

The relationship between fees and performance of domestic
equity funds in Thailand

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This study inclusively examines the relationship between fund fees and performance of open-end domestic equity funds in Thailand from 2010 to 2019 to analyze the domestic-equity fund market in 2 main dimensions: the market competitive and conflict-of-interest between the duties of asset management companies (AMCs) to their parent bank and to unitholders through fund fee channel. The study investigates the relationship of (1) fund fees, (2) fund fees set by bank subsidiaries, and (3) fund fees set by large-bank subsidiaries with its performance in term of both returns over benchmark and Jensen's alpha.

Based on the results, investors paid higher fees to AMCs without compensating the fees with superior performance from investment in Thai domestic-equity funds on average. These also implies the domestic equity funds market is not able to be concluded that the market is highly competitive. For funds managed by bank subsidiaries, the result reports that there is statistically significant in the additional negative impact from the fees set by bank-subidiaries on the fund performance. Thus, the fees set by bank-subidiaries do matter as it could higher deteriorate the fund performance. One of underlying concept to explain this is because of bank conglomerate structure in mutual fund market, there is possible that AMCs may involve in the activities such as increase in fund fees collected from unitholders that was beneficial to parent bank in term of increase in its revenue rather than maximizing the interests or fund returns to unitholders. Moreover, to inclusively study in conflict-of-interest issue through fund fee channel, the result significantly shows that investors would significantly pay higher fees especially to non-large bank subsidiaries and not receive superior performance.

Field of Study: Finance

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1. Introduction

1.1 Overview of Thai mutual fund industry¹

Thai mutual fund industry size is 4.82 trillion baht in 2019 dramatically increasing from 1.68 trillion baht in 2010 with CAGR at 11%. The industry by types of mutual funds consists of open-ended funds 4.31 trillion baht (90% of the industry size) including equity funds 1.07 trillion baht, fixed-income funds 2.60 trillion baht, mixed funds 0.43 trillion baht and alternative investment fund 0.22 trillion baht and closed-ended funds 0.50 trillion baht (10% of the industry size).

The ecosystem of Thai mutual funds is based on financial conglomerate. 91% of the asset management company (“AMC”) by asset under management (AUM) are bank subsidiaries mainly distributing the mutual funds to investors through banking channels (e.g., bank branches). 87% of Investors by mutual fund account significantly are retail customers.

1.2 Significance of the problem and suggestions from literature review

From investor perspective, fees paying to AMC matter in term of effect on total net value added to unitholders and returns vary by percentage fees. (Cooper, Halling et al. 2020) Total expense ratio, management fees, and total unitholder cost including front-end and back-end fees are significantly different across funds and across countries. (Ajay Khorana 2009)

Ferreira, Keswani et al. (2013) suggested that the value of active management can be tested from the relation between mutual fund fees and performance. In general, uninformed investors or unsophisticated investors perceive mutual fund fees as the price paying to fund operators to manage their money for compensating with better performance. There are many literatures referring to the relation between mutual fund expenses and performance and the empirical evidence is mixed. The samples in the US and international mutual funds, Carhart (1997), Dellva and Olson (1998), Ferreira, Keswani et al. (2013), and Cooper, Halling et al. (2020) found a negative relationship between fund expenses and its returns while Berk and Binsbergen (2015) found a positive correlation between current fund expenses and future performance and Garyn-Tal (2015) found no relation between fees and performance when taking into account fund classification.

¹ The overview and total net asset value of mutual fund industry from the annual report on website of Securities and Exchange Commission, Thailand excludes Real Estate Investment Trust (0.19 trillion baht in 2019), Special Funds (0.38 trillion baht) including Fund Type2-4, Vayupak Fund and Country Fund.

However, when we consider in conjunction with the financial conglomerate structure, the literature by Frye (2001) suggested that AMC considering as a bank subsidiary tends to be higher conservative than a non-bank subsidiary in term of investment strategy. Banks typically approach individual investors rather than institutional investors, and bank customers mainly focus and invest based on the bank reputation. The empirical study relating to performance of mutual fund managed by commercial bank subsidiaries showed the performance was negatively affected when AMC was a bank subsidiary, moreover, the funds managed by bank subsidiaries underperformed the funds managed by non-bank-subidiaries on average, which results are explained by the conflict-of-interest hypothesis² between the parent and AMC considering as bank subsidiaries that AMC may involve in the activities such as portfolio decisions making that was beneficial to parent bank rather than maximizing the interests or fund returns to unitholders. (Hao and Yan (2012); Golez and Marin (2015); Ferreira, Matos et al. (2018))

1.3 Objectives

This proposed special project will inclusively study the relation between fund fees and performance of open-end domestic equity funds³ in Thai market based on unsophisticated investor perspective. The number of funds used in the analysis is 73 funds from 2010 to 2019, having all information available on Morningstar Direct database used as the main data source. The funds managed by AMCs considering as bank subsidiaries are 40 funds and non-bank subsidiaries are 33 funds.

This work has 2 main objectives to study (1) whether the total expense ratio (TER) significantly has a positive effect on fund performance as the literature suggested. If so, which means higher expense ratio could provide better performance on average. Berk and Binsbergen (2015) and Cooper, Halling et al. (2020) suggested that these imply the market tends to be highly competitive and investors could notice the skills of fund managers by willing to pay higher fees to compensate for the funds potentially providing higher fund performance in the future.

However, regarding the landscape of Thai mutual fund industry relying on bank conglomerate structure, this project will also categorize the funds into 2 types which are groups of funds managed by AMCs considering as bank subsidiaries and non-bank subsidiaries to find (2) whether the TER set by bank subsidiaries has the significant

² Ferreira, et al. (2018) explain the conflict-of-interest hypothesis that the parent bank can maximize the combined revenue from its subsidiaries. The AMC receives revenue from fund fees and provides fiduciary duties on the fund investment for the investors, however, the manager objectives are also related to the parent in term of continued employment.

³ Scope of funds excludes closed-end funds (e.g., trigger funds), sector funds, tax-saving funds (including LTF, RMF, SSF, MF for PVD), accredited investor (AI) and ultra-high net worth (UI) funds.

effect on fund performance. If so, it could imply a concern on conflict-of-interest between duties of AMC's to their parent bank and their unitholders. The commitment of AMC's to maximize profit of parent bank could incentivize the AMC's to set higher fees charged to unitholders, which action deteriorates fund performance and may not maximize unitholder interest. (Ferreira, Matos et al. (2018); Korkeamaki and Smythe (2004)) Moreover, this study initially provides robust test based on the work of Demsetz and Lehn (1985), Watts and Zimmerman (1990) and Dey (2008) examining the relationship between conflict-of-interest and company size that large companies are expected to have higher agency conflicts whether there is a relation between fees set by large-bank subsidiaries on fund performance. The results should be consistent with the expected results of objective (2).

1.4 Contribution

The study mainly contributes to individual retail investors and the local regulator who may concern on aspect of both performance from indirect investment through mutual fund market by compensating with fees and investor protection with respect to the issue of agency problem in Thai mutual fund industry. There are two main following contributions.

(1) There are few literatures⁴ that analyze the fee structure in Thailand, but not scrutinizing the relationship between fees and performance basis. Thus, this proposed project would be the first empirical study to inclusively analyze the relationship between fees and performance of domestic equity funds with respect to both whether the domestic equity funds are competitive and whether there are any potential concerns on a conflict-of-interest issue through fund fee channel in the industry dominated by bank in Thailand.

(2) Based on the first objective to find the relationship between TER and performance, unsophisticated investors or retail investors may readily use the TER as one of indicators to filter or select the domestic equity funds in the market. For example, if there is a significant positive relationship between fund fees and performance, it implies funds with higher fees tend to generate higher returns on average then we could simply filter the high-quality funds in the market by using the fund with higher fees as a criterion. Moreover, the first study could be the evidence support to the regulator in

⁴ Pornlapas Na Lamphun and Winai Wongsurawat, 2012, A survey of mutual fund fees and expenses in Thailand, *International Journal of Emerging Markets*, Vol. 7, No.4, 411-429.;

Sarayut Nathaphan and Pornchai Chunchachinda, 2012, Determinants of Growth for Thai Mutual Fund Industry, *International Research Journal of Finance and Economics*, Issue 86, 120-131.;

Woraphon Wattanatorn, Sarayut Nathaphan and Kedwadee Sombultawee, 2018, Is it Worth Paying High Fee? The Evidence from Bank Affiliated Mutual Fund, *Journal of Applied Economic Sciences*, Vol. 13, Issue 7(61), 2107-2113.

term of the competition in Thai domestic equity fund market by explanation through the relationship between fund fees and performance.

In addition, the second objective could initially provide a suggestion based on empirical evidence support to the regulator to consider whether there are any concerns on the conflict-of-interest issue through the fund fee channel in Thailand.

2. Literature review

2.1 Fees

Ajay Khorana (2009) assessed the determinants of fees in samples of different countries around the globe and suggested that management fees, total expense ratio and total unitholder cost including front-end and back-end fees are significantly different across funds. In addition, fees differ among fund objectives and clientele types. Large fund size, funds selling to institutional investors, and funds offering in the country with high investor protection, low concentration in the banking industry and older fund industry tend to charge lower fees.

2.2 Fees and performance

Dellva and Olson (1998) use samples of 568 U.S. equity mutual funds from 1987-1982 to investigate the relation between front-end fees, deferred sales charges, redemption fees, and 12b-1 fees on total fund expenses and risk-adjusted performance by using cross-sectional regression. The authors found that if funds can be justified the fees charged to investors on a cost-benefit basis meaning that fund expenses can be passed on to unitholders and adjusted to improve fund returns, better fund performance, on average, also have lower expense ratios. Funds with front-end fees have lower risk-adjusted returns while funds with back-end fees have a positive relationship with risk-adjusted returns than funds without these fees. The results suggested that the funds are more operationally efficient. Investors should seek the fund that set low fees since they do not provide any economic benefit.

