalongkorn Business School

ABSTRACT

Mutual funds provide a convenient and well-diversified option for households make intertemporal fund transfers for their future needs. In this collection of three short essays, we investigate open-ended equity mutual funds in Thailand that invest in domestic equity during 2005 to 2016. While these funds collectively account for only 13.4% of assets under management of the whole industry in 2016, they comprise tax-privileged long-term equity funds (LTF) and retirement mutual funds (RMF) that had proven very popular since their inception in 2004. In the first essay, we document several stylized facts about open-ended equity mutual funds in Thailand, including facts about the types of stocks they hold and the positive relationship between past returns and the ability to attract new investment capital, which we build on in the second and third essays. The second essay investigates the influence that mutual fund capital has on the returns of the stocks they invest in, and the third essay explores how competition for investment capital can affect mutual fund investment strategy and thus their returns.

* Corresponding author. Chulalongkorn Business School, Chulalongkorn University, Phayathai Road, Pathumwan, Bangkok 10330, Thailand. (email: kanis@cbs.chula.ac.th).

Chapter 1:

Stylized Facts about Open-Ended Equity Mutual Funds in Thailand

ABSTRACT

Open-ended equity mutual funds in Thailand, while small relative to all mutual funds outstanding (13.4% of total net assets in December 2016), contains the tax-privileged investments (long-term equity funds and retirement mutual funds) that have proven very popular since their inception in 2004. In this article, we highlight four stylized facts regarding their returns, investment strategies and fund flows that we hope would be useful for both the investment community and academic researchers. A Power BI visualization of our results can be accessed at http://bit.ly/2PjAo2L.

Keywords: equity mutual funds, risk-adjusted return, flow-performance relationship

JEL Classification Code: G11

1. Introduction

Mutual funds have becoming an increasingly popular investment vehicle in Thailand, with total net assets (TNA) growing almost five-fold from just under 1 trillion Baht in 2005 to more than 4.6 trillion Baht by 2016, which is spread across more than 1,500 funds in several asset classes.[1] While most of Thai mutual fund capital is invested in domestic fixed income securities and foreign assets, a growing proportion is invested in domestic equity, representing around 13.4% of AUM in December 2016. In this article, we focus on this subset of open-ended equity mutual funds and highlight several stylized facts that, we hope, would give investors a better understanding about them. In examining 294 funds that together represent more than 620 billion Baht of AUM, the majority of which are tax-privileged, we document several interesting facts. [2] First, most open-ended equity mutual funds in Thailand do not beat the market, whether it is raw or risk-adjusted returns. Second, while 94% of funds in our sample are classified as actively-managed funds, the majority of the funds effectively act as *de facto* indexers. Third, the majority of capital is allocated to stocks with large market capitalization, and fund managers tend to prefer stocks classified as growth (versus value), and experience strong past performance (momentum). Fourth, funds that experienced higher returns and funds operated by bank-owned asset management companies tend to experience greater inflows in subsequent period. Moreover, tax-privileged investments tend to occur in the last quarter (in particular, December) of each year.

The rest of this article is structured as follow: Section 2 outlines our sources of data and empirical methodology. Section 3 presents the results and stylized facts grouped by themes as discussed above, and Section 4 concludes.

2. Data and Empirical Methodology

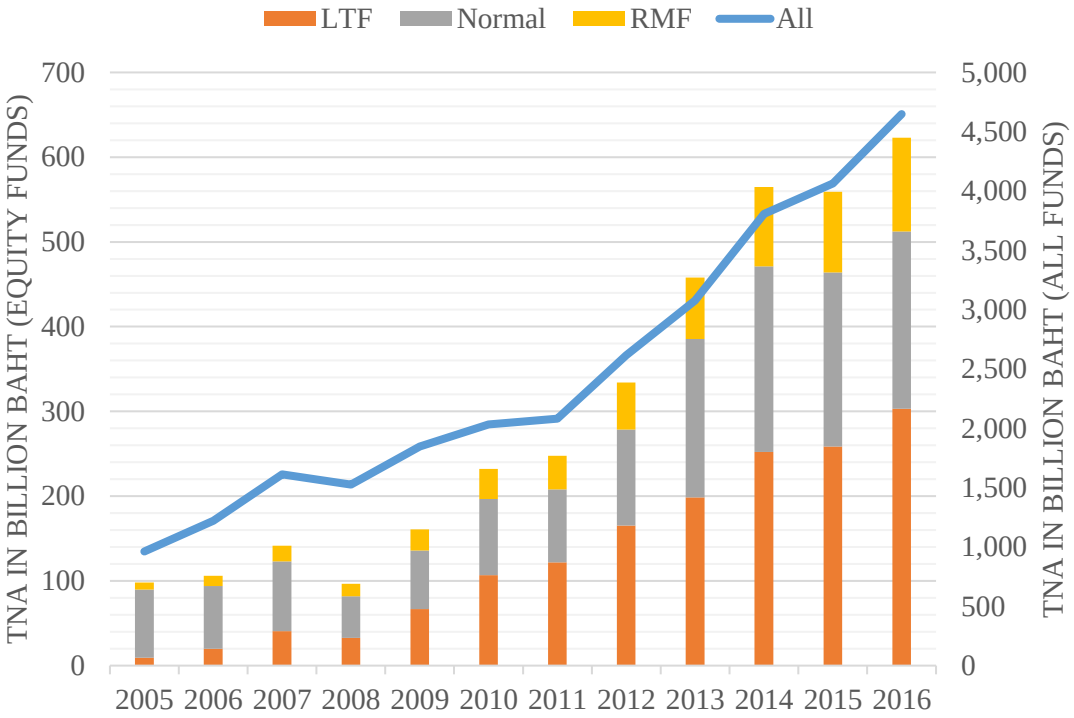
Our article relies on several data source. Fund total returns, investment objectives (referred to as Morningstar Category), fees, total net assets, fund holdings, and other fund characteristics are obtained from the Morningstar database. Stock characteristics and returns are obtained from Thomson Reuters Datastream, supplemented by stock market total returns from the Stock

[1] Another name for total net assets (TNA) is assets under management (AUM), which is a measure that represents size in the mutual fund industry.

[2] There are two main classes of tax-privileged investments: the Long Term Equity Fund (LTF), which are subjected to a 5-year lockup period (amended to 7 years for investments beginning 2016), and Retirement Mutual Fund (RMF), which are subjected to a minimum 5-year lockup period and cannot be redeemed until the investor's age reaches 55. If investments are sold prior to the respective lockup periods, investors must return the tax deductions claimed. While the tax deduction limits are separate for LTFs and RMFs, LTFs are more popular in Thailand, as more than 86% of tax-privileged assets in the sample are held through LTFs, which have much shorter effective lockup period.

Exchange of Thailand. During our sample period of 2005 to 2016, there are 294 unique open-ended equity mutual funds, whose TNA over time is presented in Figure 1.

Figure 1: Total net assets of open-ended equity mutual fund (LHS) versus all mutual funds (RHS)



Using data retrieved from providers, we compute additional variables that will be used in our analyses, which are relative return, tracking error, asset pricing risk factors, holding-based fund beta, and capital flow to fund.

Relative return, measured at monthly interval, is computed as the difference between the fund's raw total return and the total return of the Stock Exchange of Thailand. [3] Tracking error is the standard deviation of the monthly relative return. For asset pricing risk factors, we use the Carhart (1997) 4-factor adaptation of the Fama and French (1993) 3-factor model that includes the momentum (returns persistence) factor.[4] For each stock in the sample, we estimate its beta using

[3] More than 80% of the funds are benchmarked to the SET Index, which is the market-value weighted index of all listed stocks in the Stock Exchange of Thailand. The second most popular benchmark is the SET50 Index, which includes 50 stocks with the largest market capitalization. For simplicity in this article, we will use the SET Total Return Index, which incorporates not just price returns but also from distribution of dividends, as the common benchmark.

[4] The construction methodology is based on Kenneth French's website and our stock universe includes both stocks listed in the Stock Exchange of Thailand and the Market for Alternative Investment which has more relaxed listing requirements and contains smaller companies.

past returns.[5] With data on each fund's holdings of individual stocks, we can compute the value-weighted, fund-level systematic risk loading, which we refer to as the holding-based fund beta.

Finally, as we are interested in how investors select mutual funds, we compute monthly flows using the levels of TNA in each month and the one-month return, as described in Equation (1).

$$Flow_{i,t+1} = TNA_{i,t+1} - TNA_{i,t}(1 + r_{i,t+1}) \quad (1)$$

This definition measures the *amount* of flow in to the fund in each month, which is different from the popular measure in the literature which measures flow as *percentage change*. Next, we compute another measure of flow by aggregating the monthly flow in each year and then dividing the sum by the fund's TNA at the end of the previous year to get the percentage change as commonly used in previous studies.

