MUTUAL FUND PERFORMANCE IN EMERGING MARKETS: THE CASE OF THAILAND

By

TEERAPAN SUPPA-AIM

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Synopsis

The rate of growth of investment in mutual funds has increased dramatically over the past decade. Many studies have developed models for performance evaluation and have examined whether fund managers provide value added for investors. Most of these studies, however, have focused on the developed markets and only a few examine whether the findings carry over to emerging markets as well.

This thesis specifically investigates mutual funds in one of the emerging economies, Thailand, using a more extensive dataset than previous studies; it controls for investment policy and tax-purpose differences, as unique characteristics of mutual funds in Thailand. We scrutinize how fund managers perform and what strategy they use in managing their portfolios; and ask whether any fund characteristics can explain fund performance. We also explore the impact of liquidity on performance and performance measures.

We find in this context that mutual fund managers, as a whole, do not have selectivity or timing ability and they do not give value added to investors. Most of the fund managers in Thailand invest heavily in small and growth stocks. Flexible fund managers are, in comparison, more active and adjust their portfolios dynamically according to economic information.

There is persistence in performance in general mutual funds. This evidence is statistically and economically significant although it derives mainly from poorly performing funds which continue to perform badly. Size, age and fund family also have explanatory power in fund performance but it is specific to investment policy and the evidence is not economically significant. Net cash flows, in general, have no impact on fund performance. However, the significant amount of cash inflows can severely lower performance in mutual

fund since the fund managers are unable to allocate their portfolio immediately and leave large amounts in their cash position.

Liquidity also plays a major role in mutual fund performance. We find that funds which contain more illiquid assets in their portfolios perform better and this suggests that there is a liquidity premium in mutual funds. As a result, a liquidity-augmented model which includes one liquidity factor is proposed. Results from this proposed model show that our liquidity factor, as measured by stock turnover ratio, has explanatory power for fund performance, in particular in low liquidity portfolios. However, our liquidity factor is unable completely to explain the liquidity premium in mutual funds because the evidence of a liquidity premium is still present.

Finally, the study reveals the policy implications of introducing the tax-benefit funds scheme in Thailand. We find that the tax-benefit funds perform significantly better than general funds and this is also true even when controlled for other fund characteristics. The tax-benefit fund managers are more passive than managers of general funds but they do not employ any different strategy from that used by managers of general funds. Tax-benefit funds are more sensitive to cash flows and contain slightly more illiquid stocks in their underlying assets. Thus, the superior performance in tax-benefit funds is not only attributable to the liquidity premium, but also to the fund managers' superior ability, as well as to the long-term restrictions which help tax-benefit fund managers to reduce nondiscretionary trading cost in these funds.

To my parents Paiboon and Thararat Ungphakorn

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CHAPTER ONE

INTRODUCTION

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1.1 Background and motivation of the study

For a long time, mutual fund investment has played an important role in the financial market and its popularity has increased dramatically over the past decade. This can be seen from the sharp rise in worldwide mutual fund assets from $14 trillion in 2003 to $26 trillion in 2007 (ICI, 2008). In the US, mutual fund companies are the largest institutional investors in the stock market and hold more than a quarter of the stocks (ibid.). Pozen and Crane (1998) claim that around half the households in the US invest in mutual funds. The welcome given to mutual funds is attributed to its various benefits, such as its diversification, professional management, liquidity and flexibility and convenience. In addition, mutual fund investment is important to the equity market and to the growth of the economy, since they are held by institutional investors who hold a significant portion of capital assets.

Despite the popularity and importance of mutual fund investment, the notion of modern portfolio theory (MPT), which explains the relationship between risk and expected returns and also the famous efficient market hypothesis (EMH), which suggests that stock prices fully reflect information are also a challenge to the studies in mutual funds and shift the fund performance measurement from the calculation of crude returns to detailed explorations of the risk and returns methods. More recently, studies in mutual funds have become central to the performance of mutual funds. Some studies try to find a model in evaluating mutual fund performance. Others explore whether fund managers can create value added for investors and ways to succeed in this. Other studies still investigate whether mutual fund performance can be explained or forecast by any particular factors. More recently, there has been extensive research into mutual fund performance employing various research methods and different datasets from a number of different study periods.

Nonetheless, due to the availability of the most of the data, these studies tend to be conducted within the developed markets and only minor studies have focused on the mutual funds in emerging markets. In addition, studies in the emerging markets still take the prevailing approach and concentrate on showing how fund managers perform, neglecting other relevant issues. Therefore, we still know too little about mutual fund investment in emerging markets and this impedes the development of this industry.

In spite of the limited evidence about the behaviour of mutual funds in emerging markets, mutual fund investment in these areas has grown markedly over the past decade at a quicker pace than even the developed markets have shown. The growth in mutual fund investment is influential because it shapes the future development in the securities market and has important policy implications. The high proportion of institutional investors creates more timely information and therefore makes the market more efficient. However, it tends also to encourage irrational behaviour, such as herding, which makes the market more volatile. Additionally, the excessive growth is liable to inflate stock prices and makes the market more vulnerable, since it does not have enough capacity to anticipate the high inflows (Borensztein and Gelos, 2001).

Furthermore, mutual fund industries in emerging markets display some unique characteristics which are different from those in developed markets and these, too, challenge the assumptions in this respect. For instance, mutual funds in emerging markets are less competitive and information is less publicly available than elsewhere. Investors are more passive and likely to make their decision on the basis of familiarity. Moreover, mutual funds in some countries are used as part of the national financial policy, which differentiates mutual fund styles even further. For example, in Thailand, the government gives favourable tax treatment to a specific type of mutual fund in order to encourage retirement and long-term savings. Thus, these conditions potentially impact on performance and stock selection strategy, as well as decision behaviour.

More importantly, while most of the theoretical models which we use to evaluate mutual fund performance are based on the assumption of efficient markets, emerging markets fail to meet these assumptions. Returns in emerging markets suffer from several chronic conditions such as high volatility, high trading cost, non-normality, and infrequent trading (Bekaert and Harvey, 2002). Furthermore, there is still some doubt whether the factors documented in developed markets can also explain stock returns in emerging markets (for example, Claessens et al., 1995; Fama and French, 1998; Rouwenhorst, 1999; Barry et al., 2002; van der Hart et al., 2002).

Thus, the study of mutual funds in emerging markets is overdue for those who need a fuller understanding of their investment conditions. In addition, this would allow an out-of-sample test to challenge existing asset pricing models and lead to the development of new empirical models.

This study seeks to shed light on mutual fund investment in emerging markets and specifically focuses on three issues: performance, determinants of performance and the role of liquidity on performance and performance measure. Since mutual fund data from all emerging markets are segmented and hard to obtain and also that policies and regulations are different for each country, the scope of the present study rests solely on an emerging country, namely, Thailand and it is treated as a case study typical of the emerging markets as a whole.

Although the characteristics of emerging markets are relatively diverse, Thailand can represent the rest of the emerging countries, those in Asia in particular. This is because the Thai stock market exhibits several behaviours which are consistent with the average for emerging markets. For example, while the ten-year annualized growth of emerging markets ranged from -0.03% (Taiwan) to 20.45% (India), the Thai stock market grew by 12.36% per year and this figure is comparable to the growth of the MSCI Emerging Markets index[1], 11.69% (MSCI, 2010). Also, Lim and Brooks showed that Thailand obtained a World Bank FSDI equity market efficiency index of around 4 and this is close to the average of 4.42 among 33 emerging countries (cited in Gregoriou, 2009.). Allen and Chimhini (ibid.) reveal that Asian equity markets are highly correlated.

In addition, Thai mutual funds play an important role in the capital market and Thailand's economy is among the three fastest growing in the Asia/Pacific region. The data on mutual funds and the stock market, as well as other relevant information from Thailand, are sufficiently accessible and more complete than from many other emerging countries and thus allow us to make more comprehensive investigations of mutual funds in emerging markets.

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[1] The MSCI Emerging markets index is a free float-adjusted market capitalisation weighted index which is designed to measured equity market performance in emerging markets. As of June 2009, the index consists of indices for 22 countries: Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Peru, the Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey (MSCI, 2010).