Ferreira, Keswani et al. (2013) examined a sample of 16,316 open-end actively managed equity funds around the world with 27 countries between 1997 and 2007 by using panel data and time-fixed-effect model to examine the potential determinants of mutual fund performance that relate to fund characteristics including TER, front-end and back-end fees, fund age, funds size, fund family size, turnover, flows, past returns, management structure, and the number of countries where a fund is sold. The study found that the relation between fees and gross return is positive and statistically significant, while the relation between fees and net return is negative. This suggests that

higher expense ratio can generate higher gross returns but distress net returns. This study consistent with Cooper, Halling et al. (2020) whose empirical study suggested that fees do matter for investors and there was a negative relation between fees and net returns in a sample of both U.S. and international equity funds, and important economic effects for investors.

Cooper, Halling et al. (2020) used the samples of equity funds in both U.S. and international market between 1980 and 2017 with yearly data panel and used annual cross-sectional regressions to examine whether fees matter to create net value added to investors and how mutual funds price their service providing based on fund characteristics. The study found that percentage of fees was relevant from perspective of investors and there was fee dispersion among mutual funds which implied that funds having the same characteristics they charge differently. Moreover, the relation between fees and net returns was negative, which was inconsistent with the neoclassical framework assuming competitive market from the literature of Berk and Green (2004) and Berk and Binsbergen (2015) that fees should not matter to investors and net returns to investors should be zero as the gross return was equal to fees in equilibrium.

2.3 Fees and performance of mutual funds managed by bank subsidiaries

Ferreira, Matos et al. (2018) used the sample of 7,220 open-end equity mutual funds domiciled in 28 countries from 2000 to 2010 to examine the risk-adjusted return (alpha suggested by Carhart four-factor model (1997)) of funds managed by commercial bank subsidiaries. Under the conflict-of-interest hypothesis, the literature focused on the funds that are active management and invest in domestic equity because banks normally have close business activities such as lending with local firms. The authors found that mutual fund performance was negatively affected when AMC is owned by bank. In addition, funds managed by bank subsidiaries underperform non-bank subsidiaries funds by 92 basis points per year on average as measured by four-factors alpha also consistent with measured by benchmark-adjusted returns and gross returns. The results from the literature suggested that the agency problem was created, fund managers are not working for the best interests of unitholders but tend to make benefit to the parent bank through mutual fund fees.

3. Data

This special project will use all samples of Thai open-end domestic equity funds on yearly basis from Morningstar Direct as the main sources of data and SEC website (e.g., fund statistics, MRAP) as supplementary sources to cross-check the data. The analysis will exclude closed-end funds (e.g., trigger funds), sector funds, tax-saving

funds (including LTF, RMF, SSF, MF for PVD), accredited investor (AI) and ultra-high net worth (UI) funds to avoid the effect of different fund characteristics especially level of fund risk and clientele types.

3.1 Data overview

The number of funds used in the analysis is 73 funds from 2010 to 2019, having balanced information available on Morningstar Direct database used as the main data source. The funds managed by AMCs considering as bank subsidiaries are 40 funds and non-bank subsidiaries are 33 funds. The funds are categorized by fund strategies, there are 67 active funds and 6 passive funds. Besides, the fund groups divided by Morningstar categories consist of 66 large-cap funds and 6 mid-small cap funds. Table 1 shows the summary of necessary data used in the model that mainly consists of gross returns of fund and its benchmark, market return, TER, fund size, fund family size, fund flows, fund age, fund turnover and fund volatility. The funds' data is dominated by the samples categorized as bank-subsiidiaries, active funds and large-cap funds, separately.

Table 1: Summary of data

No.	Variables	Data	Unit	Frequency	Data source
1	Gross return	Gross return	%	Monthly/ Yearly	Morningstar direct
2	Benchmark return	Total return index	%	Yearly	Morningstar direct
3	R_f	Returns on T-bill	%	Monthly	Morningstar direct
4	Market return	SET total return index	%	Monthly	Morningstar direct
5	TER	Annual report net expense ratio	%	Yearly	Morningstar direct
6	Fund size (log)	Total net asset (TNA)	Baht	Yearly	Morningstar direct
7	Fund family size (log)	TNA of funds under management of the same AMC	Baht	Yearly	Morningstar direct
8	Fund flows	$((TNA_t/TNA_{t-1})-1)$ - gross return	%	Yearly	Morningstar direct
9	Fund age (log)	Data period – inception date	year	Yearly	Morningstar direct
10	Fund turnover	Portfolio turnover ratio	%	Yearly	Morningstar direct
11	Fund volatility	Standard deviation of returns	%	Yearly	Morningstar direct
12	Bank- vs. non-bank subsidiaries	Asset management companies owned by commercial bank = 1 and asset management companies not owned by commercial bank = 0	-	Yearly	Morningstar direct

13	Large- vs medium- and-small-bank subsidiaries	Asset management companies owned by commercial bank considering as large bank ⁵ =1 and owned by commercial bank, but not considering as large bank=0	-	Yearly	Morningstar direct
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3.2 Basic data analysis

Table 2, 3, 4, and 5, present the descriptive statistics of 73 domestic equity funds covered the time period 2010-2019. Those tables are separated in the dimension of overall data, types of AMCs, types of domestic equity funds by strategies, and types of domestic equity funds by Morningstar categories, respectively. In addition, Table 6 shows the statistical view of the fund samples managed by bank-subsidaries only. The summary of basic data analysis as follows.

Fund performance

The average gross return of the fund samples is 13.8%, indifferent between the performance of funds managed by bank and non-bank subsidiaries. Active funds provide the average gross returns at 13.9% higher than passive funds (13.0%). Large-cap equity funds are not substantially different in average gross return comparing to mid-small-cap equity funds, but the mid-small-cap funds give us the lower bound of gross returns between -28.8% to 61.7% while large-cap funds provide lower negative return at -21.9% and higher positive return at 79.3%. The funds managed by large-bank subsidiaries have mean return of 14.3% higher than the average return of the funds managed by non-large-bank subsidiaries at 13.3%.

On average, all samples provide excess returns with respect to gross return over benchmark at 51 bps. and Jensen's alpha (alpha) of 18 bps. The ranges of gross returns over benchmark and alpha are -20.8%-38.7% and -21.6%-31.0%, respectively. There is slightly different between the excess returns of funds managed by bank and non-bank subsidiaries. The average return over benchmark of funds managed by bank subsidiaries is 57 bps. higher than the group of funds managed by non-bank subsidiaries (44 bps.) These also consistent with mean alpha of funds managed by bank subsidiaries that is also higher than the non-bank subsidiaries' fund group. For active versus passive fund samples, the average excess returns in both gross return over benchmark and alpha is higher in the group of active funds than passive funds. However, excess returns of passive funds are not equal to zero, the passive funds generate average positive return over benchmark of 25 bps. and average negative Jensen's alpha of -90 bps. There is higher average return over benchmark in large-cap funds but higher average alpha in mid-small-cap funds. Considering on the funds managed by bank subsidiaries only, the return over benchmark and alpha is substantially better in the group of fund samples managed

⁵ Top 5 of commercial banks by asset size in 2019 are Kasikorn bank (KBANK), Bangkok Bank (BBL), Krungthai (KTB), Siam Commercial Bank (SCB) and Krungsri (BAY). Source: Bank of Thailand

by large-bank subsidiaries comparing to the group of funds managed by non-large-bank subsidiaries on average.

Table 2: Descriptive statistics of all samples

The table reports the summary statistics of all 730 samples or 73 funds from 2010-2019 which include number of observations (N), average (mean), standard deviations (s.d.), minimum value (min), and maximum value (max).

Variables	N	mean	s.d.	min	max
Gross returns	730	13.80%	19.70%	-28.80%	79.30%
Gross returns over Benchmark	730	0.51%	6.37%	-20.80%	38.70%
Jensen's alpha	730	0.18%	6.01%	-21.60%	31.00%
TER	730	1.71%	0.51%	0.56%	3.53%
Fund size (million baht)	730	1,318	2,742	6	20,060
Fund family size (million baht)	730	11,710	9,565	76	50,440
Fund flows	730	0.39%	57.60%	-93.30%	711.80%
Fund age	730	15.66	5.57	2.00	33.00
Turnover ratio	730	295.70%	392.70%	10.07%	3864.00%
Volatility	730	13.50%	5.32%	5.27%	28.50%

Table 3: Descriptive statistics of all funds managed by bank and non-bank subsidiaries

The table reports the summary statistics including number of observations (N), average (mean), standard deviations (s.d.), minimum value (min), and maximum value (max) by dividing all samples from year 2010-2019 into 2 groups: the funds managed by bank subsidiaries and by non-bank subsidiaries.

Variables	Bank subsidiaries					Non-bank subsidiaries				
	N	mean	s.d.	min	max	N	mean	s.d.	min	max
Gross returns	400	13.80%	19.60%	-23.60%	79.30%	330	13.80%	19.90%	-28.80%	58.80%
Gross returns over Benchmark	400	0.57%	7.02%	-16.10%	38.70%	330	0.44%	5.49%	-20.80%	16.60%
Jensen's alpha	400	0.20%	6.53%	-16.30%	31.00%	330	0.16%	5.33%	-21.60%	26.70%
TER	400	1.70%	0.50%	0.56%	2.59%	330	1.71%	0.51%	0.56%	3.53%
Fund size (million baht)	400	1,951	3,247	13	20,060	330	551	1,673	6	11,010
Fund family size (million baht)	400	15,140	11,170	649	50,440	330	7,551	4,452	76	20,710
Fund flows	400	8.57%	69.20%	-85.90%	711.80%	330	-9.51%	37.10%	-93.30%	336.90%
Fund age (year)	400	16	6	2	27	330	16	5	3	33
Turnover ratio	400	261%	287%	14%	2277%	330	338%	488%	10%	3864%
Volatility	400	13.80%	5.06%	5.66%	28.50%	330	13.10%	5.60%	5.27%	28.00%

Table 4: Descriptive statistics of all samples categorized by active and passive funds

The table reports the summary statistics including number of observations (N), average (mean), standard deviations (s.d.), minimum value (min), and maximum value (max) by dividing all samples from 2010-2019 into 2 groups: active and passive funds.