In this article, we do not provide an overall table of summary statistics; rather, we will focus on different aspects of the open-ended equity mutual fund industry and present the facts as we proceed. We divide the analysis into 3 topics: fund returns, fund investment strategy and fund flows, and we rely on both univariate and multivariate analyses to present our findings. The results of our analyses are best explored in conjunction with a Power BI visualization accessible via http://bit.ly/2PjAo2L.

3. Results

Fund Returns

Over the sample period, the average monthly relative returns across the 294 funds in the sample is -0.20% per month, where 233 funds (79% of all funds) have negative relative returns and 67 of them are statistically significant at 5% level. Across the 6 Morningstar Categories (Aggressive Allocation, Conservative Allocation, Equity Fix Term, Equity Large-Cap, Equity Small/Mid-Cap, Moderate Allocation), Equity Small/Mid-Cap funds have the highest average relative return at 0.10% per month, while Moderate Allocation funds have the lowest average of -0.59%. It is worth noting that total return reported by Morningstar already accounts for operating

[5] We use the beta calculation method based on Frazzini and Pedersen (2014), where each stock's beta is calculated as the ratio of its covariance to the market return and the product of the stock's and market returns standard deviation.

expenses of the funds but does not include the front-end and bank-end fees that investors may incur when buying and selling the units. Table 1 presents the results of the univariate analysis.

Table 1: Fund lifetime return (measured in monthly percentage point)

Morningstar Category	Relative return	4-factor alpha	Number of funds…	…with neg. rel. returns	… and statistically significant	… with negative alpha	… and statistically significant
Aggressive Allocation	-0.25	-0.15	47	44	11	38	5
Conservative Allocation	-0.55	0.02	14	13	1	8	0
Equity Fix Term	-0.54	-0.54	24	24	13	24	13
Equity Large-Cap	-0.13	-0.09	163	126	30	128	15
Equity Small/Mid-Cap	0.10	0.12	30	10	1	11	0
Moderate Allocation	-0.59	-0.13	16	16	11	16	3
All Funds	-0.20	-0.11	294	233	67	225	36

Next, we evaluate the fund returns with respect to the Carhart (1997) 4-factor asset pricing model to get the risk-adjusted return, alpha. Specifically, for each fund i, we estimate α_i using the regression specification described by Equation 2, where r_{it}^e is the fund's excess return (raw return minus one-month treasury bill) in each month. To account for serial correlation, standard errors are computed using the Newey-West produced with one-month lag.

$$r_{it}^e = \alpha_i + \beta_i^{MKT} MKTRF_t + \beta_i^{SMB} SMB_t + \beta_i^{HML} HML_t + \beta_i^{UMD} UMD_t + \varepsilon_{it} \quad (2)$$

The average alpha is also negative: of the 294 funds, 225 funds have negative alpha, 36 of which are statistically significant at 5% level. The correlation between average monthly relative return and 4-factor alpha is 0.7810 and statistically significant at 1% level. These results are similar to Jenwittayaroje (2017), who studies Thai equity mutual funds between 1995 and 2014 and also find only a handful of funds that deliver positive alpha. One slight difference is that we use the 4-factor asset pricing model, while to Jenwittayaroje (2017) uses the 3-factor model without the momentum factor. Overall, the results suggest that Thai equity mutual funds do not deliver returns that are on par with passive investing in the broad index.[6] This is our first stylized fact.

Further investigation of the factor loadings reveals an interesting insight: while relative returns are increasing in beta (which is expected, as funds that take on more market risk should perform better, as shown in Figure 2), fund alphas are decreasing in beta (as shown in Figure 3).

[6] We repeat the same analysis using annual data and the results are similar – funds on average deliver negative relative returns and alphas.

In other words, funds that try to increase returns by taking on more market risk deliver less risk-adjusted returns on average. This result echoes the stock-level finding by Saengchote (2017) that Thai stocks with high betas tend to have low alphas.

Figure 2: Fund relative return versus market risk (4-factor model)

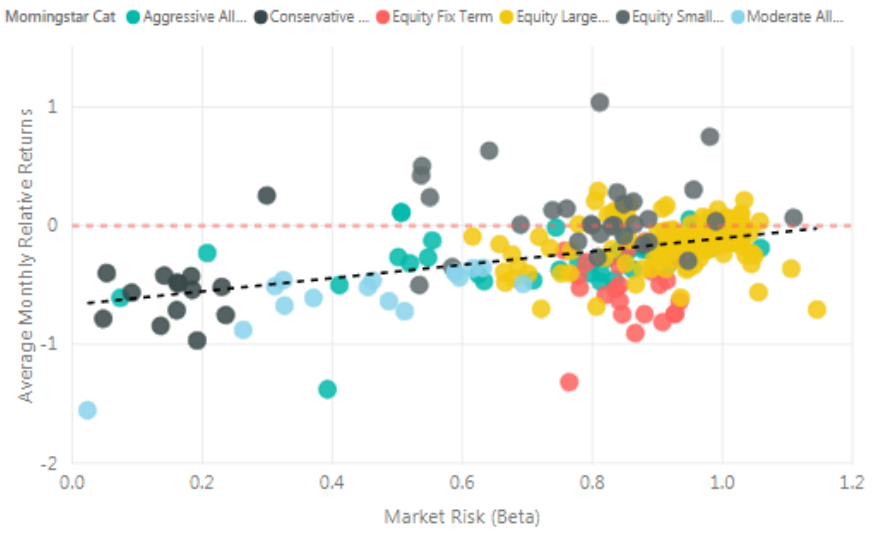
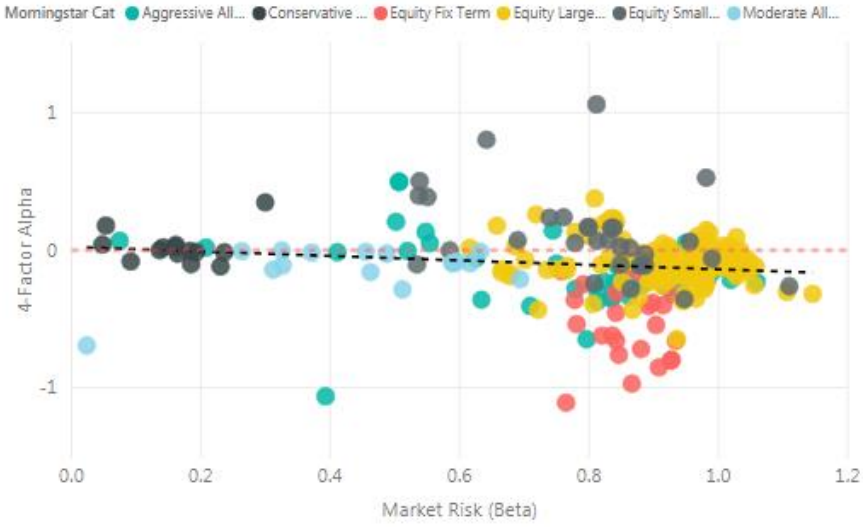


Figure 3: Fund alpha versus market risk (4-factor model)

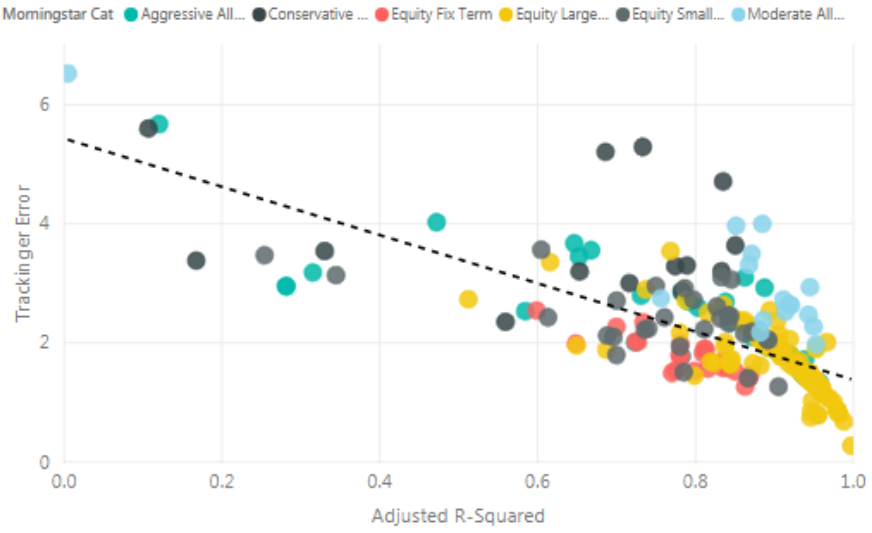


Fund Investment Strategy

The majority of equity mutual funds in Thailand are marketed as actively managed funds (94% of our sample), which means that fund managers will attempt to use their skills to outperform the market, whether through stock selection or market timing. While we do not directly observe their activities, there are several statistical methods that we can use to infer their trading strategies.