1.2 Aims of the study

The main objective of this thesis is to comprehensively explore the performance of mutual funds in an emerging market. This fills one of the gaps in mutual fund literature, since studies in this region are scarce, based on the prevailing approach and survey a small number of funds over only a short period. It should not be forgotten that emerging markets are unlike developed markets in several ways. Subsequently, this thesis uses a more comprehensive dataset of mutual funds in Thailand as a case study to represent its emerging market. Subsequently, the thesis has four main purposes. The first relates to the comprehensive evaluation of the performance of mutual funds in emerging markets and assesses style and strategy used by fund managers in order to accomplish this. This study explores fund performance at aggregated, style and fund levels and employs various models which evolved in developed markets to estimate performance. Additionally, this study compares the results with evidence from developed markets.

The second aim of this thesis is to investigate whether Thai mutual fund performance can be explained by any of its characteristics. The study examines statistic and economic importance of fund characteristics to its performance. In the literature, evidence is sparse and mixed on developed markets, let alone that on emerging markets. Rather than focusing on one particular characteristic, this study draws on the evidence from five important characteristics in the literature, which offer theoretical and empirical support. They comprise past performance, flows, longevity, fund size and family fund size. The study investigates the characteristics separately and also combines them into a group and then performs multidimensional regression, allowing for time variation.

The third aim of this thesis is to investigate the impact of liquidity on mutual fund performance, for this is one of the main concerns in emerging markets. This study measures the liquidity of assets contained in the portfolio, using a model in hedge fund literature. The study also offers an auxiliary performance measure to capture this effect and assesses how important it is to mutual fund performance in Thailand.

The fourth aim of this thesis is to investigate and discuss policy implications in Thailand which adopt tax-advantaged types of mutual fund in order to encourage retirement and long-term savings. In this thesis, the performance and characteristics of these tax-advantaged funds are also investigated in a separate group and compared to those of general mutual funds.

1.3 Contributions of the study

This thesis makes several meaningful contributions to the literature and the practical perspective. First, it is conducted in a different setting from most previous studies. Thus, it provides an out-of-sample test for the theories and empirical models so far established.

Second, this study fills one of the gaps in mutual fund studies by asking whether the findings in developed markets carry over to emerging markets. This is important because, even though emerging markets display several characteristics which are not found in developed markets, the literature on mutual funds in emerging markets is relatively thin and incomplete.

Third, this study uses a more extensive dataset than has been used in any previous mutual fund studies of emerging markets. We employ a novel mutual fund dataset in Thailand, consisting of both weekly and monthly data and including both equity and flexible funds. This is the first time a mutual fund study has used data on both weekly and monthly returns to tackle a problem. The high data frequency not only helps to validate our results, but also allows us to advance some analysis. For example, in Chapter 5, the fund weekly data are used to calculate the risk-adjusted abnormal return for each year from 2000-2007. Then, it turns into a panel data allowing us to perform a multidimensional (panel) regression on fund characteristics.

Furthermore, this is the first empirical study of an emerging market which includes flexible funds in the sample. In theory, a flexible fund is in some ways similar to equity funds since its main assets are also stocks. However, a proportion of its holdings can be more varied over time, subject to the fund manager's decision. Thus, this study includes flexible funds in the sample and puts them into a separate category and it is hoped to provide a more comprehensive account of portfolio behaviour.

Fourth, this study applies new methodologies which have never been applied to emerging markets. For instance, Chapter 5 explores the determinants of risk-adjusted mutual fund performance using multidimensional regression in addition to the common approach, which is to use a zero-cost trading strategy. This alternative methodology can explore several factors simultaneously while controlling the effect between one and another. Using the two methods allows us to examine determinants of fund performance statistically and economically and it provides more meaningful results. Moreover, in Chapter 6, we apply a model in the hedge fund literature in measuring the illiquid assets contained in a portfolio in our mutual fund data. This is the first empirical study to use such a model outside the hedge fund literature.

Fifth, this study explores new issues which have not hitherto been observed in previous studies. This is the first study in Thailand which explores the stock selection strategies and style of fund managers (Chapter 4). In Chapter 5, we consider a broader range of characteristics than previous studies in emerging markets have done in determining mutual fund performance and also include more new factors, namely fund longevity and family size, in the analysis. In Chapter 6, we look at the effect of liquidity on the mutual fund performance because liquidity is one of the major concerns in emerging markets. Leaving aside emerging markets, the liquidity effect is negligible in all mutual fund literature, even though this issue has been widely documented by writers of asset pricing. The study also puts forward an auxiliary model based on the liquidity effect in measuring mutual fund performance.

Sixth, this study can claim several new findings. This is the first mutual fund study to expose the evidence of a liquidity premium and emphasise the inclusion of including a liquidity factor in the fund performance measure (Chapter 6). This study also provides new findings about emerging markets. In Chapter 4, the study reveals the style of fund managers in these markets and shows that they rely on medium capitalisation strategy. This chapter also relates the sensitivity of data frequency to the fund performance. In addition, Chapter 5 gives the first evidence from the emerging markets of short-term persistence in performance among poorly performing funds.

Seventh, the study is the only one which gives important policy implications, reporting them in turn in each empirical chapter. This is the first study on Thailand which discusses the effect of the Thai government's encouragement of individual savings by adopting special fund styles which give favourable tax treatment. We reveal the policy implications of this action by assessing these specific funds in a separate group from general funds, before comparing and discussing the results from the two groups.

Finally, in its practical aspects, this study will, it is hoped, be useful for individuals and institutional investors in selecting mutual funds. It also helps fund managers to identify their positions and gives ideas on the strategies which they should follow in order to maximise returns for their investors.

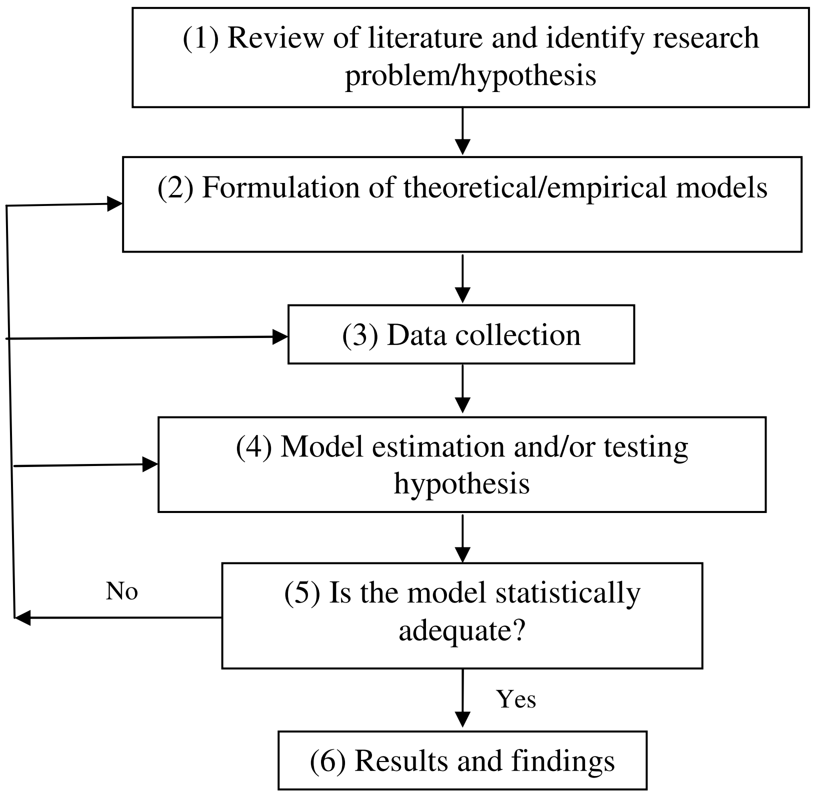
1.4 Methodology of the study

In the light of mutual fund performance analysis, our methodology involves a particular set of quantitative procedures comprising: a review of the literature; identifying research problems and hypotheses; the collection of data; analysis of data; interpretation of the empirical results; and the drawing of conclusions.