Variables	Active funds					Passive funds				
	N	mean	s.d.	min	max	N	mean	s.d.	min	max
Gross returns	670	13.90%	19.90%	-28.80%	79.30%	60	13.00%	17.90%	-16.60%	45.70%
Gross returns over Benchmark	670	0.53%	6.63%	-20.80%	38.70%	60	0.25%	1.68%	-4.15%	4.95%
Jensen's alpha	670	0.28%	6.16%	-21.60%	31.00%	60	-0.90%	3.92%	-8.02%	8.40%
TER	670	1.79%	0.44%	0.56%	3.53%	60	0.80%	0.18%	0.56%	1.13%
Fund size (million baht)	670	1,069	2,407	6	19,810	60	4,104	4,315	23	20,060
Fund family size (million baht)	670	11,390	9,562	76	43,940	60	15,240	8,938	4,016	50,440
Fund flows	670	-1.05%	56.50%	-90.10%	711.80%	60	16.50%	67.70%	-93.30%	336.90%
Fund age (year)	670	16	6	2	33	60	16	5	3	33
Turnover ratio	670	308%	405%	10%	3864%	60	154%	165%	14%	862%
Volatility	670	13.50%	5.36%	5.27%	28.50%	60	13.50%	4.85%	5.99%	25.40%

Table 5: Descriptive statistics of all samples categorized by large-cap and mid-small-cap funds

The table reports the summary statistics including number of observations (N), average (mean), standard deviations (s.d.), minimum value (min), and maximum value (max) by dividing all samples from 2010-2019 into 2 groups: large-cap and mid-small-cap funds defined by Morningstar.

Variables	Large-cap funds					Mid-small-cap funds				
	N	mean	s.d.	min	max	N	mean	s.d.	min	max
Gross returns	660	13.80%	19.60%	-21.60%	79.30%	70	13.60%	21.00%	-28.80%	61.70%
Gross returns over Benchmark	660	0.54%	5.89%	-16.10%	38.70%	70	0.20%	9.86%	-20.80%	26.70%
Jensen's alpha	660	0.09%	5.56%	-16.30%	31.00%	70	1.04%	9.27%	-21.60%	26.70%
TER	660	1.68%	0.52%	0.56%	3.53%	70	1.99%	0.22%	1.70%	2.50%
Fund size (million baht)	660	1,333	2,833	6	20,060	70	1,181	1,655	102	8,494
Fund family size (million baht)	660	11,470	9,329	76	50,440	70	13,980	11,380	1,030	40,170
Fund flows	660	-1.36%	54.60%	-93.30%	711.80%	70	16.90%	79.40%	-83.30%	341.90%
Fund age (year)	660	16	6	2	33	70	16	5	3	33

The table reports the summary statistics including number of observations (N), average (mean), standard deviations (s.d.), minimum value (min), and maximum value (max) by dividing all samples from 2010-2019 into 2 groups: large-cap and mid-small-cap funds defined by Morningstar.

Variables	Large-cap funds					Mid-small-cap funds				
	N	mean	s.d.	min	max	N	mean	s.d.	min	max
Turnover ratio	660	292%	378%	10%	3864%	70	335%	516%	23%	2844%
Volatility	660	13.50%	5.34%	5.59%	28.50%	70	13.50%	5.13%	5.27%	26.60%

Table 6: Descriptive statistics of bank-subsidaries funds (B)

The table reports the summary statistics including number of observations (N), average (mean), standard deviations (s.d.), minimum value (min), and maximum value (max) by dividing bank-subsidary samples from 2010-2019 into 2 groups: the funds managed by large-bank subsidiaries and by non-large-bank subsidiaries.

Variables	Large-bank subsidiaries					Non-large-bank subsidiaries				
	N	mean	s.d.	min	max	N	mean	s.d.	min	max
B Gross returns	220	14.30%	20.70%	-23.60%	79.30%	180	13.30%	18.20%	-15.60%	51.90%
B Gross returns over BM	220	0.97%	8.30%	-16.10%	38.70%	180	0.09%	5.03%	-13.30%	14.00%
B Jensen's alpha	220	0.41%	7.36%	-16.30%	31.00%	180	-0.05%	5.34%	-10.90%	14.50%
B TER	220	1.78%	0.51%	0.59%	2.39%	180	1.61%	0.48%	0.56%	2.59%
B Fund size (million baht)	220	2,621	3,746	64	20,060	180	1,133	2,259	13	15,390
B Fund family size (million baht)	220	19,710	10,920	649	50,440	180	9,546	8,669	1,030	43,940
B Fund flows	220	20.30%	83.30%	-82.00%	711.80%	180	-5.77%	42.60%	-85.90%	352.80%
B Fund age (year)	220	16	5	3	26	180	16	5	3	33
B Turnover ratio	220	184%	173%	32%	1334%	180	354%	363%	14%	2277%
B Volatility	220	13.70%	4.99%	5.66%	28.50%	180	14.00%	5.15%	5.99%	27.50%

TER

The average TER of all samples is 1.71% while minimum and maximum TER are 0.56% and 3.53%, respectively. By focusing on the funds managed by bank-subsidaries and non-bank subsidiaries, the average TER still indifferent. However, for the sample group of bank-subsidaries' funds, TER of funds managed by large-bank subsidiaries is 1.78% which is higher than the group of funds managed by non-large-bank subsidiaries (1.61%), on average. In aspect of fund types by management strategies, passive funds tend to have lower TER than active funds on average. The

average TER of passive funds is 0.80% while which of active funds is 1.79%. The large-cap funds by Morningstar categories set TER at 1.68% lower than the mid-small cap funds set at 1.99% on average.

Fund size

Average fund size or TNA is 1,318 million baht. Funds managed by bank-subsubsidiaries have larger fund size than the funds managed by non-bank subsidiaries. In addition, passive funds have higher average TNA (4,104 million baht) than active funds (1,069 million baht). Large-cap funds have slightly higher average TNA (1,333 million baht) than mid-small cap funds (1,181 million baht)

Fund family size

Average fund family size, the TNA of the funds that have the policy to manage domestic-equity funds under the same AMC, is 11.7 billion baht. The funds managed by bank-subsubsidiaries have higher average fund family size (15.1 billion baht) than the fund managed by non-bank subsidiaries (7.6 billion baht). In aspect of funds by strategies, the average fund family size of passive funds also has the same trend as fund size. Fund family size of passive funds has larger than which of active funds. However, the average fund family size of large-cap funds is slightly lower than mid-small cap funds on average.

Fund flows

The funds have inflow at 0.39% of TNA on average. The maximum fund outflow of all samples is 93.3% of TNA while the maximum fund inflow is 711.8% of TNA. The funds managed by bank-subsubsidiaries have fund inflows with 8.57% of TNA while the funds managed by non-bank subsidiaries have fund outflows with 9.51% of TNA on average. Moreover, passive funds have fund inflows and active funds have fund outflows, on average. Large-cap funds have fund outflows and mid-small cap funds have fund inflows on average.

Fund age

Fund age of all samples is 15.66 years on average. The longest fund age is 33 years. Active funds and passive funds have average fund age at 15 and 11 years, respectively. There are not substantially different in fund age of other various groups of samples.

Turnover

Fund turnover is 296% on average. The funds managed by bank subsidiaries have average turnover at 261% lower than which managed by non-bank subsidiaries that have the ratio at 338% on average. Active funds, mid-small-cap funds and funds managed by non-large-bank subsidiaries tend to have higher portfolio turnover than passive funds, large-cap funds and funds managed by large-bank subsidiaries, respectively.

Volatility

Average volatility is at 13.5%, not different with the group of active funds, passive funds, large-cap fund and mid-small-cap funds. The funds managed by bank subsidiaries provide average fund volatility at 13.8% slightly higher than which of funds managed by non-bank subsidiaries at 13.1%. In addition, for fund managed by bank-subsidiary group only, the large-bank subsidiary group has fund volatility at 13.7% slightly lower than the group of funds managed by non-large-bank subsidiaries.

3.3 The relevant variables suggested by literature

Fund performance

Berk and Binsbergen (2015) indicated gross return over benchmark as a value-added form investment in mutual funds. Ferreira, Keswani et al. (2013) used different perspectives of fund performance such as gross returns and market model as a regressand. However, Barber, Huang et al. (2016) suggested that unsophisticated investors may not use a complex method such as momentum of the market or industry returns to evaluate fund performance, but they simply use market-adjusted returns instead. In contrast, sophisticated investors tend to use complex benchmarks when assessing the fund performance.

Hence, fund performance as the dependent variable on this special project will be considered excess return into two main aspects based on unsophisticated investor perspective:

(1) Gross return over benchmark

$$R_{i,t} = \text{Gross return}_{i,t} - \text{Benchmark return}_{i,t} \quad (1)$$

where gross return_{i,t} is return of mutual fund i before netting total fund expense in month t. Benchmark return_{i,t} is benchmark return of mutual fund i in month t. Both gross return and benchmark return are retrieved from Morningstar Direct.

(2) *Jensen's Alpha* (α_i) by market model indicating excess return of a mutual fund return from the market return benchmark suggested by Capital Asset Pricing Model (CAPM). Positive (negative) alpha implies the fund outperform (underperforms) the benchmark. The market model regression is:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + \varepsilon_{i,t} \quad (2)$$

where α_i is the difference between a return of mutual fund i and market benchmark return in month t . $R_{m,t} - R_{f,t}$ is the domestic market risk premium in month t . The monthly alpha received from the equation (2) will be annualized in order to fit with the model (3), (4) and (5) using yearly data, presented in the methodology section.

Fund characteristics

Ferreira, Keswani et al. (2013) suggested that the determinants of mutual fund performance by fund characteristics mainly included total fund expense, fund size, fund family size, fund flows, turnover, fund age, and past performance.

The project will follow the independent variables suggested by Ferreira, Keswani et al. (2013) in the process of analysis. TER, an independent variable, will use annual report total expense ratio on yearly basis, available on Morningstar Direct database. The control variables are fund size, fund family size, fund flows, fund age, fund turnover, fund return volatility and past performance. Fund size and fund family size⁶ will use the fund's total net asset (TNA) collected from Morningstar Direct. Fund flows⁷ and fund age⁸ will be obtained from calculation. Fund turnover will use the information in yearly basis on the annual report collected by Morningstar. Fund return volatility which is fund return standard deviation will be collected from the Morningstar Direct in yearly basis. In addition, a dummy variable will be used on the analysis to study the relation between bank subsidiaries perspective with fund performance, suggested by Ferreira, Matos et al. (2018), and to capture the effect of TER set by bank subsidiaries whether it has a significant effect on fund performance, following objective (2).