The first method is to use the adjusted R-squared value from the single factor asset pricing model – that is, how much variation of the fund's return is explained by the stock market return. High adjusted R-squared value means the fund's return is very similar to the market, a measure of degree of indexing. The second method is to compute the standard deviation of the relative returns. Funds that have relative returns consistently close to zero tracks the market closely. This measure is also referred to as "tracking error" or "active risk". More than two-thirds of the funds in the sample (198 out of 294) have adjusted R-squared value of at least 85%, suggesting that they are *de facto* indexers, also commonly known in the literature as "closet indexers".[7] The adjusted R-squared value is also highly correlated with tracking error (-0.7223 and statistically significant at 1% level). The result is presented in Figure 4. This is our second stylized fact.

Figure 4: Fund's tracking error (standard deviation of relative return) plotted against degree of indexing (adjusted R-squared value from single factor regression model)



Another way to infer fund investment style is to directly look at each fund's stock holdings. Mutual fund in Thailand have to submit their investment positions periodically to the Securities and Exchange Commission, but the same information is also made available through their annual reports. We obtain data on fund holding in December 2016 from Morningstar database. In order to identify the characteristics of the stocks that funds hold, we rank Thai stocks based on dimensions that correspond to the 4-factor asset pricing model and classify them in to quintiles. For example, the fifth quintile for market capitalization corresponds to large cap stocks. In

[7] See, for example, Sebastian and Attaluri (2014) and Cremers et al. (2016).

addition, we include the holding-based fund beta and proportion of fund TNA that is allocated to stocks that belong to the SET100, the index that contains 100 largest stocks in the Stock Exchange of Thailand. The cross-sectional median is computed and reported in Table 2.

Table 2: Median fund market risk and characteristics of stocks held

Morningstar Category	Number of funds	Holding-based fund beta	TNA invested in to SET100	Quintiles of stocks on each dimension (1 corresponds to stocks with small market capitalization, low book-to-market ratio and low past 12-month returns, while 5 corresponds to the opposites)		
				Market cap ranking	Book-to-market ratio ranking	Momentum ranking
Aggressive Allocation	47	1.06	74%	4.72	2.75	3.59
Conservative Allocation	14	0.29	79%	4.85	2.59	3.57
Equity Fix Term	24	1.24	73%	4.69	2.48	3.63
Equity Large-Cap	163	1.06	79%	4.80	2.67	3.60
Equity Small/Mid-Cap	30	1.03	68%	4.68	2.57	3.62
Moderate Allocation	16	0.98	83%	4.84	2.63	3.64
All Types	294	1.06	76%	4.78	2.66	3.60

The result shows that equity mutual funds in Thailand prefer to invest in large stocks, as evidenced by both the proportion of capital allocated to SET100 stocks (76%) and the weighted-average ranking of stocks held in portfolio (4.78 is closer to 5). The book-to-market ratio is often used to distinguish value stocks (high book-to-market ratio) from growth stocks (low book-to-market ratio). Fund holdings are slightly tilted toward growth stocks (2.66 is closer to 1). Similarly, funds tend to hold stocks that experience strong past returns (3.60 is closer to 5). This is our third stylized fact.[8]

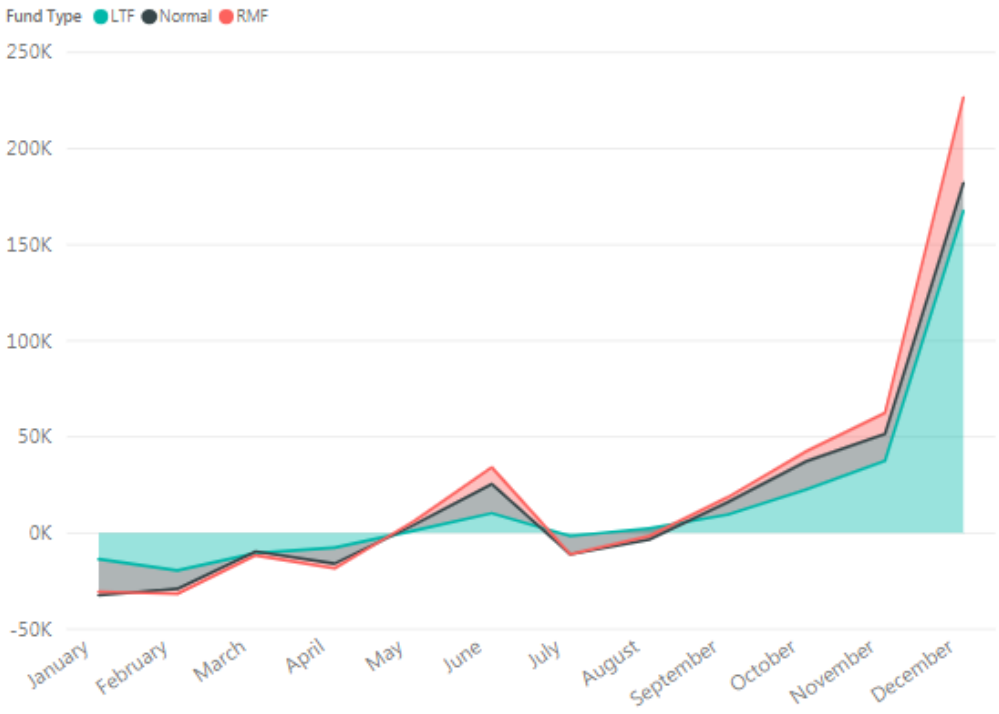
Fund Flows

Lastly, we turn our attention to fund flows. First, we look at the aggregate fund flow over 2005 to 2016 by month. During this period, more than 264 billion baht of capital is invested in equity mutual fund, 76% of which is accounted for by LTF flows. As the lockup periods for tax-deductible investments (LTF and RMF) are defined based on calendar dates (for example,

[8] The coefficients of the 4-factor pricing model confirm this finding. The median factor loading for SMB and HML are negative, signifying more exposure to large cap and growth stocks, and the median factor loading for MOM is positive. The results can be explored in the companion Power BI visualization.

investment made in December of year t to January of year t+1 is counted as 2 years when it is effectively 2 months), Thai investors tend to make such investments in the last quarter of each year to minimize the effective lockup period, as illustrated by Figure 5.

Figure 5: Aggregate fund flow over 2005 to 2016 by month (unit: million baht)



Next, we examine the determinants of fund flows. Sirri and Tufano (1998) find convex relationship between past fund returns and future fund flow. In this analysis, fund flow is aggregated in each year and flow is calculated as percentage compared to last year's ending TNA, while fund relative return is ranked into quintiles and enter the regression equation as dummy variables to allow for convex relationship between performance and flow. The 5th (bottom) performance quintile is omitted as baseline category. We modify their regression specification to include a dummy variable for funds that operated by bank-owned asset management companies and include both style and year fixed effects to account for unobservable factors that could affect fund flows. Standard errors are clustered at fund level to account for potential autocorrelation. The regression output is reported in Table 3.

Table 3: Determinants of fund flows

This table report results from regressions of percentage change in fund flow in year *t+1* on indicator variables of fund performance quintiles in year *t* and fund characteristics measured at the end of year *t*. The 5th (bottom) performance quintile is omitted as baseline category. All regressions include year and style fixed effects. Standard errors, reported in parenthesis, are clustered by fund. Stars correspond to statistical significance level, with *, ** and *** representing 10 percent, 5 percent and 1 percent level respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	All	Non-Tax	Tax	LTF	RMF
4th performance quintile	6.1014**	7.4888*	3.3660	2.7113	3.9665
	(2.7202)	(3.9579)	(2.3399)	(3.2592)	(3.6806)
3rd performance quintile	5.0363**	4.7859	5.6054*	5.6472	8.0622***
	(2.4887)	(3.1792)	(3.0406)	(5.0911)	(2.9713)
2nd performance quintile	5.3621**	5.0245	4.6596*	3.0542	8.2704**
	(2.3992)	(3.2743)	(2.4133)	(3.6458)	(3.2626)
Top performance quintile	14.6249***	13.1649***	20.0810***	21.8704***	18.4900***
	(2.7349)	(3.4858)	(3.6190)	(4.5708)	(6.4049)
Lagged std dev of monthly returns	-2.2631**	-1.7302	-0.1520	0.2417	-0.7397
	(1.0194)	(1.2270)	(1.3836)	(2.1719)	(1.6506)
Lagged expense ratio	4.0369***	2.4117**	9.3810*	11.1106	5.4918
	(1.2164)	(1.0703)	(4.9741)	(7.0673)	(3.4045)
Log of lagged fund size	-2.3615***	-2.9985**	-3.6426***	-3.4018**	-4.0331***
	(0.9089)	(1.2039)	(1.1529)	(1.4860)	(1.1930)
Fund owned by bank	15.3721***	13.7992***	14.2213***	13.5981***	16.4218***
	(2.5327)	(3.1170)	(3.3788)	(4.7934)	(3.4035)
Observations	2,144	1,396	748	433	315
Style FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.113	0.131	0.203	0.225	0.229

The regression result reveals two interesting insights. First, fund flows in Thailand respond more strongly to best-performing funds, as evident in the coefficient on the variable *top performance quintile*, similar to Sirri and Tufano (1998). Second, funds that are operated by asset management companies that are owned by bank experience greater inflow on average, likely caused by greater distribution channel that commercial banks in Thailand have. By December 2016, bank-owned asset management companies hold almost 90% of open-ended equity mutual funds' TNA. This is our fourth stylized fact.