Figure 1.1 illustrates the logical methodological process of this study. Once the general research topic is decided, the process begins by reviewing the literature from various sources, including books, journals, working papers, articles, websites and in-class handouts. After reviewing the literature, the specific research problems and hypotheses are identified. Then, the next step is to plan the research design in order to disentangle the problem. The empirical models are formulated on the basis of the formulation in the literature review. Subsequently, in Step 3, the data are collected. This study employs secondary data from different sources. The two main sources are the Association of Investment Management Companies (AIMC) and the Thompson Reuter Datastream. AIMC supplies data on mutual funds, such as net asset values (NAVs) and total asset values (TNAs). The Thompson Reuter Datastream provides other relevant data, such as stock market returns, stock characteristics and other economic data. The Securities Exchange Commission Thailand (SEC), Bank of Thailand (BOT) and Stock Exchange of Thailand (SET) give further information, such as news, policies and regulations.

Then, in Step 4, the data are used empirically to test econometrics models and hypotheses by means of statistical software packages, namely, STATA 10.0 and EViews 5.0. Step 5 is to verify whether the model is statistically adequate. If the answer is 'No', then Step 2-4 must be repeated; if 'YES', then the thesis can proceed to the next step, which is to interpret the results from the previous steps by relating them to the theory and previous empirical evidence and finally draw some conclusions and offer suggestions for further research.

Figure 1.1 Research methodology



1.5 Organisation of the study

This thesis is organised into seven chapters. Chapter One presents a general introduction to the study. This provides an overview of the thesis, including the background and motivation for the study, its main objectives, promising contributions, the methodology and the structure of the thesis.

Chapter Two critically reviews the literature on mutual fund performance. The chapter begins with the performance measures proposed in the literature, together with empirical results for developed markets. Then the chapter continues by reviewing the key issues related to performance, including persistence, flows and style analysis. Next, the chapter presents evidence from the emerging markets and finally draws some conclusions and raises some issues for further research.

Chapter Three describes the institutional background of mutual funds in Thailand and a sample selection of the remaining study. The first part of the chapter reviews the development, characteristics and regulations of Thai mutual funds and also provides some relevant statistical information about them. The latter part details the sample data which will be used for the following chapters and points out the possibilities of bias in the sample data. At the end, the chapter draws some conclusions and points out some concerns to do with institutional aspects, which can be tested in the following chapters.

Chapter Four presents the first of three empirical studies of mutual fund performance. This chapter employs various models drawn from the literature which has been widely conducted in developed markets to test mutual funds in Thailand as a case study of an emerging market. The study focuses on the performance, strategy and style used by the fund manager, controlling for investment policy and the unique characteristics of the funds. The study also performs several robustness tests, including alternative models, portfolio formation and data frequency.

Chapter Five presents the second empirical study. This aims to investigate the effects of the characteristics of mutual fund performance, focusing on five of them, namely past performance, fund longevity, flows of funds, fund size and family fund size. The study investigates each characteristic separately, using constructed trading strategy portfolios corresponding to the characteristics of the portfolios and investigating their performance. Also, the study investigates for all characteristics simultaneously, using multidimensional regression while controlling for time variation in the estimation.

Chapter Six presents the third empirical study, which aims to investigate the relationship between liquidity and performance. In the first part, the study investigates the role of the liquidity of the assets contained in the portfolio on the estimation of mutual fund performance. In the second part, it proposes an alternative performance measure to capture the liquidity premium in mutual fund performance and then discusses the importance of the auxiliary model to mutual fund performance.

Finally, Chapter Seven summarises and draws conclusions from the previous chapters. The study also discusses the policy implications and makes suggestions for future research.

CHAPTER TWO

LITERATURE SURVEY

2

2.1 Introduction

The growth of investments in mutual funds around the world has widely increased during the past few decades, leading to fierce competition in the industry. Investors now have a wide range of products to choose from, which makes their investment decision more complicated than before. Although there are many factors in their decisions, performance still seems to be a determining factor (see Ippolito, 1992; Capon et al., 1996; Sirri and Tufano, 1998). As a result, from the investors' point of view, it is important not only to know how the portfolio managers perform, but also to understand their investment policies. Similarly, at the macro level, it is worth examining the performance of fund managers as a whole to see whether they provide value added to portfolios or they are just sweeping benefits from investors.

However, superior performance in the past does not necessarily mean that it will continue into the future. This is because superior performance may be due to either a manager's skill or good luck. Therefore, it is interesting to understand the characteristics of funds and to know what caused the performance; this helps investors to understand how to select their fund manager.

This literature survey chapter is organised as follows. Section 2.2 surveys the writings related to performance measures and empirical evidence to do with them in the developed markets. Section 2.3 surveys the literature on persistence in mutual fund performance.

Section 2.4 surveys the literature on flows and their relation to performance. Section 2.5 surveys the literature on style analysis. Section 2.6 gives empirical evidence on emerging markets and, finally, section 2.6 draws some conclusions and makes suggestions for further research. At the end of this chapter, Tables 2.1 and 2.2 summarise the main theoretical and empirical studies related to mutual fund performance in developed and emerging markets, in turn.

2.2 Performance measures

It is typical that when one has made a decision, one wonders what its consequences will be. Therefore, once an investor has given money to a fund manager to invest on his/her behalf, he/she should have the right to know what sort of performance they have obtained. Does the fund manager offer superior or inferior performance? How does the fund manager perform compared to peers? And what sort of strategy is used?

Performance evaluation measures the skill of an asset manager and its principal idea is to compare the returns with an alternative appropriate portfolio to that which was obtained in a particular case. The emergence of modern portfolio theory (MPT) by Markowitz (1952), who quantifies how rational investors make decisions based on expected return and risk, has brought much development to portfolio performance measurement. It moves performance measurement from crude measures toward more precise, risk-adjusted measures. Up to now, many researchers have proposed various methods for evaluating portfolio performance in order to find a model which could give a precise and reliable measure (e.g. Jensen, 1968; Grinblatt and Titman, 1993; Ferson and Schadt, 1996; Cahart, 1997; Daniel et al., 1997).

Although these researchers use different methods to evaluate portfolio performance, they all aim to provide an appropriate method by which to distinguish superior managers from others. However, it is difficult for a user to decide which model is the best suited for the performance evaluation is a given case. Therefore, while many researchers have proposed different methods for performance evaluation, some researchers also enquire which model gives the best evaluation technique. (e.g. Grinblatt and Titmann, 1994; Kothari and Warner, 2001; Fletcher and Forbes, 2002; Otten and Bams, 2004). An appropriate model depends not only on the method used for measurement, but also depends on the appropriateness of the measure to the data and the market being evaluated. This section will first introduce various methods of portfolio performance measurement which have been discussed in the literature, partially following Grinblatt and Titman (Jarrow et al., 1995). We divide performance measures into three classes: first, performance measures in the early stage (Section 2.2.1), second, measures which require benchmark returns (Section 2.2.2 - 2.2.4) and, third, measures which evaluate portfolios based on their composition and do not necessarily require a benchmark portfolio (Section 2.2.5). Following this, we highlight empirical evidence of fund performance in developed markets in Section 2.2.6.

2.2.1 The early stage of performance measurement

In the early stage, the past few decades, performance evaluation was made by focusing fund performance on the returns of the portfolio. The two methods which can measure the return on a portfolio are the 'money-weighted return method' and the 'time-weighted return method'. The money-weighted return (otherwise called the internal rate of return) is the discount rate which makes the final value of portfolio equal the sum of initial value and cash flows occurring during the period. Alternatively, the time-weighted return method is the geometric mean return of the portfolio's sub periods. This measure assumes that all distributed cash flows, such as dividend, are reinvested. As return is the key aspect of performance measurement, some criticisms can be made of the choice of method when measuring return. For example, Sharpe and Alexander (1990) suggest that the time-weighted return method is preferable because this method is not strongly influenced by the size and timing of cash flows, which managers are unable to control. Spaulding (2003) reveals that when a portfolio is measured in a short period and has few cash flows, the choice of return method is not different. Campisi (2004) argues that the money-weighted return method is more appropriate for measuring active investments. Nevertheless, the time-weighted return method is still widely used in practice in the investment fund industry and it is believed that increasing the measurement interval improves the precision of the calculation.