⁶ Total net asset value of the funds under management of the same company

⁷ Fund flow $_{i,t} = ((TNA_{i,t}/TNA_{i,t-1})-1)$ -Gross return $_{i,t}$

⁸ Fund age = Time period t - (inception time)

4. Methodology

The methodology suggested by Ferreira, Keswani et al. (2013) is panel data analysis with time-fixed-effect regression model to find the relation between fees and performance by regressing fund performance on lagged fund characteristics including TER, fund size, fund family size, fund flows, fund age, turnover, and past performance. This project will also use the literature of Ferreira, Keswani et al. (2013) as the main paper to help in the assessment and analysis on the relation between mutual fund fees and performance.

4.1 Constructed models

As mentioned earlier that this study will follow the methodology of Ferreira, Keswani et al. (2013) to analyze panel data with time-fixed-effect model. The regressand is fund performance, the regressor is TER, and the control variables are fund size, fund family size, fund flows, fund age, turnover, volatility and past performance. The independent and control variables related to the fund's characteristics and past performance are lagged by one period of time. This project proposes three main dimensions to analyze the effect of fund TER on its performance consisting of (i) gross returns over the benchmark and (ii) alpha suggested by CAPM based on the perspective of unsophisticated investors as follows.

4.1.1 The relation between TER set by all Thai AMC and fund performance

To study the relationship between TER and fund performance in samples of open-end domestic equity funds. The fund excess returns could be affected or explained by fund characteristics consisting of TER, fund size, fund family size, fund flows, fund age, turnover, fund return volatility and past performance, following Chen, Hong et al. (2004), Ferreira, Keswani et al. (2013), and Ghoul and Karoui (2017). The baseline constructed model (3) is:

$$R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 \log(Fund\ size)_{i,t-1} + \beta_4 \log(Fund\ family\ size)_{i,t-1} + \beta_5 Fund\ flows_{i,t-1} + \beta_6 \log(Fund\ age)_{i,t-1} + \beta_7 Turnover_{i,t-1} + \beta_8 Volatility_{i,t-1} + U_{i,t} \quad (3)$$

Where;

$R_{i,t}$ is fund performance of fund i in year t, analyzed into 2 main dimensions: gross return over benchmark and Jensen's alpha suggested by CAPM.

α_i	is unobserved heterogeneity having time invariant property and specific to fund i.
$R_{i,t-1}$	is past performance of fund i in year t-1.
$TER_{i,t-1}$	is annual report total expense ratio of fund i in year t-1.
Fund size $_{i,t-1}$	is total net asset value of fund i in year t-1.
Fund family size $_{i,t-1}$	is total net asset value of funds under management of the same AMC in year t-1.
Fund flow $_{i,t-1}$	is the estimated annual fund flow of fund i in year t-1.
Fund age $_{i,t-1}$	is the age of fund i from inception to year t-1.
Turnover $_{i,t-1}$	is annual fund turnover ratio of fund i in year t-1.
Volatility $_{i,t-1}$	is the fund return standard deviation of fund i in year t-1.

Cooper, Halling et al. (2020) referred to the literature of Berk and Binsbergen (2015) who suggested that under neoclassical framework⁹ relating to the efficient market where financial markets are highly competitive and investors are rational, percentage fees are irrelevant to investors because a fund with better performance will attract new fund flows from investors who are able to observe skills of fund managers and are willing to pay for compensation with higher performance. When funds become bigger, fund size will adjust to the equilibrium and net alpha of the funds is closed to zero. These are implying that the positive relation between fund fees and their performance indicates efficient market potentially. Otherwise, it implies that the market may be not highly competitive. Thus, we focus on coefficient β_2 to analyze whether TER can significantly explain the performance of Thai equity funds or not. β_2 is expected to be a significantly positive relation under efficient market hypothesis. Funds with higher TER investors observed potentially provide better performance. The application is that unsophisticated investors may be aware of how fees could affect the fund performance and use fund fees as one of indicators to select the funds to invest. Moreover, Thai regulator may use this result as empirical evidence to support

⁹Berk and Binsbergen (2015) refer the standard neoclassical assumptions that (1) investors are rational, (2) financial markets are competitive, and (3) managers optimize.

how competition in Thai domestic equity fund market based on fees and performance analysis.

4.1.2 The relation between TER set by bank subsidiaries and performance

To study whether the TER set by bank subsidiaries has the significant effect on fund performance or not, the samples used will be separated into 2 groups which are groups of funds managed by bank subsidiaries versus non-bank subsidiaries. The analysis will use the same methodology mentioned in subsection 4.1.1, however, the model (4) will be added the interaction term between TER and a dummy variable represented as a bank subsidiary (bank) to capture the additional impact of TER set by AMC owned by commercial bank on fund performance in the constructed model (3).

$$R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 TER_{i,t-1}(bank) + \beta_4 \log(Fund\ size)_{i,t-1} + \beta_5 \log(Fund\ family\ size)_{i,t-1} + \beta_6 Fund\ flows_{i,t-1} + \beta_7 \log(Fund\ age)_{i,t-1} + \beta_8 Turnover_{i,t-1} + \beta_9 Volatility_{i,t-1} + U_{i,t} \quad (4)$$

Where;

$TER_{i,t-1}(bank)$ is an interaction term between $TER_{i,t-1}$ and dummy variable which is 1 when the funds operated by bank subsidiaries and 0 when the funds operated by non-bank subsidiaries.

Ferreira, Matos et al. (2018) and Korkeamaki and Smythe (2004) suggested that the funds managed by an AMC considering as a bank subsidiary potentially have a negative effect on performance due to the conflict-of-interest issue between the AMC and its bank parent that AMC may involve in the activities such as portfolio decisions making or increase in fund fees collected from unitholders that was beneficial to parent bank rather than maximizing the interests or fund returns to unitholders. In other words, mutual funds managed by bank subsidiaries charge higher fees, and these costs investors bared are not compensated with higher risk-adjusted returns. Hence, β_3 is expected to be zero or the additional impact of fees set by bank subsidiaries on fund performance should be insignificant in this test, which implies there is potentially no conflict of interest between responsibilities or duties of AMCs to their parent bank and to unitholders through fund fee channel. The application is that investors and regulators may not much concern on the conflict-of-interest issues of AMC passing through the fund fee channel in Thai equity fund market.

4.1.3 The relationship between TER set by large-bank subsidiaries and performance

To provide robust test examining in conjunction with the effect of TER set by large-bank subsidiaries and medium-and-small bank subsidiaries on fund performance to emphasize the conflict-of-interest in the perspective of firm size, based on the suggestion from Demsetz and Lehn (1985), The results should be consistent with the expected results on objective (2).

The analysis will use samples of funds managed by bank subsidiaries only and follow the same methodology as in subsection 4.1.1, but in the model (5) will be added the interaction term between TER and a dummy variable represented as a large-bank subsidiary (large bank)¹⁰ to capture the additional impact of TER set by AMC owned by a large commercial bank on fund performance in the constructed model (3).

$$R_{i,t} = \alpha_i + \beta_1 BR_{i,t-1} + \beta_2 BTER_{i,t-1} + \beta_3 BTER_{i,t-1}(\text{large bank}) + \beta_4 \log(BFund \text{ size})_{i,t-1} + \beta_5 \log(BFund \text{ family size})_{i,t-1} + \beta_6 BFund \text{ flows}_{i,t-1} + \beta_7 \log(BFund \text{ age})_{i,t-1} + \beta_8 BTurnover_{i,t-1} + \beta_9 BVolatility_{i,t-1} + U_{i,t} \quad (5)$$

Where:

- $BR_{i,t-1}$ is past performance of fund i managed by bank subsidiary in year t-1.
- $BTER_{i,t-1}(\text{large-bank})$ is an interaction term between $BTER_{i,t-1}$ and dummy variable which is 1 when the funds operated by large-bank subsidiary and 0 when the funds operated by non-large-bank subsidiary.
- $BTER_{i,t-1}$ is annual report total expense ratio of fund i managed by bank subsidiary in year t-1.
- $BFund \text{ size}_{i,t-1}$ is total net asset value of fund i managed by bank subsidiary in year t-1.

¹⁰ Top 5 of commercial banks by asset size in 2019 are Kasikorn bank (KBANK), Bangkok Bank (BBL), Krungthai (KTB), Siam Commercial Bank (SCB) and Krungsri (BAY). Source: Bank of Thailand

BFund family size $i,t-1$	is total net asset value of funds under management of the same AMC considering as bank subsidiary in year t-1.
BFund flow $i,t-1$	is the estimated annual fund flow of fund i managed by bank subsidiary in year t-1.
BFund age $i,t-1$	is the age of fund i managed by bank subsidiary from inception to year t-1.
BTurnover $i,t-1$	is annual fund turnover ratio of fund i managed by bank subsidiary in year t-1.
BVolatility $i,t-1$	is the fund return standard deviation of fund i managed by bank subsidiary in year t-1.

Based on the explanation on conflict-of-interest hypothesis in subsection 4.1.2 and the additional suggestion from Demsetz and Lehn (1985), Watts and Zimmerman (1990) and Dey (2008) who studied the relationship between conflict-of-interest and company size that larger companies are expected to have higher agency conflicts, β_3 on the model (5) should provide the same conclusion with the model (4). β_3 is expected to be zero, there is no additional impact of TER set by large-bank subsidiaries, in other words, there is potentially no conflict-of-interest between responsibilities or duties of AMCs to their parent bank and unitholders through the fund fee channel.

4.2 The relationship between fund characteristics and fund performance suggested by literature

TER

TER represents the cost of investors paying to fund managers for compensating with higher performance. Thus, the fund fees and performance relation can be used to evaluate the value of active management. (Ferreira, Keswani et al. 2013) There is mixed empirical evidence on the relationship between fund fees and performance. The samples in the US and international mutual funds, Carhart (1997), Dellva and Olson (1998), Ferreira, Keswani et al. (2013), Cooper, Halling et al. (2020) found a negative relationship between fund expenses and its returns while Berk and Binsbergen (2015) found a positive correlation between current fund expenses and future performance and Garyn-Tal (2015) found no relation between fees and performance when taking into account fund classification.