Another interesting result is that investors seem to focus less on expense ratio relative to other factors when they select funds: funds with higher expense ratio tend to experience greater

inflows. When the subsamples are partitioned by tax status, the relationship disappears for tax-privileged funds, reflecting the fact that these funds tend to experience more inflow and also have higher expense ratio in general, but the negative relationship persists for non-privileged funds. Barber et al. (2005) find that investors care more about "visible" fees such as front- and back-end load fees, but not operating expenses, so this could potentially be one reason behind this puzzling finding.

4. Conclusion

In this article, we outline four stylized facts regarding open-ended equity mutual funds in Thailand. First, most funds do not beat the market, whether it is raw or risk-adjusted returns. Second, most funds effectively act as *de facto* indexers, delivering returns that are very similar to the market. Third, the majority of capital is allocated to stocks with large market capitalization, and growth stocks, and momentum stocks. Fourth, funds that experienced higher returns and funds operated by bank-owned asset management companies tend to experience greater inflows. From these stylized facts, several potential research questions arise. For example, the convex flow-performance relationship gives fund managers an incentive to chase returns by taking on additional risk, is there evidence of such behavior in the market? Why do investors allocate more capital to funds that have higher expense ratios? Most funds tend to hold similar stocks, so does the need to deploy capital impact some stocks more than others? We leave these questions for future research.

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Chapter 2:

Institutional Capital Allocation and Equity Returns: Evidence from Thai Mutual Funds' Holdings

ABSTRACT

Information about mutual funds' stock holdings can provide useful signal for investors. In this study, we show that portfolio of stocks that are not favored by mutual funds tend to perform poorly, with monthly returns of 0.38% to 0.82% lower than stocks more widely held. When compared against asset pricing models, portfolio of such stocks can have monthly alphas as low as -0.33%, and the reason seems unrelated to stock-picking ability. One possible explanation is that demand from institutional investors can drive up stock prices, highlighting the importance of investor clientele in emerging market asset pricing.

Keywords: mutual funds returns, investment horizon, asset pricing, institutional ownership

JEL Classification Code: G11, G23

1. Introduction

Stock selection is a demanding task, both in terms of time required and skills involved. Combined with the fact that investing in individual stocks is risky while portfolio investing offers more stable returns through diversification, this challenge makes investment vehicles such as mutual funds or exchange-traded funds (ETFs) an attractive choice for individual investors. In doing so, we delegate the task of investment management to experts who, for a fee, select a handful of stocks in promise of superior performance.

Studies on fund managers' stock selection skills and fund performance yield mixed results, partly because there are various ways one could measure them.[9] The broad perception, however, is that their edges are not commensurate with the fees charged, leading to the recent global popularity of passive investing through index mutual funds and ETFs. The focus of our study is not on skills or fund performance per se but rather on the potentially informative signal that could be learned from their investment choices, which is observable to the public. In other words, if investors pay managers to pick stocks on their behalf, what can we learn from their stock holdings?

The setting of our study is Thailand, where total net assets (TNA) of open-ended equity mutual funds grew by 7.9 times between 2005 and 2016 while total equity market capitalization grew only by 3 times during the same period. We investigate the characteristics of stocks that mutual funds hold and whether the extent of holdings are predictive of such stocks' future returns. Our study is similar to Chen et al. (2000) who investigate the returns of U.S. stocks that are widely held by mutual funds and find no evidence of outperformance. Our measure of mutual fund ownership is slightly different; rather than basing ownership on the fraction of outstanding shares held, we use the dollar amount allocated to each stock to more directly address the vote of confidence that fund managers place on each stock.

2. Data and Empirical Methodology

We explore the relationship between mutual fund capital allocation and stock returns using data of individual mutual fund's stock holdings. We compile data from multiple sources: fund returns, characteristics, TNAs, and periodic stock holdings are obtained from Morningstar

[9] For example, Carhart (1997) and Fama and French (2010) find evidence against skills, while Chen et al. (2010) and Kosowski et al. (2006) find opposite results. These mixed results also highlight the difficulty in how to define and measure skills.

database from 2005 to 2016. During the sample period, there are 303 unique open-ended equity mutual funds; 90% are classified as large-cap funds, 50% as large-cap growth funds, and 94% are actively-managed funds. We obtain stock total returns, prices and financial statements data from Datastream database and construct asset pricing risk factors using the double-sorting methodology of Fama and French (2018).

The holding-level data allows us to do two things: quantify the holding value of individual stock for each fund over time and identify how long stocks are held for. Motivated by successes of long-term investment professionals such as Warren Buffett, we classify funds based on their holding horizon (long and short). However, there is mixed evidence regarding which types of funds perform better. For example, Yan and Zhang (2007) find outperformance among U.S. stocks traded by short-term funds, while Lan et al. (2018) find outperformance for U.S. stocks held by long-horizon funds.

The calculation of the holding horizon measure is similar to Lan et al. (2018) and follows a two-step process. First, for each stock i that fund j holds, we identify the date τ_{ij} that the stock is first added to the fund portfolio. This measure uses only information available at the time in order to prevent the look-ahead bias. Then, in each month t, we calculate h_{ijt} which measures the horizon (number of months) that the fund has held the stock, as described by Equation 1.

$$h_{ijt} = \begin{cases} t - \tau_{ij} & \tau_{ij} \leq t \\ 0 & otherwise \end{cases} \quad (1)$$

Next, we define the weight w_{ijt} as the value of stock i holding (V_{ijt}), calculated as the number of shares held times current price, relative to the fund's TNA at month t, and compute the fund-level holding horizon measure HH_{jt} as the weighted average horizon from the first stage, as described by Equation 2, where N_{jt} is the number of stocks that fund j holds in month t. Then in each year at September, we classify funds into terciles based on the values of HH_{jt}.[10] Funds in the bottom tercile are classified as short-horizon funds, while funds in the top tercile are long-horizon funds. The median TNA and holding horizon for funds classified as short-, medium- and long-horizon funds are reported in Table 1.

$$HH_{jt} = \sum_{i=1}^{N_{jt}} w_{ijt} h_{ijt}\,, \qquad where\ w_{ijt} = \frac{V_{ijt}}{TNA_{jt}} \quad (2)$$

[10] In Thailand, the majority of mutual fund investments are made in the last quarter of each year. Consequently, we use more recent stock holdings data available before September to calculate holding horizon for each fund.

[TABLE 1 ABOUT HERE]

For each stock, we can now compute the value of mutual fund capital allocated by type of fund, $VMC_{it}^{h} = \sum_{j=1}^{M_t} V_{ijt}^{h}$, where $h \in \{All, Long, Short\}$. Conditional on being in the mutual fund investment set, we rank the stocks based on the amount of capital allocated into terciles at the end of the first month of every quarter (that is, January, April, August, and October) and add the forth group for stocks not held by mutual funds. With classifications based on VMC_{it}^{h}, we can analyze the characteristics and returns of stocks in each group. On average, mutual funds invest in about 51% of listed stocks. However, among those stocks, the top tercile stocks (which amount to about 115 stocks in 2016) receive between 95% to 99% of allocated capital. The majority (about 76%) of these are members of the large cap index, consistent with fund styles.[11] These statistics are direct consequences of the highly-skewed distribution of stocks in the Thai equity market: in December 2016, 100 largest listed companies represent 80% of combined market capitalization, and the top 50% already account for more than 96% of the market.

For the stock-level analysis, we form value-weighted portfolios based on each type of rankings above and compute excess returns r_{pt}^{e} by deducting monthly returns by the one-month T-Bill rate obtained from Bloomberg. If mutual fund managers are skillful in stock selection, then we expect to see stocks favored by mutual fund perform better on average. In addition to assessing r_{pt}^{e} and their annualized Sharpe ratios, we estimate the portfolio alphas with respect to the Carhart (1997) 4-factor model, Fama and French (2016) 5-factor model, and Fama and French (2018) 6-factor model.

