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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

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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.[1] 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

[1] 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.

returns, characteristics, TNAs, and periodic stock holdings are obtained from Morningstar 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}.[2] 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.

[2] 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.

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

[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.[3] 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.

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] 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.

3. Results

[FIGURE 1, TABLE 3 ABOUT HERE]

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.[4] 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

[4] 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).

abnormal returns on a risk-adjusted basis.[5] [6] Similar to the stock-level analysis, the asset pricing models perform very well: the adjusted R-squared values are very high across all portfolios.

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).[7] 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.[8]

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.[9] Third, mutual fund returns, on average, are well-explained by market, size and momentum factors. While there is no evidence in support of fund

[5] 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.
[6] Jenwittayaroje (2017) studies Thai equity mutual funds between 1995 and 2014 and also find only a handful of funds that deliver positive net alphas.
[7] 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.
[8] 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.
[9] 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.

managers' superior stock selection abilities, our analysis suggests that mutual funds stock holdings can be used as a useful investment signal for individual investors.

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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.

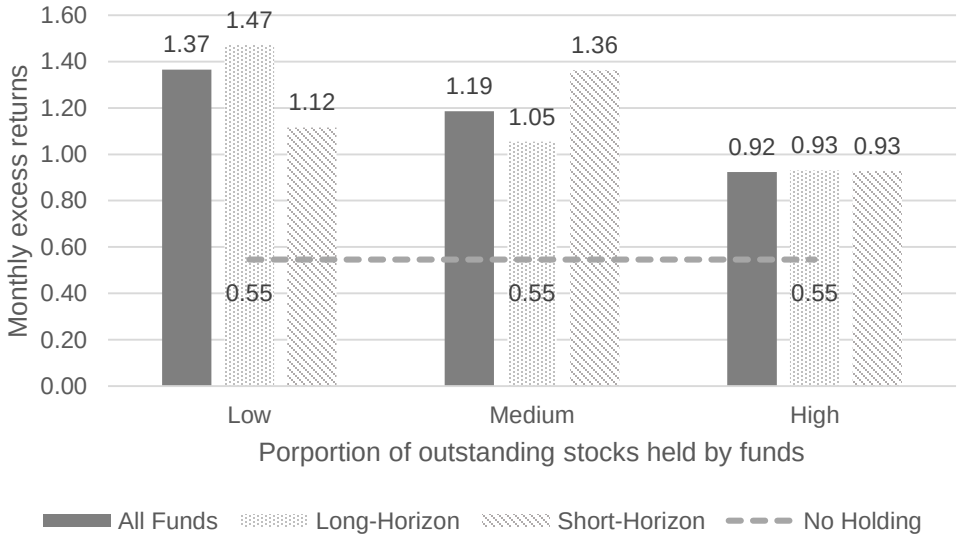

Table 1: Fund Characteristics by Holding Horizon

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]