Fund size

Large funds could gain more benefits comparing to small funds in several aspects such as investment opportunities not available to small funds, the expense of the fund (e.g., brokerage fees) in term of negotiation that they have large positions on volumes trading. However, larger funds can be suffered from trade larger volumes of stocks, the large volumes could drive the stock price to be higher (higher price impact cost). In addition, small funds tend to be more active than larger funds since small funds have a few exposures on each stock while large funds need to continue seeking new investment opportunities with higher investment constraints such as investment limits that could dilute their management skills. The authors found that there was a negative relationship between the fund size (TNA) and performance in samples of US funds, fund size had a negative effect on fund performance. Small funds had better performance comparing to the larger funds. (Ferreira, Keswani et al. 2013)

Fund family size

Fixed expenses of the company such as research and administrative expenses can be shared across funds managed under the same AMC. Fund family size is TNA of the same type of funds that fund managers tend to use the same set of economic data and resources to manage those funds. Thus, fund family size is used to capture the economies of scale of the company. The author found that fund family size had a positive relationship to the fund performance. Larger fund family size is likely to perform well. (Ferreira, Keswani et al. 2013)

Fund flows

Investors tend to put new investments in the funds observed that could potentially provide higher returns in the future which is initially suggested by Gruber (1996). The relation between cash inflows to the funds and fund performance is significantly positive in samples of non-US funds. The fund that has higher new cash inflows subsequently provides better performance. (Ferreira, Keswani et al. 2013)

Fund age

Fund age and performance can be both positive and negative relations. For the positive relation, low fund age typically has higher fund cost because the size of funds is small and fund managers may lag of experience to manage a particular type of funds then new funds tend to perform badly when compared to the fund with longer longevity. In contrast, there is another explanation on the negative relation is that new funds will be committed to achieve better performance to survive, causing the younger funds to have better performance. (Ferreira, Keswani et al. 2013)

Turnover

For active management, trading costs are significant negative effect on fund performance especially when there is in the market that has low liquidity and high transaction costs. High fund's portfolio turnover ratio indicates the high level of active trading of the fund implying that which fund potentially has higher transaction costs which deteriorates the fund performance. (Ferreira, Keswani et al. 2013)

Fund return volatility

Ghoul and Karoui (2017) and Cooper, Halling et al. (2020) suggested to add fund return volatility which is fund standard deviation in the model to capture a fund risk characteristic. The empirical evidence form the U.S. equity funds over the period of 2003-11 found that the high volatility of fund returns would significantly affect the future fund performance.

Past performance

Several literatures are explaining the persistence of performance in samples of the US funds that bad performing funds tend to be persistent than the funds that perform well. In samples of non-US funds, only UK funds have performance persistence while others are not persistent or insignificant. (Ferreira, Keswani et al. 2013)

Bank subsidiaries

Under bank conglomerate, the parent bank can maximize the combined revenue from its subsidiaries. The AMC receives revenue from fund fees and provides fiduciary duties on the fund investment for the investors, however, the manager objectives are also related to the parent in term of continued employment. (Ferreira, Matos et al. 2018) Hence, the conflict of interest between duties of AMC to bank's shareholders and unitholders could occur, AMC may involve in the activities leading the benefits to the parent bank rather than maximizing the interests or fund returns to unitholders. The empirical study relating to the performance of mutual funds managed by commercial bank subsidiaries showed the performance was negatively affected when AMC was a bank subsidiary. (Hao and Yan (2012); Golez and Marin (2015); Ferreira, Matos et al. (2018))

5. Results

This special project inclusively studies the relationship between fund fees and performance of open-end domestic equity funds in Thai market based on unsophisticated investor perspective by observing the funds samples during 2009-2019

and using time-fixed-effect model following the equation (3), (4), and (5) as the main methodology. The data analysis results are presented as follows.

5.1 The relation between TER set by all Thai AMC and fund performance

To examine whether the TER significantly has a positive effect on fund performance. The underlying concept of this test is based on the suggestion of Berk and Binsbergen (2015) that in the highly competitive market and investor are rational, the investors could notice skills of fund managers by willing to pay higher fees to compensate with the funds potentially providing higher fund performance. In other word, higher TER should provide higher returns on average in the highly competitive market.

Table 7 reports the statistically significance of negative relationship between TER and fund performance including both returns over benchmark and Jensen's alpha at significant level of 1%. The higher TER deteriorates the return over benchmark and alpha. These empirical result is inconsistent with Cooper, Halling et al. (2020) and Berk and Binsbergen (2015) suggesting that under the efficient market where financial markets are highly competitive and investors are rational, percentage fees are irrelevant to investors because a fund with better performance will attract new fund flows from investors who are able to observe skills of fund managers and are willing to pay higher fees for compensation with higher performance. Thus, the study cannot conclude that Thai domestic-equity fund market is highly competitive. However, the result of negative effect on fund performance is consistent with Ferreira, Matos et al. (2018) who suggested that in the mutual fund market with the bank conglomerate structure, the mutual fund performance was negatively affected because of the agency problem that might be created.

Table 7: The relationship between TER set by all Thai AMC and fund performance of all samples

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (3): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 \log(Fund\ size)_{i,t-1} + \beta_4 \log(Fund\ family\ size)_{i,t-1} + \beta_5 Fund\ flows_{i,t-1} + \beta_6 \log(Fund\ age)_{i,t-1} + \beta_7 Turnover_{i,t-1} + \beta_8 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER and fund performance (β_2) by using the samples of 73 open-end domestic equity funds in Thailand. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	All funds	
	Return over benchmark	Alpha
Constant	0.8443*** (5.3318)	0.8144*** (4.4813)
R_{t-1}	0.0373	-0.0206

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (3): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 \log(Fund\ size)_{i,t-1} + \beta_4 \log(Fund\ family\ size)_{i,t-1} + \beta_5 Fund\ flows_{i,t-1} + \beta_6 \log(Fund\ age)_{i,t-1} + \beta_7 Turnover_{i,t-1} + \beta_8 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER and fund performance (β_2) by using the samples of 73 open-end domestic equity funds in Thailand. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	All funds	
	Return over benchmark	Alpha
	(1.0430)	(-0.6823)
TER _{t-1}	-7.0576*** (-3.9579)	-5.7005*** (-3.0769)
Fund size _{t-1} (log)	-0.0337*** (-7.1555)	-0.0294*** (-5.8889)
Fund family size _{t-1} (log)	-0.0087 (-1.0521)	-0.0088 (-0.9669)
Fund flows _{t-1}	-0.0024 (-0.4153)	0.0002 (0.0403)
Fund age _{t-1} (log)	0.0038 (0.2386)	0.0144 (0.9429)
Turnover _{t-1}	-0.0006 (-1.6129)	0.0001 (0.1486)
Volatility _{t-1}	0.3283** (2.3901)	-0.0635 (-0.4400)
Observations	730	730
Number of funds	73	73
Adjusted R-squared	0.2567	0.2345

Fund size has statistically significant relationship in the opposite direction with the excess returns. Larger fund size provides lower fund performance, consistent with the empirical evidence suggested by Ferreira, Keswani et al. (2013) that large funds need to continue seeking new investment opportunities with higher investment constraints such as investment limits that could dilute their management skills significantly has negative impact on fund performance. Fund volatility significantly has positive impact on return over benchmark only. Funds with high volatility tend to have higher excess returns. For other independent variables including past performance, fund family size, fund flows, fund age and turnover, there are statistically insignificant.

Table 8 reports the results of fund samples categorized by types of fund strategies consisting of active and passive funds. The table presents the strongly negative relationship between TER and fund performance in samples of active funds while in samples of passive funds cannot observe the statistically significant relationship. Therefore, the study cannot conclude that the equity funds with actively managed strategies is highly competitive. On average, investors would not compensate the fees charged by a fund operator actively managing domestic equity funds with superior performance. This result is consistent with Table 7.

Table 8: The relationship between TER set by all Thai AMC and fund performance of all samples categorized by fund strategies

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (3): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 \log(Fund\ size)_{i,t-1} + \beta_4 \log(Fund\ family\ size)_{i,t-1} + \beta_5 Fund\ flows_{i,t-1} + \beta_6 \log(Fund\ age)_{i,t-1} + \beta_7 Turnover_{i,t-1} + \beta_8 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER and fund performance (β_2) by using the samples of 73 open-end domestic equity funds categorized by fund strategies consisting of 67 active funds and 6 passive funds. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Active funds		Passive funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Constant	0.8312*** (5.0763)	0.8092*** (4.3172)	0.3264 (1.2119)	0.4905 (0.7208)
R_{t-1}	0.0493 (1.3750)	-0.0253 (-0.8111)	-0.0014 (-1.2398)	-0.0570 (-0.3706)
TER_{t-1}	-7.0037*** (-3.7396)	-5.4992*** (-2.8396)	-5.3871 (-1.5628)	-4.8772 (-1.0701)
Fund size $_{t-1}$ (log)	-0.0366*** (-7.3997)	-0.0331*** (-6.5152)	-0.0186* (-2.0683)	-0.0272 (-1.9095)
Fund family size $_{t-1}$ (log)	-0.0064 (-0.7347)	-0.0051 (-0.5290)	0.0090 (1.4470)	-0.0099 (-0.5948)
Fund flows $_{t-1}$	-0.0064 (-1.2049)	-0.0037 (-0.9887)	0.0096 (1.7601)	0.0151 (1.7215)
Fund age $_{t-1}$ (log)	0.0029 (0.1752)	0.0089 (0.5707)	-0.0248 (-1.8026)	0.0605* (2.5347)
Turnover $_{t-1}$	-0.0007* (-1.8341)	-0.0001 (-0.1661)	-0.0004 (-0.3878)	-0.0010 (-0.3448)
Volatility $_{t-1}$	0.4023*** (2.7048)	-0.0266 (-0.1688)	-0.2447* (-2.3214)	0.9397*** (4.3464)

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (3): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 \log(Fund\ size)_{i,t-1} + \beta_4 \log(Fund\ family\ size)_{i,t-1} + \beta_5 Fund\ flows_{i,t-1} + \beta_6 \log(Fund\ age)_{i,t-1} + \beta_7 Turnover_{i,t-1} + \beta_8 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER and fund performance (β_2) by using the samples of 73 open-end domestic equity funds categorized by fund strategies consisting of 67 active funds and 6 passive funds. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Active funds		Passive funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Observations	670	670	60	60
Number of funds	67	67	6	6
Adjusted R-squared	0.2859	0.2741	0.2943	0.7890

In active fund samples, there are negatively strong relationship between fund size and both return over benchmark and Jensen's alpha with significant level of 1% and positive relationship between fund volatility and return over benchmark significantly, consistent with the result presented on table 7. In addition, fund turnover presents negative relationship with return over benchmark with significant level of 10%, inconsistent with the all-sample result found that there is no relationship between the two. In passive fund samples, higher volatility would strongly enhance Jensen's alpha with significant level of 1%. In addition, there are negative relationship between fund size and return over benchmark and between fund volatility and return over benchmark, and positive relationship between fund age and Jensen's alpha with significant level of 10%.