[TABLE 2 ABOUT HERE]

For the fund-level analysis, we use the terciles ranked on HH_{jt} to form equally-weighted portfolios of funds that have short-, medium- and long-horizon and rebalance the portfolios every September. Similar to the stock-level analysis, we report portfolio excess returns, annualized Sharpe ratio, and alphas with respect to the 4-, 5- and 6-factor models.

3. Results

[FIGURE 1, TABLE 3 ABOUT HERE]

[11] The SET100 index is constructed from 100 companies with the largest market capitalization and listed in the main exchange (Stock Exchange of Thailand). However, stocks not listed on the main exchange can also be very large but are on the secondary exchange (Market for Alternative Investment) because other requirements such as minimum free float are not met.

Table 3 reports the results of the stock-level analysis. The average monthly excess returns, visualized as bar charts in Figure 1, exhibit an interesting pattern. Average returns of stocks not held by mutual funds are substantially lower than those held by funds, while top tercile stocks (which account for most of capital allocation) have the lowest average returns in all horizons. When benchmarked against asset pricing models, stocks not held by mutual funds have negative alphas, ranging between -0.33% to -0.29% per month, while top tercile stocks have small positive alphas of around 0.06% per month.[12] Further investigation by fund horizon reveals that the top tercile alphas are present only for stocks favored by long-horizon funds. The results are similar to Lan et al. (2018), although our magnitude of outperformance is substantially lower. Adjusted R-squared values are extremely high across all asset pricing models, suggesting that the edge exists, albeit very small. The results that mutual fund capital allocation influences stock returns and that stocks favored by long-horizon fund managers perform slightly better seem to support the view of superior stock selection ability. This naturally leads to our next question: do long-horizon funds perform better?

[TABLE 4 ABOUT HERE]

For fund-level analysis, the average monthly excess returns of horizon-sorted portfolios are reported in Table 4. While the average monthly returns of longer-horizon funds are higher, they are not statistically significant, and neither are the differences across the fund categories. In addition, portfolio alphas are statistically insignificant for all horizons against all asset pricing model: there is no evidence that mutual fund managers of any horizon can systematically deliver abnormal returns on a risk-adjusted basis.[13] [14] Similar to the stock-level analysis, the asset pricing models perform very well: the adjusted R-squared values are very high across all portfolios.

[12] We do not report factor loadings with respect to the pricing models, but the loadings correspond to the characteristics of the stocks reported in Table 2. For example, stocks in the top tercile are more exposed to the market factor (high beta), negatively exposed to the size factor (large cap) and negatively exposed to the value factor (growth).

[13] In Panel B of Table 4, we report factor loadings of the fund portfolios as we believe the results allow us to better understand fund performance. The significant loadings are market, size and momentum factors. The majority of Thai mutual funds investment policies specifically spell out large cap stocks as their objective, so the size loading is not surprising. The exposure to momentum factor is consistent with the finding of Carhart (1997) and explains the returns better than the profitability and investment factors, which do not seem to be priced in the Thai market.

[14] Jenwittayaroje (2017) studies Thai equity mutual funds between 1995 and 2014 and also find only a handful of funds that deliver positive net alphas.

Taken together with earlier stock-level result, this finding seems puzzling: it appears that the superior returns of stocks held by mutual funds may not be attributable to managerial skills. Given that average characteristics of stocks not held by funds compared with stocks minimally held (bottom tercile) are not substantially different, what could be causing this returns gap? In this study, we do not investigate the cause further, but one possible explanation is that mutual fund capital increases the demand for stocks with specific characteristics (e.g. larger, more liquid) and thus drive up their prices, as documented by Gompers and Metrick (2001).[15] Even though the majority of funds are classified as actively managed, limited investment opportunities in local market may effectively turn them into index funds. However, it is worth noting that portfolios of stocks widely held by mutual funds appear to be well-priced with respect to several asset pricing models, suggesting that institutional investors in emerging markets may play a role in enhancing market efficiency, making investor clienteles potentially an important part of asset pricing.[16]

4. Conclusion

In this study, we use holding-level microdata to investigate the role of institutional capital allocation in an emerging equity market. We document several interesting facts about Thai mutual funds. First, funds only invest in about half of all listed stocks (more than 600 by the end of 2016). Second, most (95% to 99%) of mutual fund capital is allocated to just 33% of all stocks they invest in, most of which are large-cap, growth stocks.[17] Third, mutual fund returns, on average, are well-explained by market, size and momentum factors. While there is no evidence in support of fund managers' superior stock selection abilities, our analysis suggests that mutual funds stock holdings can be used as a useful investment signal for individual investors.

[15] There is counter evidence by Frazzini and Lamont (2008) that mutual fund flow represents "dumb" money that destroy retail investors' wealth over the long run, but their definition of flow is based on abnormal changes in funds' stock holdings.

[16] For an example, Cao et al. (2018) document that institutional investors can help arbitrage away mispriced stocks, and some types of institutions (e.g. hedge funds) contribute more than others.

[17] This concentration is mainly caused by highly skewed distribution of company size described earlier and the general preference toward large cap stocks in fund objective.

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Figure 1: Average Monthly Excess Returns of Stocks Ranked by Mutual Fund Holdings

This figure plots the average monthly excess returns for listed stocks in Thailand. One month after the end of each quarter (i.e., January, April, July and October), stocks are ranked into terciles (low, medium, high) based on the amount of capital allocated by mutual funds. Stocks that are not held by mutual funds are assigned a separate ranking (no holding) where the returns are represented as dotted line. Value-weighted portfolios are formed and held until the next quarterly rebalancing date. Excess return for each stock is computed as actual return minus one-month T-Bill rate.

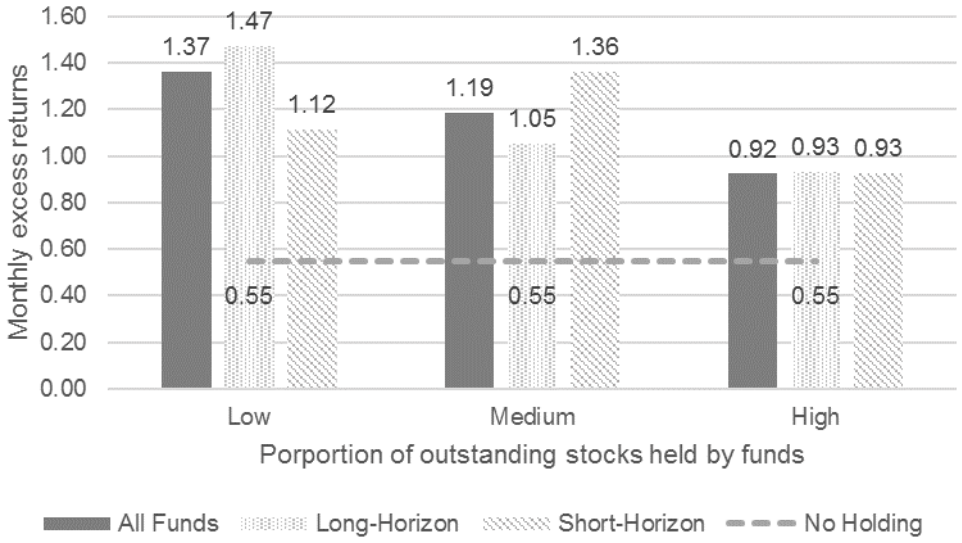

Table 1: Fund Characteristics by Holding Horizon

This table reports the characteristics of the median fund when ranked in each year by their holding horizon. Holding horizon of each fund at *t* is calculated as the value-weighted average length of time (in months) that each stock in the fund's portfolio has been held. At the end of each month, funds are ranked into terciles (short, medium, long) based on their holding horizon. The median values of total net assets (in THB million) and holding horizon (in months) for funds in each group at the end of December for each year is reported.

	Median Total Net Assets (THB million)				Median Holding Horizon (months)			
Year	Short	Medium	Long	All	Short	Medium	Long	All
2005	276	368	322	321	10.4	32.3	70.7	30.3
2006	336	317	286	306	16.0	40.4	74.9	39.4
2007	266	486	329	363	15.0	40.3	72.3	40.5
2008	208	271	204	222	13.2	45.8	73.4	45.4
2009	268	439	275	324	21.1	54.2	86.6	55.9
2010	314	534	315	378	21.9	60.5	95.7	58.6
2011	286	545	324	345	20.0	63.7	101.7	63.8
2012	170	1,137	526	417	9.6	62.0	107.6	61.5
2013	171	1,277	678	447	11.8	57.4	110.9	61.1
2014	228	774	926	519	12.0	52.6	109.9	52.6
2015	182	475	1,017	430	14.0	46.7	117.8	49.4
2016	217	505	1,107	434	10.4	50.9	120.3	45.8

Table 2: Characteristics of Stocks Held by Mutual Funds

This table reports the characteristics of stocks that are held by mutual funds. One month after the end of each quarter (i.e., January, April, July and October), stocks are ranked into terciles (low, medium, high) based on the proportion of outstanding stocks held by mutual funds as reported in the most recent book-closing date. Funds that have holding horizon values in the top tercile are classified as long-horizon funds, and short-horizon funds are funds in the bottom tercile. The average values of market capitalization (in THB million), book-to-market ratio and beta at the time of ranking are reported for each group. Stocks that are not held by mutual funds are assigned to a separate group. The proportion of stocks in each group that are members of the SET100 index (100 companies with the largest market capitalization) and the proportion of shares held by each class of mutual funds are also reported.