In term of risk measurement, there are two possible choices for measuring risk, namely, 'total risk' and 'systematic risk'. Total risk is the overall risk of a portfolio including both systematic and unsystematic risk and is measured by the portfolio's standard deviation of portfolio. In contrast, systematic risk (or market risk) is measured by the portfolio's beta coefficient, which is the sensitivity of the portfolio's return to changes in the return on the market portfolio. The choice of risk measures depends on the way in which the portfolio is diversified. If the portfolio is well diversified, then using systematic risk is preferable.

Thus, it is advisable in the early stages of mutual fund performance evaluation to use the basic approach, directly comparing the return on portfolios to other portfolios with the same risk (benchmark portfolio). This evaluation technique is straightforward and still widely used among investors and practitioners. However, it could potentially be misleading and biased, because to be truly comparable it requires the benchmark portfolio to have same risks and constraints.

2.2.2 Risk-adjusted non-regression approaches

The revolution of performance evaluation owes much to the capital asset pricing theory (CAPM) which was developed simultaneously by Sharpe (1964), Lintner (1965) and Mossin (1966), based on Markowitz's mean-variance portfolio theory. The capital asset pricing theory shows a linear relationship between systematic risk and expected return. It is stated that the expected returns of any assets are a function of systematic risk (beta) of the market risk premium, shown in the following equation:

$$E(R_{pt}) = R_{ft} + \beta_p [E(R_{mt}) - R_{ft}] + \varepsilon_{pt} \qquad (2.1)$$

where $E(R_{pt})$ is the expected return on portfolio p at time t, R_{ft} is the risk-free rate of return at time t, β_p is systematic risk for portfolio p, $E(R_{mt})$ is the expected return on the market portfolio at time t and ε_{pt} is the random component of the portfolio return.

Many scholars have proposed their portfolio performance measures based on the implication of CAPM. Among several non-regression measures, the two focal measures are the Treynor and Sharpe ratios. Treynor (1965) introduced the 'Reward-to-Volatility ratio', or so-called Treynor ratio, which was based on the security market line (SML). The Reward-to-Volatility ratio corresponds to the slope of the line connecting the risky asset to the risk free asset. The Reward-to-Volatility is defined by:

$$TR_p = \frac{E(R_p) - R_f}{\beta_p} \qquad (2.2)$$

where TR_p is the Reward-to-Volatility ratio of portfolio p, $E(R_p)$ is the expected return of portfolio p, R_f is the risk free rate of return and β_p is the portfolio's systematic risk which is the relation of portfolio returns to those of the market.

In order to discover whether our portfolio has a superior or inferior performance, we need to compare portfolio returns with the benchmark returns. The benchmark returns give the average return if an alternative portfolio with identical risk had been chosen. For this result, the benchmark portfolio should be identified to precede the calculation. The benchmark of the Reward-to-Volatility ratio is the slope of the SML, which equals the excess return of the market portfolio (market risk premium). If the Reward-to-Volatility ratio of the portfolio is greater than the market excess returns, the portfolio lies above the SML and, hence, has outperformed the market benchmark. In contrast, if the ratio is lower than the market excess return, then the portfolio has underperformed the market.

Sharpe (1966) also proposed the 'Reward-to-Variability ratio', called the Sharpe ratio. In contrast to Treynor (1965)'s ratio, which based on the SML, this technique is drawn from the capital market line (CML) and measures the excess returns of a portfolio relative to the total risk of the portfolio, which is measured by its standard deviation. The benchmark of this measure is based on the slope of the CML, which is the market risk premium divided by its standard deviation. If the portfolio's Reward-to-Variability ratio is larger than this figure, then the portfolio's own superior performance is compared to the benchmark and vice-versa. The Reward-to-Variability ratio is defined by:

$$SR_p = \frac{E(R_p) - R_f}{\sigma_p} \tag{2.3}$$

where SR_p is the Reward-to-Variability ratio of portfolio p, $E(R_p)$ is the expected rate of return of portfolio p, R_f is the risk-free rate of return and σ_p is the standard deviation of the portfolio's return during the measurement period.

The difference between the Reward-to-Volatility ratio and the Reward-to-Variability ratio is the use of risk measurement. The appropriate risk measure depends on the investor's portfolio. If the investor has many other assets in his/her portfolio, then using systematic risk is more relevant. Conversely, if the investor has only a few assets or relies dependently on this portfolio, then total risk will give more accuracy. Grenblatt and Titman (Jarrow et al., 1995) argue that the Reward-to-Variability ratio is not appropriate because managers rarely manage the entire savings of an investor and investors hardly ever put all their wealth in a single portfolio.

Conversely, the Reward-to-Volatility ratio uses systematic risk, which is drawn from the CAPM and leads to Roll's (1977) critique of the choice of market benchmark. Roll argues that using the CAPM as a benchmark is inconsistent, since the market portfolio is unobservable and, as a result, using different benchmark portfolios gives different results. However, Stambaugh (1982) and, Kandel and Stambaugh (1987) show that the choice of benchmark is not an empirical problem as long as there is a high correlation between the benchmark and true market portfolios (cited in Campbell et al., 1997).

Additionally, Sortino and Price (1994) introduce the Sortino ratio as a modified version of the Sharpe ratio. The Sortino ratio focuses on the downside risk. It measures returns in excess of the minimum acceptable return (MAR) and, instead of the total risk as in the Sharpe ratio, uses the semi-standard deviation. Therefore, the Sortino ratio can be viewed as a goal-oriented measure because returns are adjusted with the minimum rate they want to achieve, instead of the risk-free rate returns. The high Sortino ratio can be interpreted as meaning that the fund has a low risk of large loss. The Sortino ratio is defined by:

$$Sortino\,Ratio_p = \frac{E(R_p) - MAR}{\sqrt{\frac{1}{T}\sum_{\substack{t=0 \\ Rpt<MAR}}^{0}(R_{pt} - MAR)^2}} \tag{2.4}$$

where $E(R_p)$ is the expected rate of return of portfolio p and MAR is minimum acceptable rate of return.

Besides to the above ratios, the Information ratio (IR) is also being used widely in practice these days. The information ratio or so-called appraisal ratio is an expected return of an active portfolio compared to its tracking error. The tracking error measures how closely the portfolio follows its benchmark and is defined as the standard deviation of the difference between the portfolio and the benchmark. The Information ratio is defined by:

$$IR = \frac{E(R_p - R_b)}{\sigma(R_p - R_b)} \tag{2.5}$$

where R_p is the return of the portfolio; and R_b is the return of the benchmark. The information ratio tells us whether the return we received is sufficient in relation to the amount of risk taken and, thus, a high Information ratio is preferable. Nevertheless, it is argued that this ratio does not take systematic risk into account. It is not desirable to compare portfolios which have different degree of diversification (Le Sourd, 2007).

Additionally, the main drawback of using ratios for performance evaluation is that it helps only by comparing whether a fund performance is better or worse than its peers. Furthermore, it is impossible to interpret whether these signs of superior/inferior performance are statistically significant or have any economic meaning.

2.2.3 Regression-based approaches

2.2.3.1 Single-factor model

One of the most popular performance measures is the single-factor model, which was proposed by Michael Jensen (1968). This measure also uses the implication of the CAPM by measuring portfolio performance as the difference between the return of a portfolio and the return explained by the market model. The mathematical formula of Jensen's alpha is as follows:

$$E(R_{pt}) - R_{ft} = \alpha_p + \beta_p [E(R_{mt}) - R_{ft}] + \varepsilon_{pt} \tag{2.6}$$

where $E(R_{pt})$ is the expected return on portfolio p at time t, R_{ft} is the risk-free rate of return at time t, β_p is the systematic risk for portfolio p, $E(R_{mt})$ is the expected return on the market portfolio at time t, ε_{pt} is the random component of the portfolio return at time t and α_p is the an intercept of estimated regression, or called *Jensen's alpha*. Jensen's alpha represents the performance of a mutual fund portfolio which is an additional unit return generated from the manager's performance.