Table 9 presents the result of all fund samples categorized by Morningstar categories into large-cap fund and mid-small-cap fund samples. Large-cap fund samples provide strongly negative relationship between TER and fund performances. Funds set higher fees potentially provide lower excess returns, consistent with empirical results following table 7 and 8. In samples on mid-small-cap funds, there is negatively significant in the relationship between TER and return over benchmark with significant level of 10%.

Table 9: The relationship between TER set by all Thai AMC and fund performance of all samples categorized by Morningstar categories

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (3): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 \log(Fund\ size)_{i,t-1} + \beta_4 \log(Fund\ family\ size)_{i,t-1} + \beta_5 Fund\ flows_{i,t-1} + \beta_6 \log(Fund\ age)_{i,t-1} + \beta_7 Turnover_{i,t-1} + \beta_8 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER and fund performance (β_2) by using the samples of 73 open-end domestic equity funds categorized by Morningstar categories consisting of 66 large-cap funds and 7 mid-small cap funds. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	Large-cap funds		Mid-small-cap funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Constant	0.8022*** (5.2750)	0.7608*** (4.1636)	1.4976*** (4.3444)	1.7522*** (5.7540)
R_{t-1}	0.0029 (0.0642)	-0.0526 (-1.4307)	0.0534 (1.1612)	-0.0564 (-1.0504)
TER_{t-1}	-6.2674*** (-3.6477)	-5.4555*** (-2.8620)	-20.1927* (-2.3977)	-12.4124 (-1.5397)
Fund size $_{t-1}$ (log)	-0.0299*** (-6.2896)	-0.0259*** (-5.1638)	-0.0599** (-3.3133)	-0.0467** (-3.1566)
Fund family size $_{t-1}$ (log)	-0.0082 (-1.0963)	-0.0082 (-0.9583)	-0.0158 (-0.5900)	-0.0313 (-1.3656)
Fund flows $_{t-1}$	-0.0016 (-0.3491)	0.0005 (0.1042)	0.0112 (0.4889)	0.0106 (0.6069)
Fund age $_{t-1}$ (log)	-0.0064 (-0.4597)	0.0089 (0.6345)	0.1644 (1.8130)	0.0628 (0.6041)
Turnover $_{t-1}$	-0.0008* (-1.7057)	-0.0001 (-0.1668)	-0.0001 (-0.0430)	0.0013 (1.4817)
Volatility $_{t-1}$	0.2826* (1.9739)	-0.0597 (-0.4264)	0.2819 (0.6766)	0.0106 (0.0256)
Observations	660	660	70	70
Number of funds	66	66	7	7
Adjusted R-squared	0.2711	0.2613	0.0547	0.0683

In both large-cap and mid-small-cap fund samples, fund size has strongly negative impact on return over benchmark and Jensen's alpha, consistent with the results shown in table 7. The relationship of fund turnover and volatility only present the significant impact with return over benchmark in large-cap fund samples with significant level of 10%. Higher turnover ratio deteriorates return over benchmark and higher

volatility would enhance return over benchmark. Those relationship are consistent with the all-fund samples and active fund samples presented on table 7 and 8, respectively.

5.2 The relation between TER set by bank subsidiaries and performance

In consideration of bank conglomerate structure in Thailand, the project also examines whether TER set by bank subsidiaries has significant effect on fund performance. This is to find empirical evidence in Thailand if there is the potential to have conflict-of-interest issue trough fund fee channel as the evidence found by Korkeamaki and Smythe (2004) and Ferreira, Matos et al. (2018).

Figure 10 presents the significantly negative relationship between TER set by bank subsidiaries and the excess returns consisting of return over benchmark and Jensen's alpha in all samples. This implies that the TER set by bank subsidiaries do matter because it could provide the additional negative impact of fees set by bank subsidiaries on fund performance. On average, the fund fees set by AMC's considering as bank-subidiaries would provide higher deterioration on fund performance than non-bank subsidiaries. This result supports the work of Korkeamaki and Smythe (2004) and Ferreira, Matos et al. (2018) who explained the rationale behind that the funds managed by an AMC that is a bank subsidiary potentially have a negative effect on performance due to the conflict-of-interest issue between the AMC and its bank parent that AMC may involve in the activities that was beneficial to parent bank rather than maximizing the interests or fund returns to unitholders.

Table 10: The relationship between TER set by bank subsidiaries and fund performance of all samples

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (4): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 TER_{i,t-1}(bank) + \beta_4 \log(Fund\ size)_{i,t-1} + \beta_5 \log(Fund\ family\ size)_{i,t-1} + \beta_6 Fund\ flows_{i,t-1} + \beta_7 \log(Fund\ age)_{i,t-1} + \beta_8 Turnover_{i,t-1} + \beta_9 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by bank subsidiaries and fund performance (β_3) by using the samples of 73 open-end domestic equity funds in Thailand. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	All funds	
	Return over benchmark	Alpha
Constant	0.8667*** (5.3016)	0.8429*** (4.5171)
R_{t-1}	0.0364 (1.0064)	-0.0217 (-0.7159)
TER_{t-1}	-4.5475** (-2.1051)	-2.5024 (-1.1649)

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (4): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 TER_{i,t-1}(bank) + \beta_4 \log(Fund\ size)_{i,t-1} + \beta_5 \log(Fund\ family\ size)_{i,t-1} + \beta_6 Fund\ flows_{i,t-1} + \beta_7 \log(Fund\ age)_{i,t-1} + \beta_8 Turnover_{i,t-1} + \beta_9 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by bank subsidiaries and fund performance (β_3) by using the samples of 73 open-end domestic equity funds in Thailand. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	All funds	
	Return over benchmark	Alpha
TER _{t-1} (bank)	-5.8160* (-1.9328)	-7.4101** (-2.4103)
Fund size _{t-1} (log)	-0.0335*** (-7.2245)	-0.0292*** (-5.9849)
Fund family size _{t-1} (log)	-0.0093 (-1.1003)	-0.0096 (-1.0378)
Fund flows _{t-1}	-0.0021 (-0.3690)	0.0005 (0.1110)
Fund age _{t-1} (log)	0.0044 (0.2742)	0.0152 (0.9886)
Turnover _{t-1}	-0.0004 (-0.9736)	0.0003 (0.8247)
Volatility _{t-1}	0.3247** (2.3803)	-0.0682 (-0.4690)
Observations	730	730
Number of funds	73	73
Adjusted R-squared	0.2585	0.2388

The Fund size has strongly negative impact on fund performance with significant level of 1%, consistent with the empirical results on table 7, 8, and 9. The relationship of fund volatility with return over benchmark also support the same positive direction as presented on table 7.

Table 11 reports the results based on groups of samples considering as active and passive funds. In samples of active funds, TER set by bank subsidiaries has negatively additional impact on return over benchmark and Jensen's Alpha, consistent with the results based on all samples in table 10. However, there is no significant relationship between TER set by bank subsidiaries and excess returns in sample of passive funds.

Table 11: The relationship between TER set by bank subsidiaries and fund performance of all samples categorized by fund strategies

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (4): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 TER_{i,t-1}(bank) + \beta_4 \log(Fund\ size)_{i,t-1} + \beta_5 \log(Fund\ family\ size)_{i,t-1} + \beta_6 Fund\ flows_{i,t-1} + \beta_7 \log(Fund\ age)_{i,t-1} + \beta_8 Turnover_{i,t-1} + \beta_9 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by bank subsidiaries and fund performance (β_3) by using the samples of 73 open-end domestic equity funds categorized by fund strategies consisting of 67 active funds and 6 passive funds. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Active funds		Passive funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Constant	0.8541*** (5.0372)	0.8398*** (4.3460)	0.3310 (1.2361)	0.5116 (0.8260)
R_{t-1}	0.0484 (1.3320)	-0.0265 (-0.8482)	-0.0013 (-1.1554)	-0.0562 (-0.3476)
TER_{t-1}	-4.5793** (-2.0837)	-2.2703 (-1.0523)	-3.7828 (-0.5258)	-4.1584 (-0.4440)
$TER_{t-1}(bank)$	-5.8806* (-1.8409)	-7.8318** (-2.4403)	-1.7441 (-0.3528)	-0.8271 (-0.1196)
Fund size $_{t-1}$ (log)	-0.0365*** (-7.4984)	-0.0329*** (-6.7146)	-0.0177 (-1.6101)	-0.0270 (-1.7241)
Fund family size $_{t-1}$ (log)	-0.0070 (-0.7838)	-0.0059 (-0.6013)	0.0079 (1.0352)	-0.0110 (-0.5712)
Fund flows $_{t-1}$	-0.0062 (-1.1727)	-0.0035 (-0.9351)	0.0096 (1.7886)	0.0152 (1.7453)
Fund age $_{t-1}$ (log)	0.0040 (0.2313)	0.0103 (0.6443)	-0.0246 (-1.8211)	0.0593* (2.0807)
Turnover $_{t-1}$	-0.0005 (-1.1957)	0.0002 (0.4964)	-0.0003 (-0.2488)	-0.0009 (-0.2897)
Volatility $_{t-1}$	0.3951*** (2.6769)	-0.0361 (-0.2278)	-0.2438* (-2.2600)	0.9408*** (4.2097)
Observations	670	670	60	60
Number of funds	67	67	6	6

Adjusted R-squared	0.2876	0.2788	0.2814	0.7839
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The significantly negative relationship between fund size and excess returns and positive relationship between fund volatility and return over benchmark in samples of active funds are consistent with the result based on all samples on table 10. In samples of passive funds, fund age only provides weakly positive relationship with Jensen's alpha. Fund volatility has strongly positive impact on Jensen's alpha with significant level of 1% in passive fund group.