Fund holding	Member of SET100 (%)	Market Cap. (THB mm)	Book-to-Market Ratio	Beta	Shares Held by Funds (%)
Stocks with no fund holding	4.47	3,157	0.98	0.90	0.00
All mutual funds					
Low	2.97	3,685	1.08	0.96	0.12
Medium	18.12	6,943	0.93	0.98	1.51
High	76.33	78,184	0.64	1.11	5.09
Long-horizon funds					
Low	2.44	3,604	1.01	0.92	0.04
Medium	17.96	7,029	0.98	1.02	0.47
High	77.22	78,333	0.66	1.12	1.71
Short-horizon funds					
Low	4.90	4,691	1.05	0.90	0.01
Medium	20.07	7,956	0.95	1.03	0.17
High	73.59	76,782	0.64	1.13	0.87
All stocks	21.00	18,818	0.92	0.97	

Table 3: Mutual Fund Holdings and Future Stock Returns

This table reports the excess returns and the alphas of the stock portfolios sorted on the proportion of mutual fund ownership. Portfolios are rebalanced every January, April, July and October. The returns reported are monthly and value-weighted by market capitalization, with time series average excess returns r_t^e (actual returns minus one-month T-Bill rate) reported with corresponding t-statistic and annualized Sharpe ratio. For the asset pricing tests, we report the portfolio alphas of a regression of excess portfolio returns on the Carhart (1997) 4-factor model, Fama and French (2016) 5-factor model, and Fama and French (2018) 6-factor model. Panel A reports the results for all mutual funds, panel B for long-horizon funds and panel C for long-horizon funds respectively. The sample period is May 2005 to January 2017. Standard errors are computed using the Newey-West procedure with one-month lag, and t-statistics are reported in brackets. Stars correspond to statistical significance level, with *, ** and *** representing 10 percent, 5 percent and 1 percent level respectively.

	No	*A: All Mutual Funds*			*B: Long-Horizon Funds*			*C: Short-Horizon Funds*		
Statistic	Holding	Low	Medium	High	Low	Medium	High	Low	Medium	High
r_t^e	0.546	1.365***	1.185***	0.924*	1.471***	1.054**	0.931*	1.115***	1.362***	0.928*
t-stat	[1.286]	[2.752]	[2.449]	[1.826]	[2.927]	[2.210]	[1.838]	[2.379]	[2.612]	[1.838]
SR_t	0.375	0.803	0.715	0.533	0.854	0.645	0.536	0.694	0.762	0.536
α 4F	-0.331**	0.175	-0.0698	0.0602*	0.267	-0.173	0.0653**	-0.0386	0.183	0.0593
t-stat	[-2.009]	[0.806]	[-0.413]	[1.833]	[1.163]	[-1.089]	[2.059]	[-0.185]	[0.983]	[1.570]
Adj-R^2	0.860	0.847	0.889	0.996	0.847	0.890	0.996	0.822	0.888	0.995
α 5F	-0.320*	0.134	-0.0437	0.0610*	0.232	-0.145	0.0649*	-0.0756	0.143	0.0656
t-stat	[-1.850]	[0.624]	[-0.263]	[1.727]	[1.044]	[-0.961]	[1.925]	[-0.382]	[0.800]	[1.627]
Adj-R^2	0.861	0.844	0.885	0.996	0.846	0.888	0.996	0.827	0.890	0.995
α 6F	-0.285*	0.186	-0.0979	0.0560*	0.272	-0.184	0.0598*	-0.0654	0.160	0.0565
t-stat	[-1.725]	[0.867]	[-0.596]	[1.686]	[1.219]	[-1.194]	[1.875]	[-0.331]	[0.876]	[1.502]
Adj-R^2	0.864	0.848	0.890	0.996	0.848	0.890	0.997	0.826	0.890	0.995

Table 4: Returns of Long- and Short-Horizon Mutual Funds

This table reports the excess returns, alphas and factor loadings of the 3 fund portfolios sorted on holding horizon. Portfolios are rebalanced every September and the stock holding data used to calculated holding horizon is at least 3 months from the book-closing date. The returns reported are monthly and equally-weighted, with time series average excess returns r_t^e (actual returns minus one-month T-Bill rate). For the asset pricing tests, we report in Panel A the portfolio alphas of a regression of excess portfolio returns on the Carhart (1997) 4-factor model, Fama and French (2016) 5-factor model, and Fama and French (2018) 6-factor model. The sample period is October 2005 to December 2016. Panel B reports the factor loadings on the 6 factor models excluding the alphas already reported in Panel A. Standard errors are computed using the Newey-West procedure with one-month lag, and t-statistics are reported in brackets. Stars correspond to statistical significance level, with *, ** and *** representing 10 percent, 5 percent and 1 percent level respectively.

Panel A: Tests of Returns using Asset Pricing Models

Statistic	Short-Horizon	Medium-Horizon	Long-Horizon
r_t^e	0.610	0.708	0.735
t-stat	[1.517]	[1.555]	[1.533]
SR_t	0.452	0.464	0.457
α 4F	-0.113	-0.0418	-0.103
t-stat	[-1.477]	[-0.741]	[-1.490]
Adj-R^2	0.973	0.987	0.984
α 5F	-0.0656	-0.0127	-0.0546
t-stat	[-0.661]	[-0.185]	[-0.585]
Adj-R^2	0.964	0.984	0.978
α 6F	-0.108	-0.0387	-0.0958
t-stat	[-1.346]	[-0.676]	[-1.322]
Adj-R^2	0.972	0.986	0.983

Panel B: Factor Loadings of the 6-Factor Model

Factor	Short-Horizon	Medium-Horizon	Long-Horizon
Market	0.778***	0.875***	0.927***
(RMRF)	[32.71]	[67.84]	[57.79]
Size	-0.050*	-0.092***	-0.077***
(SMB)	[-1.958]	[-4.688]	[-3.131]
Value	-0.013	-0.020	-0.010
(HML)	[-0.565]	[-1.000]	[-0.408]
Profitability	-0.015	-0.008	-0.027
(RMW)	[-0.436]	[-0.296]	[-0.766]
Investment	0.008	-0.021	0.006
(CMA)	[0.263]	[-0.710]	[0.168]
Momentum	0.106***	0.065***	0.103***
(UMD)	[4.612]	[3.659]	[4.818]

Chapter 3:
Chasing Returns with High-Beta Stocks

ABSTRACT

One of the proposed explanations for the low-beta anomaly – a prevalent yet puzzling empirical finding that stocks with low systematic risk tend to earn higher returns than the Capital Asset Pricing Model (CAPM) predicts and vice versa – is that leveraged-constrained and index-benchmarked mutual funds drive up demand for high-beta stocks, leading to systematic mispricing. We find evidence that Thai mutual fund managers, on average, favor high-beta stocks and tend to alter their portfolio composition of high-beta stocks in response to fund flows. In addition, funds that hold high-beta stocks perform poorly compared to their peers: a one standard deviation increase in high-beta stock holdings is associated with a 1.3 percentage point decrease in future relative returns.

Keywords: high-beta stocks, mutual fund returns, low-beta anomaly

JEL Classification Code: G11, G23

1. Introduction

For many individual investors around the world, mutual funds provide a convenient way to participate in the capital market. Numerous studies have documented how mutual fund investors tend to asymmetrically reward funds with stellar returns than penalize funds with poor returns (e.g. Chevalier and Ellison (1997), Huang et al. (2007), Sirri and Tufano (1998)). As fund managers tend to be rewarded by the size of their TNA, this convex flow-performance relationship induce them to engage in risk-shifting behavior and make riskier investments in order to "chase returns" and attract inflows (e.g. Brown et al. (1996), Ha and Ko (2017)). In order to increase risk, mutual fund managers typically have few options, as usage of leverage, derivatives and short-selling is restricted, and even if permitted, tend not to be employed.[18] Because of this limitation, managers may resort to chasing returns by investing in riskier stocks instead.