If the market is semi-strong form efficient[2] in Fama's sense (1970), the Jensen's alpha of a passive portfolio, in which return is measured before all expenses, is expected to be zero. Hence, positive alphas represent the portfolio's superior performance to the benchmark portfolio and negative alphas represent the reverse.

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[2] Fama (1970) identifies three forms of efficient market according to the degree of information reflected in the prices. These are the weak form, the semi-strong form and the strong form of efficiency. Weak form efficiency is shown when prices reflect historical price information and, therefore, make it impossible to outperform the market using past return information. Semi-strong form efficiency is shown when prices not only reflect past prices but also other public information (i.e. past price, earnings, dividends and accounting statements). Therefore, fundamental analysis is irrelevant. Strong form efficiency is shown when prices reflect all public and private information and investors cannot benefit more than the market does.

Jensen's alpha is widely used for performance, since it has strong theoretical support as well as being simple to calculate and interpret. This is because this measure contains a benchmark which allows portfolios with different levels of risk to be compared. More importantly, the regression approach affords both statistics and economic meaning to the performance evaluation.

Nevertheless, in a similar vein to Treynor's ratio, the single-factor measure is still concerned by Roll's (1977) criticism of benchmark appropriateness. Furthermore, several studies show that expected returns cannot be completely explained by a single risk factor; for example, Ross, 1976; Fama and French, 1992, 1993). Ferson and Schadt (1996) also suggest that this measure would bias performance upwardly, since portfolio systematic risk is assumed to be fixed over the evaluation period.

2.2.3.2 Multifactor models

A great deal of theoretical and empirical evidence in asset pricing suggests that expected returns can be explained by more than one variable[3]. Thus, performance measuring has been extended to a multifactor model. The multifactor model allows a set of variables to explain the returns of the portfolio. The set of variables can be obtained from macroeconomic, financial market and firm characteristics. It is believed that using the factor model will improve performance measurement since it comprises several risk factors. The factor model is defined as follows:

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[3] For example, Amihud and Mendelson (1986), Chen et al. (1986); Connor and Korajczyk (1988); Fama and French (1993); Jagadeesh and Titman (1993); Brennan and Subrahmanyam (1996); Brenan et al. (1998); Acharya and Pederson (2005)

$$R_{pt} = \alpha_i + \sum_{K=1}^{K} \beta_{pk} F_{kt} + \varepsilon_{pt} \tag{2.7}$$

where R_{pt} is the return on portfolio p at time t; β_{pk} is the sensitivity of portfolio p's return to factor k; F_{kt} is the return of factor k at time t; ε_{pt} is the random error components of portfolio p at time t; and α_p is the expected return for portfolio p if the expected value of the factors equals zero.

Campbell et al. (1997) reviews the two approaches, statistical and theoretical, to selecting the factors included in the model. The statistical approach is based on the Arbitrage Pricing Theory (APT). The APT model was proposed by Ross (1976) as an alternative asset pricing model. It is based on the law of one price and relaxes the strong assumptions of the CAPM model, given that returns are sensitive to other factors, not only means and variances. Ross suggests that there are 'K' common macroeconomic sources affecting asset returns. However, this does not specify how many factors there are. Lehmann and Modest (1988) use factor analysis and Connor and Korajczyk (1988) employ principal components to investigate the APT-based multifactor model. They conclude that there is little sensitivity when the number of factor rises to more than five.

Alternatively, factors in the model can be selected using the theoretical approach. This approach selects factors based on theoretical arguments that can capture systematic risk. These factors can be either economic variables or firm characteristics. Chen et al. (1986) argue that stock returns are affected by any factors influencing the change in future cash flows. They go on to propose a five-factor model which includes expected inflation, unexpected inflation, term structure of the interest rate, default premium and industrial production, and they find that these factors have a significant explanatory influence on pricing.

The more practical and better-known approach for multifactor models is to use firm characteristics as risk factors. This employs firm characteristics which have empirical evidence to show that they can explain cross-section returns and then form portfolios based on these characteristics. These models are also widely used among practitioners because they make it simple to construct benchmark portfolios and are informative.

Elton et al. (1993) proposed for their evaluation a three-index model including return on large stock, small stock and bond indexes. Their model is presented as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{pL}(R_{Lt} - R_{ft}) + \beta_{pS}(R_{St} - R_{ft}) + \beta_{pB}(R_{Bt} - R_{ft}) + \varepsilon_{pt} \qquad (2.8)$$

where R_{Lt} is the return on large stock index at time t, R_{St} is the return on small stock index at time t, R_{Bt} is the return on bond index at time t, R_{pt} is the expected return on portfolio p at time t, R_{ft} is the risk-free rate of return at time t and ε_{pt} is the random error of the portfolio return at time t.

Fama and French (1993) propose a 3-factor model comprising, besides the return on market portfolio, two additional variables related to firm size and book-to-market ratio which provide empirical evidence of the power to explain a cross-section of average returns (Fama and French, 1992). As a result, fund managers who employ this strategy should not qualify as informed or skilled managers. Fama and French (1993) construct variables related to size and book-to-market ratio, called SMB and HML respectively. Each year from 1963 to 1991, NYSE, Amex and NASDAQ stocks are ranked in size and split into two groups (Small and Big) based on median NYSE size. NYSE, Amex and NASDAQ stocks are also ranked on the basis of book-to-market ratio and broken into three groups (30% each for High and Low and 40% for Medium). This allows six value weighted portfolios to be constructed (S/L, S/M, S/H, B/L, B/M, B/H). The SML variable is constructed by the average of the three small cap stock portfolios minus the average of the three big cap stock portfolios. Similarly, the HML is the average of the two high book-to-market stock portfolios minus the average of the two low book-to-market stock portfolios. Fama and French's three-factor model is as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{0p}(R_{mt} - R_{ft}) + \beta_{1p} SMB_t + \beta_{2p} HML_t + \varepsilon_{pt} \quad (2.9)$$

where SMB is the difference in return between a small cap portfolio and a large cap portfolio and HML is the difference in return between a portfolio of high book-to-market and a portfolio of low book-to-market.

In addition to Fama and French's three-factor model, Mark Cahart (1997) shows that fund managers employ momentum strategy in order to earn abnormal return. The momentum anomaly was pointed out by Jegadeesh and Titman (1993). He finds that stocks which perform best (worst) over a three- to twelve-month period tend to continue to perform well (poorly) over a subsequent period. Therefore, if fund managers employ this phenomenon in order to earn abnormal returns, it should not be counted as value added. Subsequently, Cahart proposed his four-factor model which includes 3 factors from Fama and French (1992) and one extra variable to capture the momentum anomaly. His momentum variable is the equally weighted portfolio of the stock's highest 30% eleven-month returns, lagged one month, minus the equally weighted portfolio of stocks with the lowest 30% eleven-month returns, lagged one month. Cahart's (1997) four-factor model is expressed as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{0p}(R_{mt} - R_{ft}) + \beta_{1p} SMB_t + \beta_{2p} HML_t + \beta_{3p} PR1YR_t + \varepsilon_{pt} \quad (2.10)$$

where $PR1YR$ is the difference in return between a portfolio of past winners and a portfolio of past losers.

Although there is criticism that both Fama and French's three-factor model and Cahart's four-factor model are not based on any theoretical framework, these models are commonly used in portfolio performance and many studies show evidence that these multifactor models, in particular Cahart's four-factor model, do a good job in performance measurement (see, for example, Fletcher and Forbes, 2002; Otten and Bams, 2004; Hubner, 2007).