Table 12 reports the empirical results based on groups of samples considering as large-cap and mid-small-cap funds. In samples of large-cap funds, the relationship between TER set by bank subsidiaries and return over benchmark and Jensen's alpha are significantly negative, consistent with the results based on all samples and active fund samples. The funds that AMCs set higher fee would provide higher deterioration on excess returns. In contrast, the study found no significant relationship of TER with excess returns in samples of mid-small-cap funds.

Table 12: The relationship between TER set by bank subsidiaries and fund performance of all samples categorized by Morningstar categories

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (4): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 TER_{i,t-1}(bank) + \beta_4 \log(Fund\ size)_{i,t-1} + \beta_5 \log(Fund\ family\ size)_{i,t-1} + \beta_6 Fund\ flows_{i,t-1} + \beta_7 \log(Fund\ age)_{i,t-1} + \beta_8 Turnover_{i,t-1} + \beta_9 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by bank subsidiaries and fund performance (β_3) by using the samples of 73 open-end domestic equity funds categorized by Morningstar categories consisting of 66 large-cap funds and 7 mid-small cap funds. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	Large-cap funds		Mid-small-cap funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Constant	0.8285*** (5.2615)	0.7935*** (4.2455)	1.4028** (3.4456)	1.7616*** (5.2198)
R_{t-1}	0.0011 (0.0232)	-0.0549 (-1.4858)	0.0671 (1.3422)	-0.0577 (-1.1855)
TER_{t-1}	-3.6733* (-1.8664)	-2.2394 (-1.0480)	-12.8131 (-0.8111)	-13.1445 (-0.7501)
$TER_{t-1}(bank)$	-5.9641** (-2.1008)	-7.3940** (-2.4484)	-17.4116 (-0.8474)	1.7273 (0.0627)
Fund size $_{t-1}$ (log)	-0.0300*** (-6.2825)	-0.0261*** (-5.2398)	-0.0527** (-2.9846)	-0.0474** (-2.7223)
Fund family size $_{t-1}$ (log)	-0.0088	-0.0089	-0.0155	-0.0313

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (4): $R_{i,t} = \alpha_i + \beta_1 R_{i,t-1} + \beta_2 TER_{i,t-1} + \beta_3 TER_{i,t-1}(bank) + \beta_4 \log(Fund\ size)_{i,t-1} + \beta_5 \log(Fund\ family\ size)_{i,t-1} + \beta_6 Fund\ flows_{i,t-1} + \beta_7 \log(Fund\ age)_{i,t-1} + \beta_8 Turnover_{i,t-1} + \beta_9 Volatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by bank subsidiaries and fund performance (β_3) by using the samples of 73 open-end domestic equity funds categorized by Morningstar categories consisting of 66 large-cap funds and 7 mid-small cap funds. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	Large-cap funds		Mid-small-cap funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
	(-1.1339)	(-1.0178)	(-0.5846)	(-1.3432)
Fund flows $t-1$	-0.0013	0.0009	0.0101	0.0107
	(-0.2781)	(0.1968)	(0.4245)	(0.6669)
Fund age $t-1$ (log)	-0.0059	0.0096	0.1556	0.0637
	(-0.4011)	(0.6687)	(1.5352)	(0.5605)
Turnover $t-1$	-0.0005	0.0002	0.0005	0.0013
	(-1.1171)	(0.4197)	(0.2363)	(0.7800)
Volatility $t-1$	0.2840*	-0.0580	0.3335	0.0055
	(1.9893)	(-0.4128)	(0.7437)	(0.0126)
Observations	660	660	70	70
Number of funds	66	66	7	7
Adjusted R-squared	0.2736	0.2666	0.0429	0.0528

Fund size strongly provide significant negative impact on return over benchmark and alpha in both large-cap and mid-small-cap fund samples. Fund volatility is positively significant to return over benchmark in samples of large-cap funds, consistent with results based on all samples and active fund samples shown on table 10 and 11.

5.3 The relationship between TER set by large-bank subsidiaries and performance

To provide robust test examining in conjunction with the effect of TER set by large-bank subsidiaries and medium-and-small bank subsidiaries on fund performance to emphasize the conflict-of-interest in the perspective of firm size, based on the suggestion from Demsetz and Lehn (1985), the fees set by either large-bank subsidiaries or non-large bank subsidiaries and performance should provide the relationship consistent with the results on objective (2). In order to analyze large-bank and non-large bank subsidiaries, all samples include 40 funds managed by bank-subidiaries only.

Figure 13 reports the significantly strong negative relationship between TER set by non-large-bank subsidiaries and fund performance including return over benchmark and Jensen's alpha. This implies that the higher fees non-large-bank subsidiaries charged to investors decrease the excess returns investors should get, consistent with the results on table 7-12. However, there is not statistically significant in additional impact from TER set by large-bank subsidiaries and fund performance then the fees set by AMC's having their parent bank considering as large bank does matter in this case. Thus, in term of firm size and level of conflict-of-interest, these results are not consistent with what Demsetz and Lehn (1985), Watts and Zimmerman (1990) and Dey (2008) who suggested that the relationship between conflict-of-interest and company size that larger companies are expected to have higher agency conflicts.

Table 13: The relationship between TER set by large-bank subsidiaries and fund performance of bank-subsidaries funds (B)

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (5): $R_{i,t} = \alpha_i + \beta_1 BR_{i,t-1} + \beta_2 BTER_{i,t-1} + \beta_3 BTER_{i,t-1}(\text{large bank}) + \beta_4 \log(BFund \text{ size})_{i,t-1} + \beta_5 \log(BFund \text{ family size})_{i,t-1} + \beta_6 BFund \text{ flows}_{i,t-1} + \beta_7 \log(BFund \text{ age})_{i,t-1} + \beta_8 BTurnover_{i,t-1} + \beta_9 BVolatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by large-bank subsidiaries and fund performance (β_3) by using the samples of 40 open-end domestic equity funds in Thailand. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	All funds	
	Return over benchmark	Alpha
Constant	1.1812*** (6.8891)	1.1723*** (5.8248)
BR _{t-1}	0.0549 (1.1229)	0.0354 (0.8003)
BTER _{t-1}	-8.1207*** (-3.9886)	-9.7340*** (-2.9192)
BTER _{t-1} (large bank)	-6.4485 (-1.5517)	-0.4771 (-0.1038)
BFund size _{t-1} (log)	-0.0356*** (-6.2259)	-0.0325*** (-6.0435)
BFund family size _{t-1} (log)	-0.0152* (-1.7039)	-0.0193** (-2.0239)
BFund flows _{t-1}	-0.0035 (-0.6163)	-0.0009 (-0.2053)
BFund age _{t-1} (log)	0.0096 (0.5773)	0.0388* (1.9907)

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (5): $R_{i,t} = \alpha_i + \beta_1 BR_{i,t-1} + \beta_2 BTER_{i,t-1} + \beta_3 BTER_{i,t-1}(\text{large bank}) + \beta_4 \log(BFund \text{ size})_{i,t-1} + \beta_5 \log(BFund \text{ family size})_{i,t-1} + \beta_6 BFund \text{ flows}_{i,t-1} + \beta_7 \log(BFund \text{ age})_{i,t-1} + \beta_8 BTurnover_{i,t-1} + \beta_9 BVolatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by large-bank subsidiaries and fund performance (β_3) by using the samples of 40 open-end domestic equity funds in Thailand. Robust t-statistics are in parentheses and *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	All funds	
	Return over benchmark	Alpha
BTurnover _{t-1}	0.0008 (1.0767)	0.0001 (0.1663)
BVolatility _{t-1}	-0.1313 (-0.6842)	-0.3967** (-2.0387)
Observations	400	400
Number of funds	40	40
Adjusted R-squared	0.2850	0.2759

Fund size has strongly negative relationship with return over benchmark and Jensen's alpha with significant level of 1%. The substantial relationship is consistent with table 7-12. Fund family size firstly provides a significantly negative relationship with the excess returns, inconsistent with Ferreira, Keswani et al. (2013) who suggested that fund family size is a factor to capture economy of scale that the funds managed by AMC that have larger fund family size is likely to perform well. Fund age only statistically presents significantly positive effect on Jensen's alpha. Longer fund age higher alpha with significant level of 10%. However, fund volatility has no significantly relationship with returns over benchmark while provided statistically significant relationship with Jensen's alpha.

Table 14 reports the results based on groups of bank-subsidary samples considering as active and passive funds. In samples of active funds, the empirical result is consistent with all fund samples that there is strongly negative relationship between TER set by non-large-bank subsidiaries and fund performance. In addition, the study also shows that TER of active fund that is charged by large-bank subsidiaries is statistically significant to return over benchmark with opposite direction. These imply active equity funds managed by large-bank subsidiaries could provide additional deterioration on fund performance comparing to the active funds managed by non-large-bank subsidiaries. In contrast, there is no significant impact of TER on fund performance in samples of passive funds.