The demand for high-beta stocks from leverage-constrained and index-benchmarked investors such as mutual fund managers has been proposed by Baker et al. (2011) as candidate explanation for the low-beta anomaly, a puzzling empirical finding that stocks with low systematic risk tend to earn higher returns than the Capital Asset Pricing Model (CAPM) predicts – a phenomenon first documented by Black (1972) and continues to be the subject of investigation today. Recent studies by Boguth and Simutin (2018) and Christoffersen and Simutin (2017) show that U.S. mutual fund managers do indeed tilt their portfolios toward riskier stocks, and their increased risk-taking is related to the returns to the betting-against-beta portfolio proposed by Frazzini and Pedersen (2014), shedding light on one potential source of the low-beta anomaly.[19]

In this article, we investigate the source of the low-beta anomaly in Thailand by examining the behavior of open-ended equity mutual funds through two research questions: (1) do fund managers change their funds' exposure to systematic risk in response to fund flows, and (2) do funds that have higher exposure to high-beta stocks experience worse relative returns? Mutual funds in Thailand are leverage-constrained and their performances are benchmarked against indices, which make them susceptible to returns-chasing behavior. We find that managers tend to

[18] For example, in the US, section 18 of the Investment Company Act of 1940 restricts the ability of funds to issue "senior securities", which are defined as "any bond, debenture, note, or similar obligation or instrument constituting a security and evidencing indebtedness". In Thailand, the Securities and Exchange Commission restricts fund's leverage to 10% of total net assets.

[19] The betting-against-beta (BAB) portfolio by Frazzini and Pedersen (2014) involves taking a long position on low-beta stocks and short position on high-beta stocks in a way that has net zero investment and net zero average beta.

adjust fund beta in response fund flows, but only for tax-privileged funds which are larger and more popular.

The second research question is our main contribution: our article explicitly investigates the relationship between stock holdings and future fund returns. We compute funds' holdings of low-beta stocks and high-beta stocks as percentage of TNA, and find that fund managers tend to invest disproportionately more in high-beta stocks (24%) than low-beta stocks (5%). We find that fund performance is related to the composition of stock holdings: funds that have more extreme beta (low and high) stocks tend to have worse future relative return. This result is similar to Stambaugh et al. (2012, 2015), who find evidence of long-short arbitrage asymmetry in several anomalies. The asymmetry suggests that the low-beta anomaly will likely persist in absence of investors able and willing to take short positions in high beta stocks, potentially suppressing returns for individual investors.

2. Data and Empirical Methodology

To examine the relationship between fund performance and risk-taking, we rely on multiple data sources. We obtain fund returns, investment objectives, fees, total net assets, fund holdings, and other fund characteristics from the Morningstar database from 2005 to 2016. We focus on open-ended equity funds that have at least 5 years of data and TNA of at least THB 100 million (approximately USD 3 million). The equity holdings are then matched to contemporaneous stock prices in Datastream, and betas estimated from past returns. [20] This allows us to compute the value-weighted, fund-level systematic risk loading, as well as examine the detailed composition of stock holdings. Annual relative returns are computed as the differences between the funds' raw returns and the benchmark index returns obtained from the Stock Exchange of Thailand.[21] Annual fund flows are calculated based on changes in assets, adjusted for the returns during the period, and scaled by lagged assets to control for differences in size, as describe by Equation 1.

$$Flow_{i,t+1} = \frac{TNA_{i,t+1} - TNA_{i,t}(1 + r_{i,t+1})}{TNA_{i,t}} \quad (1)$$

[20] We use the beta calculation method based on Frazzini and Pedersen (2014), where each stock's beta is calculated as the ratio of its covariance to the market return and the product of the stock's and market returns standard deviation.

[21] More than 80% of the funds are benchmarked to the SET Index, which is the market-value weighted index of all listed stocks in the Stock Exchange of Thailand. The second most popular benchmark is the SET50 Index, which includes 50 stocks with the largest market capitalization.

In Thailand, certain open-ended equity funds are tax-privileged: individuals who invest in such funds can deduct annual contributions (up to a certain limit based on their income level) from their taxable income, as long as they keep their funds invested for specified periods of time.[22] The policy was instigated in 2004 to encourage capital market participation and has proved hugely popular since, as evidenced by the differences in TNA. According to the Securities and Exchange Commission's Capital Market Report, TNA of tax-privileged mutual funds in December 2017 is THB 500 billion, representing 51% of all equity funds' TNA. As the lockup periods are defined based on calendar dates (for example, investment made in December of year t to January of year t+1 is counted as 2 years when it is effectively 2 months), Thai investors tend to make their tax-deductible investments in the last quarter of each year to minimize the effective lockup period. For this reason, we separate the analysis for tax-privileged and general funds (which we will refer to as "tax" and "non-tax" funds) and define the end of year for data aggregation at September. There are 161 funds, 65 of which are tax funds, with 1,420 fund-year observations.

Summary statistics of key variables used in our analysis are reported in Table 1. While there are more non-tax funds, tax funds tend to be larger in size and have higher expense ratios. On average, non-tax funds have slightly better returns, but tax funds tend to experience greater net inflows. Fund betas are also quite similar for both types. In each year, we rank the stocks based on their beta and classify the top 20% as high-beta stocks, and bottom 20% as low-beta stocks. In our sample, approximately 5% of TNA is invested in low-beta stocks and, surprisingly, 24% in high-beta stocks.

[TABLE 1 ABOUT HERE]

For our first research question, we consider 2 versions of regressions of model, first with forward fund beta on fund flow, and second with *change* in fund beta on fund flow, as described by Equation 2 and 3, where X_{it} is a vector of control variables that includes contemporaneous fund beta, log of fund size (TNA), and expense ratio. In Equation 3, dX_{it} represents the first-differenced values of the variables used in Equation 2, except fund flow and relative return. To mitigate

[22] There are two main classes of tax-privileged investments: the Long Term Equity Fund (LTF), which are subjected to a 5-year lockup period (amended to 7 years for investments beginning 2016), and Retirement Mutual Fund (RMF), which are subjected to a minimum 5-year lockup period and cannot be redeemed until the investor's age reaches 55. If investments are sold prior to the respective lockup periods, investors must return the tax deductions claimed. While the tax deduction limits are separate for LTFs and RMFs, LTFs are more popular in Thailand, as more than 86% of tax-privileged assets in the sample are held through LTFs, which have much shorter effective lockup period.

potential omitted variable bias, we include year (δ_t) and style (ψ_i) fixed effects in all regressions, and cluster standard errors by funds to account for serial correlation in the variables. Based on our prediction, we expect to see negative α.

$$Beta_{i,t+1} = \psi_i + \delta_t + \alpha\, Flow_{it} + \gamma' X_{it} + \eta RRet_{it} + \varepsilon_{it} \quad (2)$$

$$dBeta_{i,t+1} = \psi_i + \delta_t + \alpha\, Flow_{it} + \gamma' dX_{it} + \eta RRet_{it} + \varepsilon_{it} \quad (3)$$

For the second question, we use a similar specification as Equation 2 and regress forward relative returns on proportions of assets allocated to high-beta stocks, controlling for fund beta, as follow:

$$RRet_{i,t+1} = \psi_i + \delta_t + \beta_1 PctLow_{it} + \beta_2 PctHigh_{it} + \alpha\, Flow_{it} + \gamma' X_{it} + \eta RRet_{it} + \varepsilon_{it} \quad (4)$$

Here, our main coefficients of interest are β_1 and β_2. Based on the findings of the literature on the low-beta anomaly, we expect β_1 to be positive and β_2 to be negative.

3. Results

Table 2 reports the result of Equation 2. The α is negative and statistically significant as we expect, but only for tax funds. The α of the first-differenced specification of Equation 3, reported in Table 3, is also negative only for tax funds by less statistically significant. The results of Table 2 and 3 combined suggest that suggesting that fund flows can affect fund managers' risk-taking strategy: tax funds that experience lower (higher) fund flow tend to have higher (lower) beta in the subsequent period, and the fund beta increase (decrease) in response. Given the substantial differences in size of TNA for tax and non-tax funds, the stakes and thus incentives are larger to act.

[TABLE 2, 3 ABOUT HERE]

Next, we turn to a more pertinent issue: some mutual funds appear to adjust systematic risk exposure through overweighting high-beta stocks, so does this influence their future returns? Table 4 reports the result of Equation 4. In column 1-3, we first report results without the inclusion of beta composition as baseline: current fund beta is positively related to future relative returns, supporting the returns-chasing behavior of fund managers by increasing systematic risk exposure, and past relative returns are related to future relative returns, similar to Grinblatt and Titman (1992) and Vidal-García et al. (2016).

[TABLE 4 ABOUT HERE]

When we include the holding proportions, the result supports only one side of our prediction. On average, both types of funds that hold more high-beta stocks tend to perform worse. A one standard deviation increase in allocation to high-beta stocks leads to a 1.3 percentage point decrease in relative return.[23] Interestingly, non-tax funds that hold low-beta stocks also tend have worse performance, which seems inconsistent with international evidence on the low-risk anomaly. However, anomalies in Thailand are still little-studied. Indeed, Saengchote (2017) finds that the low-beta anomaly in Thailand is more about high-beta stocks earning low returns than low-beta stocks earning high returns, which is more consistent with the underperformance of the high-exposure funds in this study. As mutual funds cannot short stocks, their long positions can lead to overpriced stocks that cannot be arbitraged away, similar to the findings of Stambaugh et al. (2012, 2015).