2.2.3.3 Conditional measures

Ferson and Schadt (1996) argue that the performance measures mentioned above are based on unconditional expected returns and risk, meaning that the portfolio's betas are fixed for the whole observation period. This could make performance unreliable because many empirical studies show that risks and returns are predictable over time using economic variables such as dividend, interest rate, etc. Hence, they build their conditional model on the basis of three assumptions. First, many studies have rejected the CAPM due to the conditional returns and evidence suggesting that the risks and returns of stocks and bonds are predictable, using dividend yields, interest rates and also other economic variables. Second, the traditional measures assume that investors have unconditional expectations and any information used by fund managers can be considered an abnormal performance. However, if the market is semi-strong form efficient, as defined by Fama (1970), meaning that market prices are fully reflected in all public information, thus, a manager who adjusts a portfolio dynamically according to the readily available information should not be viewed as having superior performance. Finally, betas are a functional form. This is because there is a time-varying factor in betas, which is due to three sources: first, the changing in betas of the underlying assets, second, the portfolio's re-weighting by active managers and, third, the major fund flows into or out of a portfolio which can consequently change the weight of a passive portfolio.

As a result, Ferson and Schadt (1996) mitigate the drawback of traditional measures by incorporating interaction variables in order to capture time-varying expectations. These interaction variables are a vector of the predetermined economic variables. They assume that the conditional beta is a linear function of a vector of the predetermined variables. In addition to the conditional betas, these predetermined variables can also be incorporated with the portfolio alpha in order to allow time-varying in abnormal performance. The relationship of the conditional beta and alpha is defined, respectively, by:

$$\beta_p(Z_t) = \beta_{0p} + \beta_p' Z_{t-1} \tag{2.11}$$

$$\alpha_p(Z_t) = \alpha_{0p} + \alpha_p' Z_{t-1} \tag{2.12}$$

where $\beta_p(Z_t)$ are the conditional betas of portfolio p at time t and Z_{t-1} is a vector of the public information variables lagged t-1 period.

This conditional beta can be used to replace any of the betas in the unconditional model to capture a dynamic strategy on the part of a fund manager. Many studies incorporate the conditional beta and alpha for the portfolio performance evaluation and suggest that using a conditional model economically and statistically improves portfolio performance and makes performance more neutral (see Ferson and Schadt, 1996; Ferson and Warther, 1996; Sawicki, 2001; Roy and Deb, 2003).

2.2.4 Timing ability

Fama (1972) suggests that performance can be broken down into two components: selectivity ability – the ability to select superior stocks at the given risk level; and timing ability – the ability to forecast the market's movement or anticipate the market direction.

As expected return on a portfolio is linearly related to its beta, a successful market timer will shift the portfolio beta according to the market situation. If the market is expected to rise, a manager will increase the beta on the portfolio. Conversely, if the market is expected to fall, a manager will lower the beta on the portfolio. Therefore, a manager who has market timing ability may perform poorly under the standard constant beta measurement.

Timing ability can be measured by decomposing performance into timing and selecting abilities. The two best-known approaches in measuring timing ability are, first, the 'quadratic regression method' proposed by Treynor and Mazuy in 1966 (Treynor and Mazuy, 1966). This model is built on the assumption that the characteristic line is not straight since the steepness will be different according to its volatility. For example, if we think that the market is falling, we will then shift our stocks from more to less volatility. Therefore, the quadratic regression model is defined as follows:

$$R_{pt} - R_{ft} = \alpha_p + \sum_{j=1}^{k} \beta_j (R_{jt}) + \gamma_p (R_{mt} - R_{ft})^2 + \varepsilon_{pt} \qquad (2.13)$$

where β_j is the loading on factor j. γ_p is the manager's ability to time the market movement and α_p is the expected return for portfolio p generated from the manager's selectivity skills.

If a manager has successfully timed the market, then the coefficient of the quadratic term (γ_p) will be positive and significant. In contrast, if a manager has no timing ability, then the relationship between the portfolio return and market return will be linear and the quadratic term will be zero.

Alternatively, market timing ability can be measured by the 'dummy variable regression method', which was developed by Henriksson and Merton (Henriksson and Merton, 1981). They view market timing as the payoff to a call option. Hence they use a dummy variable to capture the up and down market situation. A successful market timer will raise the beta value when the market is up ($R_m > R_f$), which appears as a steeper slope of the characteristic line. In contrast, when the market is down ($R_m < R_f$), they will lower the beta risk. The dummy variable regression model is as follows:

$$R_{pt} - R_{ft} = \alpha_p + \sum_{j=1}^{k} \beta_j (R_{jt}) - \gamma_p D_t (R_{mt} - R_{ft}) + \varepsilon_{pt} \tag{2.14}$$

where D_t=0 if the market is up (R_{mt}-R_{ft} ≥0), D_t= 1 if the market is down (R_{mt} - R_{ft} < 0)

The γ_p is the difference between up-market beta and down-market beta which estimates the manager's timing ability. If the γ_p is positive and significant, then portfolio manager has successfully timed the market.

Although both quadratic regression and dummy variable regression methods can be used to assess the portfolio manager's timing ability, the difference between the two models is that the quadratic regression method allows the portfolio's beta to fluctuate over many values, depending on the size of the market return, while the dummy variable regression allows the beta to be varied only between up and down the market (Sharpe and Alexander, 1990).

Fund managers can also time the volatility in the market by reducing the market risk exposure when the volatility in market increases. Busse (1999) proposed the market volatility model as:

$$R_{pt} - R_{ft} = \alpha_p + \sum_{j=1}^{k} \beta_j (R_{jt}) + \lambda r_{mt\,t} (\sigma_{mt} - \overline{\sigma}_m) + \varepsilon_{pt} \tag{2.15}$$

where σ_m is the market volatility. The λ coefficient indicates market timing volatility. If the manager successfully times market volatility, the coefficient will be negative and significant.

Nonetheless, there are some arguments regarding the potential bias in the market timing measures. Goetzmann et al. (2000) show that the model can be misspecified when a manager's decision horizon is different from the evaluation horizon. However, Fama and French's three-factor model improves the market timing model specifications, Coles et al. (2006) also show that the wrong model or the wrong benchmark can lead to severe bias in the estimation.

2.2.5 Non-benchmark performance evaluation approaches

Performance can also be measured using the semi-parametric approach. The models with under this approach require stock holding data. The first study using this approach was conducted by Grinblatt and Titman (1989). The authors introduce a 'Positive Period Weighting measure' (PPW) to evaluate mutual fund performance. This measure is based on the intuition that if a manager has the ability to beat the market, then his/her performance will be repeated over several periods. Therefore, the measure uses the excess returns of a portfolio over several periods and assigns a non-negative weighting to each of them. The positive period weighting is defined as follows:

$$PPW = \sum_{t=1}^{T} w_t R_{pt} \tag{2.16}$$

Given: $w_t \geq 0$, $\sum_{t}^{T} w_t = 1$ and $\sum_{t=1}^{T} w_t R_{Bt} = 0$

where R_{pt} is the excess return of the portfolio at period t, R_{Bt} is the excess return of the benchmark portfolio at period t and w_t is the weighting attributed to the return at period t. Nonetheless, the drawback of this measure is that the weights of portfolio returns are required for each period which is rather difficult in practice.

Grinblatt and Titman (1993) propose a performance measurement method based on the composition of the portfolio. The intuition behind this method is that the portfolio manager will give greater weight to the stocks which are expected to earn higher return and will give less weight to other stocks. This change of portfolio composition implies the performance of the fund manager. Therefore, the portfolio performance is defined by:

$$GT = \sum_{t=1}^{n} \sum_{t=1}^{T} (r_{it}(x_{it} - x_{i,t-k}))/T \tag{2.17}$$

where r_{it} is the returns of stock i at time t, x_{it} is the weighting of stock i at time t and T is the number of the period.

Using this approach, a passive portfolio with buy-and-hold strategy is expected to yield zero return. Then, if an active fund manager can accurately outguess the market, then the return will be positive. However, the model is not adjusted to take account of risk and requires comprehensive information about the portfolio holdings. Therefore, they are not widely used in either academic or practical applications.