Table 14: The relationship between TER set by large-bank subsidiaries and fund performance of bank-subsidaries funds categorized by fund strategies

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (5): $R_{i,t} = \alpha_i + \beta_1 BR_{i,t-1} + \beta_2 BTER_{i,t-1} + \beta_3 BTER_{i,t-1}(\text{large bank}) + \beta_4 \log(BFund\ size)_{i,t-1} + \beta_5 \log(BFund\ family\ size)_{i,t-1} + \beta_6 BFund\ flows_{i,t-1} + \beta_7 \log(BFund\ age)_{i,t-1} + \beta_8 BTurnover_{i,t-1} + \beta_9 BVolatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by large-bank subsidiaries and fund performance (β_3) by using the samples of 40 open-end domestic equity funds categorized by fund strategies consisting of 35 active funds and 5 passive funds. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	Active funds		Passive funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Constant	1.2261*** (6.1011)	1.2054*** (5.1973)	0.1950 (0.6152)	1.8752 (0.9544)
BR _{t-1}	0.0528 (1.0746)	0.0127 (0.2767)	-0.0045* (-2.4216)	0.1392** (3.2968)
BTER _{t-1}	-7.7469*** (-3.7549)	-9.3229** (-2.6444)	-1.4723 (-0.7789)	0.6010 (0.3379)
BTER _{t-1} (large bank)	-8.8034* (-1.8382)	-2.9917 (-0.5724)	-5.6318 (-0.9847)	-29.7282 (-0.9459)
BFund size _{t-1} (log)	-0.0359*** (-6.1326)	-0.0331*** (-5.9190)	-0.0142 (-0.9175)	-0.0504 (-1.1438)
BFund family size _{t-1} (log)	-0.0168* (-1.8132)	-0.0186* (-1.7312)	0.0103 (0.8961)	-0.0436 (-1.1419)
BFund flows _{t-1}	-0.0048 (-0.8406)	-0.0017 (-0.3787)	0.0014 (0.3186)	0.0270 (0.9915)
BFund age _{t-1} (log)	0.0166 (0.7995)	0.0390* (1.8090)	-0.0275** (-3.0691)	-0.0291 (-0.4996)
BTurnover _{t-1}	0.0010 (1.3896)	0.0004 (0.5040)	-0.0015 (-0.4070)	0.0122 (1.2981)
BVolatility _{t-1}	-0.1308 (-0.5856)	-0.4165* (-1.8529)	-0.1675 (-1.8006)	0.9031** (3.4771)
Observations	350	350	50	50
Number of funds	35	35	5	5
Adjusted R-squared	0.3134	0.3050	0.0732	0.7900

The negative relationship between fund size and fund performance and between fund family size and fund performance in samples of active funds are consistent with the results shown on table 13. Fund age statistically has positive effect on Jensen's alpha in

samples of active funds while it has negative effect on return over benchmark in samples of passive funds. In addition, the relationship between fund volatility and Jensen's alpha is significantly negative in samples of active funds, but positive in samples of passive funds.

Table 15 reports the results based on groups of bank-subsidary samples considering as large-cap and mid-small-cap funds. In samples of large-cap funds, the empirical result is consistent with active funds that there is strongly negative relationship between TER set by non-large-bank subsidiaries and fund performance and the funds managed by large-bank subsidiaries could provide additional deterioration on fund performance. There is no significant impact of TER on fund performance in samples of mid-small-cap funds.

Table 15: The relationship between TER set by large-bank subsidiaries and fund performance of bank-subsidaries funds categorized by Morningstar categories

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (5): $R_{i,t} = \alpha_i + \beta_1 BR_{i,t-1} + \beta_2 BTER_{i,t-1} + \beta_3 BTER_{i,t-1}(\text{large bank}) + \beta_4 \log(BFund\ size)_{i,t-1} + \beta_5 \log(BFund\ family\ size)_{i,t-1} + \beta_6 BFund\ flows_{i,t-1} + \beta_7 \log(BFund\ age)_{i,t-1} + \beta_8 BTurnover_{i,t-1} + \beta_9 BVolatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by large-bank subsidiaries and fund performance (β_3) by using the samples of 40 open-end domestic equity funds categorized by Morningstar categories consisting of 36 large-cap funds and 4 mid-small cap funds. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	Large-cap funds		Mid-small-cap funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
Constant	1.1404*** (6.7296)	1.1266*** (5.7628)	0.7429 (0.7501)	1.2094 (1.3322)
BR _{t-1}	0.0355 (0.6038)	0.0296 (0.5502)	0.0661 (0.7002)	0.0227 (0.2854)
BTER _{t-1}	-6.6720*** (-3.3281)	-8.0206** (-2.4903)	261.4218 (1.3653)	158.2593 (0.9152)
BTER _{t-1} (large bank)	-8.2849* (-2.0012)	-2.9195 (-0.6417)	-299.1683 (-1.5477)	-173.8186 (-0.9842)
BFund size _{t-1} (log)	-0.0329*** (-5.9203)	-0.0295*** (-5.3255)	-0.0548 (-1.1322)	-0.0645 (-1.7798)
BFund family size _{t-1} (log)	-0.0123 (-1.5334)	-0.0159* (-1.7671)	-0.0728 (-1.8160)	-0.0710 (-1.7331)
BFund flows _{t-1}	-0.0009 (-0.2014)	0.0001 (0.0311)	-0.0013 (-0.0397)	0.0078 (0.3372)
BFund age _{t-1} (log)	-0.0047	0.0235* (0.0235)	0.5000** (0.5000)	0.4547** (0.4547)

This table reports the fixed-effect regression of fund performance consisting of return over benchmark and Jensen's alpha ($R_{i,t}$) from 2010 to 2019 in yearly basis by following the equation (5): $R_{i,t} = \alpha_i + \beta_1 BR_{i,t-1} + \beta_2 BTER_{i,t-1} + \beta_3 BTER_{i,t-1}(\text{large bank}) + \beta_4 \log(BFund\ size)_{i,t-1} + \beta_5 \log(BFund\ family\ size)_{i,t-1} + \beta_6 BFund\ flows_{i,t-1} + \beta_7 \log(BFund\ age)_{i,t-1} + \beta_8 BTurnover_{i,t-1} + \beta_9 BVolatility_{i,t-1} + U_{i,t}$. This is to examine the relationship between TER set by large-bank subsidiaries and fund performance (β_3) by using the samples of 40 open-end domestic equity funds categorized by Morningstar categories consisting of 36 large-cap funds and 4 mid-small cap funds. Robust t-statistics are in parentheses and *** p<0.01, ** p<0.05, * p<0.1.

Variables	Large-cap funds		Mid-small-cap funds	
	Return over benchmark	Alpha	Return over benchmark	Alpha
	(-0.4025)	(1.8220)	(3.4100)	(3.4402)
BTurnover _{t-1}	0.00003	-0.0007	0.0059	-0.0001
	(0.0281)	(-0.5240)	(0.4185)	(-0.0094)
BVolatility _{t-1}	-0.3166**	-0.6370***	0.3671	0.2277
	(-2.1343)	(-5.1739)	(0.4130)	(0.2489)
Observations	360	360	40	40
Number of funds	36	36	4	4
Adjusted R-squared	0.3205	0.3235	0.0289	0.0270

Fund size has strong negative relationship with fund performance in samples of large-cap funds, consistent with all funds and active funds reported on table 14 and 15. The fund family size only provides significantly negative effect on Jensen's alpha in samples of large-cap-funds. Fund age strongly gives us statistical positive relationship with both return over benchmark and Jensen's alpha in samples of mid-small-cap funds while it only shows positive relationship with Jensen's alpha in samples of large-cap funds. Higher volatility in large-cap equity funds managed by bank-subsidaries could significantly deteriorate the fund performance.

6. Conclusion

This study inclusively examines the relationship between fund fees and performance of 73 open-end domestic equity funds in Thailand from 2010 to 2019 in yearly basis. The project would intensively analyze the domestic-equity fund market into 2 main dimensions which are the market competitive and conflict-of-interest through fund fee channel. Time-fixed-effect regression model is used as the main methodology to analyze panel data what the relationship of (1) fund fees, (2) fund fees set by bank subsidiaries, and (3) fund fees set by large-bank subsidiaries with its performance in term of both returns over benchmark and Jensen's alpha. Other fund characteristics consisting of fund size, fund family size, fund flows, fund age, fund

turnover, volatility and past performance are also included in the model as control variables.

In addition, this project also categorized the samples into several sample groups consisting of all samples, active funds, passive funds, large-cap funds, mid-small cap funds, to investigate the relationship between fund fees and its performance in different dimensions.

The result from examining the relationship between fees and performance of all funds, active fund, and large-cap fund samples is that fees strongly have negative impact on fund performance in both return over benchmark and alpha while mid-small-cap fund samples only significantly provide negative relation with return over benchmark and passive fund samples are not found statistically significant effect on fund performance. The fund set high fees potentially generate lower excess returns to investors. In other word, higher fees would deteriorate the fund performance. These imply the open-end domestic equity funds in Thailand cannot claim that the market is highly competitive.

The result from investigating the relationship between fees set by bank subsidiaries and performance is that the fees set by bank subsidiaries have negatively associated with return over benchmark and Jensen's alpha for the sample group of all funds, active funds, and large-cap funds. AMC considering as bank-subsidaries may charge investors with high fees that causes investors receive additional deterioration on excess returns. This also implies that fees set by bank subsidiaries do matter to create higher negative impact on fund performance and the rationale behind may be because of the conflict-of-interest issue in the mutual fund market under bank conglomerate structure that AMC may involve in the activities such as increase in fund fees collected from unitholders that was beneficial to parent bank rather than maximizing the interests or fund returns to unitholders.

To robust the results based on samples of funds managed by bank subsidiaries, the study on the relationship between fees set by large-bank subsidiaries and non-large bank subsidiaries found that fees set by large-bank subsidiaries only provides negative relationship with return over benchmark for the sample group of active funds and large-cap funds while fees set by non-large-bank subsidiaries negatively associate with both return over benchmark and the alpha. These imply that investors pay the fees to bank subsidiaries considering as non-large-bank subsidiaries by not compensating with the superior performance.

In addition, the other empirical result is that the funds having large total net asset will potentially provide lower performance. Investors may get higher returns if they invest in the domestic equity funds having high volatility, but this is not for the large-cap equity funds managed by bank-subsidaries.

Finally, the domestic-equity fund market cannot be concluded that it is highly competitive in Thailand. The fund fee charged to investors significantly deteriorates the fund performance. Under bank conglomerate structure in Thai mutual fund market, there is potential of conflict-of-interest through fund fee channel that the fees charged by bank subsidiaries may not compensate with superior performance on average.



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