4. Conclusion

Capital market frictions can artificially affect demand for assets and compel investors to make decisions that are inconsistent with traditional asset pricing models, such as "reaching for yield" in bond market and "chasing returns" in equity mutual funds.[24] In this article, we contribute to the growing evidence that frictions in mutual fund management and the beta anomaly are intertwined. The finding suggests that short-selling against mutual funds can be profitable, similar to the finding of Arif et al. (2015). Given that short-selling volatile stocks is risky, as documented by Engelberg et al. (2018), underperformance of high-beta stocks will likely persist, to the detriment of mutual fund investors.

[23] In unreported analysis, we rank mutual funds in each year based on their exposure to high beta stocks into 3 portfolios and compute value-weighted relative returns. The cumulative relative return between 2006 to 2016 for the low-, medium- and high-exposure portfolios are 59%, 47% and 34% respectively.

[24] For evidence of "reaching for yield" in bond market, see Becker and Ivashina (2015) and Choi and Kronlund (2017).

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Table 1: Summary Statistics

This table reports the average, standard deviation, and the key percentiles of fund characteristics. *t* or *t+1* denote the year (ending in September) in which the characteristics are measured. Fund beta is calculated as the value-weighted average betas based on the stock holdings reported as of (or latest available prior to) September in each year. Relative return is computed relative to the relevant benchmark (mostly SET Index and SET50 Index) in each year. Fund flow at t+1 is computed as $(TNA_{i,t+1} - TNA_{i,t}\ (1+r_{i,t+1})) / TNA_{i,t}$. Fund size (total net assets) and fund expenses are retrieved from Morningstar. In each year, stocks are ranked based on their beta and divided into quintiles. Low-beta stocks are classified as those in the bottom quintile and high-beta stocks top quintile respectively. Tax funds are mutual funds which are tax-privileged.

Tax funds

Variable	Mean	SD	P10	P50	P90
Relative return t+1 (in decimals)	0.03	0.06	-0.03	0.02	0.10
Fund flow t+1 (in decimals)	0.13	0.31	-0.10	0.08	0.39
Fund beta t	0.95	0.22	0.68	0.93	1.24
Fund size (TNA) t (in THB millions)	2,951	5,665	99	885	6,843
Expenses t (in %)	1.81	0.45	1.19	1.87	2.25
% low-beta stocks t (in decimals)	0.05	0.06	0.00	0.02	0.14
% high-beta stocks t (in decimals)	0.25	0.14	0.06	0.26	0.43
Observations	572				
Number of funds	65				

Non-Tax funds

Variable	Mean	SD	P10	P50	P90
Relative return t+1 (in decimals)	0.04	0.06	-0.03	0.04	0.12
Fund flow t+1 (in decimals)	0.02	0.60	-0.31	-0.07	0.27
Fund beta t	0.98	0.21	0.76	0.95	1.24
Fund size (TNA) t (in THB millions)	917	1,684	76	312	2,440
Expenses t (in %)	1.66	0.48	1.02	1.80	2.22
% low-beta stocks t (in decimals)	0.05	0.07	0.00	0.02	0.14
% high-beta stocks t (in decimals)	0.24	0.13	0.06	0.25	0.40
Observations	848				
Number of funds	96				

Table 2: Fund Flow and Mutual Fund Risk-Taking

This table report results from regressions of fund beta in year *t+1* on fund flow in year *t* and fund characteristics measured at the end of year *t* (ending in September), as specified in Equation 2. Fund beta is calculated as the value-weighted average betas based on the stock holdings reported as of (or latest available prior to) September in each year. All regressions include year and style fixed effects. Fund beta in year *t* is included to account for potential serial correlation of beta. Standard errors, reported in parenthesis, are clustered by fund. Stars correspond to statistical significance level, with *, ** and *** representing 10 percent, 5 percent and 1 percent level respectively. See Table 1 for definition of other variables.

	(1)	(2)	(3)
Depvar: Fund beta (t+1)	Pooled	Tax	Non-Tax
Fund flow	-0.0098	-0.0260**	0.0078
	(0.0079)	(0.0104)	(0.0123)
Fund beta	0.2737***	0.2921***	0.2139***
	(0.0395)	(0.0506)	(0.0724)
Log fund size	-0.0066*	-0.0117**	-0.0046
	(0.0038)	(0.0055)	(0.0054)
Expenses	-0.0197**	-0.0256	-0.0143
	(0.0100)	(0.0168)	(0.0128)
Relative return	0.2073**	0.3403***	-0.0034
	(0.0944)	(0.1252)	(0.1384)
Observations	1,420	572	848
Adjusted R-squared	0.512	0.499	0.532

Table 3: Fund Flow and Change in Mutual Fund Risk-Taking

This table report results from regressions of change in fund beta from year *t* to year *t+1* on fund flow in year *t* and changes in fund characteristics measured at the end of year *t* (ending in September), as specified in Equation 3. Fund beta is calculated as the value-weighted average of betas based on the stock holdings reported as of (or latest available prior to) September in each year. All regressions include year and style fixed effects. Standard errors, reported in parenthesis, are clustered by fund. Stars correspond to statistical significance level, with *, ** and *** representing 10 percent, 5 percent and 1 percent level respectively. See Table 1 for definition of other variables.

	(1)	(2)	(3)
Depvar: Fund beta (t, t+1)	Pooled	Tax	Non-Tax
Fund flow (t)	-0.0151	-0.0664*	0.0073
	(0.0213)	(0.0385)	(0.0226)
Fund beta (t-1, t)	-0.5513***	-0.5180***	-0.5742***
	(0.0192)	(0.0310)	(0.0268)
Log fund size (t-1, t)	0.0170	0.0165	0.0148
	(0.0224)	(0.0758)	(0.0241)
Expenses (t-1, t)	-0.0178	0.0119	-0.0504
	(0.0268)	(0.0460)	(0.0349)
Relative return (t)	0.0478	0.0629	0.0582
	(0.1022)	(0.1673)	(0.1270)
Observations	1,269	519	750
Adjusted R-squared	0.725	0.692	0.752

Table 4: High-Beta Stocks and Future Returns

This table report results from regressions of fund relative return in year *t+1* on proportion of stock holdings in year *t* and fund characteristics measured at the end of year *t* (ending in September), as specified in Equation 4. Relative return is computed relative to the relevant benchmark (mostly SET Index and SET50 Index). In each year, stocks are ranked based on their beta and divided into quintiles. Low-beta stocks are classified as those in the bottom quintile and high-beta stocks top quintile respectively. The proportion of stock holdings are computed as the market value of stocks with low-/high-beta relative to the fund's total net assets. All regressions include year and style fixed effects. Standard errors, reported in parenthesis, are clustered by fund. Stars correspond to statistical significance level, with *, ** and *** representing 10 percent, 5 percent and 1 percent level respectively. See Table 1 for definition of other variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Depvar: Relative return (t+1)	Pooled	Tax	Non-Tax	Pooled	Tax	Non-Tax
% low beta stocks				-0.0597*	0.0562	-0.1606***
				(0.0340)	(0.0600)	(0.0394)
% high beta stocks				-0.0991***	-0.0852**	-0.1043***
				(0.0234)	(0.0358)	(0.0301)
Fund flow	-0.0044**	-0.0053	-0.0050**	-0.0045**	-0.0053	-0.0059**
	(0.0021)	(0.0044)	(0.0025)	(0.0022)	(0.0043)	(0.0026)
Fund beta	0.0049	0.0121	-0.0055	0.0207***	0.0288***	0.0017
	(0.0077)	(0.0106)	(0.0114)	(0.0075)	(0.0105)	(0.0107)
Log fund size	-0.0027***	-0.0028*	-0.0020	-0.0031***	-0.0042***	-0.0016
	(0.0010)	(0.0016)	(0.0013)	(0.0009)	(0.0015)	(0.0012)
Expenses	-0.0087**	-0.0062	-0.0090***	-0.0081**	-0.0051	-0.0089***
	(0.0033)	(0.0077)	(0.0030)	(0.0034)	(0.0078)	(0.0030)
Relative return	0.1557***	0.1573***	0.1387***	0.1421***	0.1430***	0.1304***
	(0.0257)	(0.0385)	(0.0347)	(0.0251)	(0.0399)	(0.0344)
Observations	1,420	572	848	1,420	572	848
Adjusted R-squared	0.391	0.393	0.378	0.406	0.408	0.401