Based on the work of Grinblatt and Titman (1993), Daniel et al.'s study (1997) (DGTW) develops a portfolio characteristic-based approach for performance evaluation by matching each stock contained in the fund with the 'benchmark stocks'. For each quarter, all stocks are quintiles-sorted on the basis of market capitalization, book-to-market value and past year returns. Then value weighted portfolios are constructed corresponding to these characteristics, which results in 125 portfolios. The DGTW measures fund performance by decomposing fund characteristics into three sorts of component, namely, Characteristic selectivity (CS), Characteristic timing (CT) and Average Style (AS). The CS measures the ability of the fund manager to pick stocks which beat their matching characteristic-based benchmarks. The CT measures the ability of fund managers to hold stocks with characteristics at times when these characteristics bring optimal returns. Finally, the AS measures the tendency of fund managers to hold stocks with optimal characteristics over a long time period. The CS, CT and AS are calculated by:

$$CS_t = \sum_{j=1}^{N} w_{j,t-1}(R_{jt} - R_t^{b_{j,t-1}}) \tag{2.18}$$

$$CT_t = \sum_{j=1}^{N} (w_{j,t-1}R_t^{b_{j,t-1}} - w_{j,t-5}R_t^{b_{j,t-5}}) \tag{2.19}$$

$$AS_t = \sum_{j=1}^{N} w_{j,t-5}R_t^{b_{j,t-5}} \tag{2.20}$$

where R_{jt} is return on stock j at time t and $R_t^{b_{j,t-k}}$ is the return on the benchmark portfolio to which stock j was allocated in the period t-k. The $w_{j,t-k}$ is the weight of stock j in the portfolio at time t-k. If the value is positive, then a fund manager can outperform its benchmarks. Subsequently, the overall DGTW performance approach is measured by the sum of these three characteristics.

$$DGTW = CS_t + CT_t + AS_t \tag{2.21}$$

Daniel et al. (1997) argue that the characteristics-based approach is superior to parametric measures because mutual fund style drifts over time and, therefore, stock returns can be better explained by characteristics. Furthermore, this approach increases the statistical power of the test. Nonetheless, the major drawback of this approach is that it requires a comprehensive dataset including information on stock holdings in the funds. Furthermore, some funds also hold other assets besides stocks, for example, bonds and cash. Thus, this measure rarely carries over outside the US market to where data are less complete.

2.2.6 Empirical studies in mutual fund performance

Corresponding to the growth in the fund industry during the past few decades, there has been extensive research in this area with a variety of different data, periods and methodology used. Comprehensive details of empirical studies in developed markets are chronologically summarised in Table 2.1 and examples of research in portfolio performance in developed capital markets are highlighted below.

In the early stages of mutual fund performance, a direct comparison between its returns and other portfolios with similar risk was normally used. For example, Friend et al. (1970) (cited in Elton et al., 2002) examined the performance of mutual funds during 1960-1968 by dividing mutual funds into three risk categories (high, medium and low risk). Then, they were compared to the random portfolios with the same risk categories. The results of this study show that mutual funds did worse than the randomly selected portfolios.

Jensen (1968), who proposes a single-index model based on the capital asset pricing model, investigates the performance of 115 U.S. open-end mutual funds with various investment objectives (growth, income, balance, etc.) from 1945 to 1964 using annual data and uses the S&P500 index as a market benchmark. He finds that 14 funds underperformed the market benchmark with t-statistic values of less than -2 and only 3 funds outperformed the market with t-statistic values greater than 2. On average, funds perform 1.1% and 0.4% per year less than the market when using net return and gross return, respectively. Therefore, he suggests that fund managers have no ability to outperform buy-and-hold strategy even before deducting fees and expenses.

In contrast to Jensen (1968), Ippolito (1989) employs a similar model and similar data to Jensen but uses more updated data; he consulted 143 U.S. mutual funds during 1965-1984 to test for efficiency of the capital markets and overall performance of the mutual fund performance to see whether active funds yield enough return to compensate for the higher fee charged. His results show that 12 funds significantly outperformed and only 4 funds significantly underperformed the market. He concludes that, on the net of fees and expenses apart from the load fees basis, mutual funds, overall, have outperformed passive funds and are large enough to compensate for the load charges, a result which is consistent with the concept of costly information in an efficient market (Grossman and Stiglitz, 1980).

Grinblatt and Titmann (1989) studied funds during 1975 to 1984 using both actual returns and gross returns. They employ Jensen's single-index measure with four sets of benchmarks. They find significantly superior performance among growth funds when gross returns data are employed but evidence of this vanishes when using actual returns. Hence, they conclude that growth funds outperformed the market but the evidence disappeared because of its high expenses.

Cumby and Glen (1990) investigate 15 U.S.-based international funds during the period 1982-1988. They employ Jensen's measure and the Positive Period Weighting proposed by Grinblatt and Titmann (1989) and find positive alphas in only 3 funds though even these are not statistically significant. They also look into market timing ability as a part of their mutual fund performance study. Using Treynor and Mazuy's timing model, they find evidence of negative market timing ability. Similarly, Malkiel (1995) examines fund performance in the U.S market during the period 1972-1991 using Jensen's single-factor model. He finds the average alpha equals to -0.6% with very low t-statistic value. He reveals that, on average, mutual funds have underperformed benchmark both before and after fees and expenses have been deducted.

Gruber (1996) analyses common equity fund performance from 1985 to 1994 using a relative return to the market, Jensen's measure and multifactor model. The multifactor model includes four variables, namely market return premium, difference in return between small and large cap stocks, difference in return between growth and value and bond return premium. Using 270 mutual funds, he finds that mutual funds underperform the market by 1.56% and 0.65% per year using respectively a single factor model and a multifactor model.

Similar to the studies above, in the U.K., Blake and Timmermann (1998) investigate a large dataset of unit trusts for the period 1972-1995 using the three-index method, which includes T-bills and bond and dividend yield. They find an average inferior performance of 1.8% per annum. Quigley and Sinquefield (2000) also reveal similar evidence in the UK funds for the period 1978-1997.

Some studies examine performance in more detail by decomposing performance into selectivity and timing ability. Studies related to the market timing ability include Treynor and Mazuy (1966)'s study of the market timing ability of 57 U.S. mutual funds between 1953 and 1962 using a quadratic regression approach. They find that only 1 out of 57 funds exhibited significant market timing.

Kon (1983) suggests that a fund manager has timing ability if he adjusts risk level ahead of the market movements. Hence, he tests the timing ability by investigating the stationarity of the fund's systematic risk. He employs 37 funds from 1960 to 1976 and concludes that some funds have significant timing ability but this is not the case at overall level.

In contrast, Bollen and Busse (2001) argue that active fund managers adjust their portfolio at high frequency. Hence, they employ mutual fund daily data from 1984 to 1995. They find that, using daily data, 40% of funds have positive market timing ability.

Matallin-Saez (2006) examines the performance of mutual funds in Spain and tests the effect of omitting a relevant benchmark. He uses a range of performance methods, including Jensen's measure, several multi-index models and Treynor and Mazuy's market timing, and judges that the performance of Spanish mutual funds is inferior and has negative market timing but that these results are not statistically significant. He also confirms that the effect of omitting the benchmark is that it leads to more perverse market timing.

While there was much evidence of inferiority in mutual fund performance from earlier times, studies in mutual fund performance have become much more comprehensive in the last decade. Recently, more completed data and sophisticated measures have been used. In 1996, Ferson and Schadt argued that the all the single- and multifactor measures are biased, since portfolio risk and returns are fixed through time (known as the unconditional measure). For this reason, they propose in their model a conditional measure which allows time-varying. They use both measures to investigate the performance of 67 mutual funds in the U.S. market during the period 1968-1990. They employ 5 predetermined variables for their conditional measure – including 1-month Treasury bills, dividend yield, slope of term structure, quality of spread in the bond market and a dummy variable for the January effect – and incorporate it with Jensen's single factor measure. Their results show negative Jensen's alphas in overall fund performance. However, the alphas shift and become more positive when predetermined variables are included. They also apply their conditional method to Treynor and Mazuy's (1966) and Henriksson and Merton's (1981) market timing measures and use 3 self-constructed buy-and-hold portfolios to test the market timing models, as well as data from 67 mutual funds. They conclude that the unconditional market timing models are misspecified, since the results show negative market timing performance even if they are in the buy-and-hold strategy portfolios. When the conditional market timing measures are replaced, the negative timing coefficients are removed. Therefore, they confirm that using their conditional model brings both statistical and economic significance and makes the performance of the funds look better.

In a similar way, Sawicki and Ong (2000), apply both unconditional and conditional Jensen's measures, as well as Treynor and Mazuy's market timing model to investigate Australian funds between 1983 and 1995 They find weak evidence of positive performance and negative market timing performance. In consistent to Ferson and Schadt (1996), they confirm the statistical significance of incorporating lagged information variables in the model, in particular with regard to dividend yield. They also confirm that the conditional model shifts the alphas to the right and makes funds look better. Dahlquist (2000) explores Swedish fund performance in broad fund classifications from 1993 to 1997, using a conditional measure. He finds superior performance only for funds in the equity class.

Daniel et al. (1997) use their proposed characteristic-based performance measure to examine more than 2500 US funds over the period 1975-1994. In contrast to the conventional belief that fund managers are unable to outperform the market, they reveal that fund managers have selectivity ability but no timing ability. However, the abnormal performance is relatively small, 0.8% per annum, and close to its management fee. The evidence of abnormal performance is stronger in growth-oriented funds.

Their results are also confirmed by Chen et al. (2000), who examine mutual funds during 1975 to 1995. They conclude that fund managers have selectivity ability. They employ stock held and trading data in mutual funds and reveal that fund managers did not hold outperforming stocks but the stocks which they bought significantly outperformed the stock which they sold by 2% per year. However, selectivity ability vanishes because fund managers usually hold stocks for longer than a year.

In the similar vein, Wermers (2000) decomposes mutual fund performance during 1975 and 1994. He shows that fund managers have stock selectivity skill but style and high expenses fade out any signs of abnormal return. On average, stocks held in the funds outperform the market by 1.3% per year but their net fund return is 1% lower than the market. The differences are attributed to the lower return for the non-stock holding component, 0.7%, and the remaining 1.6% is split between expense ratio and transaction cost.

Kosowski et al. (2006) also find that, over the period 1975-2002, the average net return alpha is around 0.5% below the market benchmark. Nonetheless, among these funds, there are some fund managers who significantly outperform the market. Subsequently, they examine whether the superior performance in some fund managers is due to skill or luck. They employ a bootstrapping technique to analyse their data since they argue that the return alphas of funds are non-normal. Their findings show that abnormal performance in fund managers is not solely due to luck. The top 20% funds earn abnormal return because of managers' skills but this is not enough to cover expenses. In contrast, only the top 5% funds really have positive abnormal performance which are large enough to compensate for their expenses. This evidence is strong for growth-oriented funds.

Using similar measures to Kosowski et al., Cuthbertson et al. (2008) investigate evidence of abnormal return using UK data. In contrast to the US findings, they find that the superior performances of UK funds are due to luck rather than skill.

While most of the writings on performance are focused on equity portfolios, Comer (2006) proposes an investigation into hybrid fund market timing performance. He uses a multi-index model which is incorporated with quadratic variables for stock and bond returns. He reveals little evidence of timing ability over the period 1981-1991 but during the period 1992-2000, he claims that funds exhibit statistically significant timing ability.

As a variety of performance measures have been proposed in the literature and evidence of fund performance is still mixed, it is still not certain which of them provides a valid performance measure and several studies have been conducted to answer this question.

For example, Grinblatt and Titman (1994) investigate the sensitivity of fund performance to the choice of benchmarks and performance measures and also the relationship between fund performance and fund attributes. They use 4 benchmarks and 3 measures to examine 109 passive portfolios which are formed on the basis of stock characteristics and also 279 mutual funds between 1974 and 1984[4]. They find that mutual fund performance is more sensitive to the choice of benchmarks than measurement methods are. The CRSP value-weighted index is the most inefficient benchmark because it admits size-related bias. The P8 index appears to be the most reliable index in this study. In contrast, the choices of performance measure are not sensitive to fund performance since few funds in this study exhibit positive market timing.

Kothari and Warner (2001) also study the properties of performance measures for mutual funds. They employ simulation procedures to simulate funds whose characteristics mimic actual funds and test 5 different performance measures, both regression-based and characteristic-based measures. They find that performance measures are unreliable and have little ability to detect any large magnitude of abnormal performance, in particular funds whose styles are different from the value-weighted benchmark market portfolio.

Fletcher and Forbes (2002) investigate the validity of different benchmarks used to evaluate performance using the U.K. market. They use a similar approach to that of Grinblatt and Titmann (1994), employing passive portfolios, formed on the basis of industry and stock characteristics and 724 UK unit trusts, to test the specification of two performance measures across five different benchmarks. They find that all five benchmarks have some bias. Cahart's (1997) four-factor model has the smallest degree of mispricing, although it does not

[4] The four benchmarks are the CRSP value-weighted, CRSP equally-weighted, 10-Factor (Lehman and Modest, 1988) and P8 (Grinblatt and Titmann, 1988) indices and the three performance measures are Jensen's (1968), Treynor-Mazuy's (1966) and Positive Period Weighting (1989)

fully capture the return on small stocks. Furthermore, it is found that using the conditional model yields similar inferences to the unconditional model.

Otten and Bams (2004) use a different approach in order to explore which model is best suited to measuring mutual fund performance. They employ a step-wise process to examine the added value of additional variables, such as size, book-to-market, momentum, bond index and a vector of information variables. They use a richer dataset than that used in previous studies and analyse the data on both aggregate and style levels. They find that conditional factor models are statistically superior to these unconditional models and that Cahart's four-factor model is the best model to explain mutual fund returns. They conclude that conditional models add strong economic and statistical importance to the performance measurement.

In a nutshell, this section reviews mutual fund performance measures as well as the empirical evidence of mutual fund performance in developed markets over time. It may be concluded that, in developed markets, mutual funds, as a whole, are unable to beat the market although some studies suggest that growth-oriented funds perform better than others. The inferiority in performance is not because fund managers have no ability, but is due mainly to its high transaction costs and expenses. Subsequently, many researchers suggest that investors should invest in passive index funds with low costs. Furthermore, some studies look into performance from the viewpoint of the ability to forecast market direction. Most studies find very little evidence of market timing, or even perverse market timing in mutual fund performance. Evidence from a number of empirical studies exposes the fact that mutual fund performance is sensitive not only to the measurement model but also to the benchmark and data used.

2.3 Persistence in performance

Persistence in performance is another issue which has been widely discussed in the literature. This is because we all want to know whether any sort of performance will be repeated in the future. In other words, we want to know whether choosing funds based on an ex-ante performance measure can earn abnormal returns in the future. Cuthberson et al. (2006) claim that the concept of persistence is different from predictability, in the sense that persistence implies that a winner (loser) will continue to be a winner (loser), meaning that there is only a positive correlation, whereas the concept of predictability allows both positive and negative correlation.

More importantly, the performance persistence issue is also evidence for rejecting market efficiency. In an efficient market, prices change according only to new information, which means that stock prices follow the random walk hypothesis. As a result, if a market is efficient, performance persistence should not exist. However, Grossman and Stiglitz (1980) aruge that the market should not fully reflect all information because if it did there would be no reward for the costly search for new information.

There have been a number of studies so far on persistence in performance. However, most of them investigate persistence in performance as part of the study of mutual fund performance and, more importantly, the evidence in this topic is still mixed. We can classify methods which are widely used in the persistence in the performance literature into four broad groups. These are discussed below.

First, rank correlation: this approach is to split the fund performance into two time periods and then use rank correlation to investigate the relationship between the performance in the two periods. This approach is used in the early studies on persistence. For instance, Sharpe (1966) estimates the Reward-to-Variability ratios for the periods 1944-1953 and 1954-1963. The rank correlation coefficient of the two periods is 0.36. He concludes that past performance can predict future performance, though it is not the best predictor. Blake et al. (1993) use this approach to investigate persistence in bond mutual funds by dividing their 10-year sample into two 5-year periods and three 3-year periods. They find no evidence of predictability using past performance. Nonetheless, the drawback of this approach is that it is crude and unable to investigate performance persistence over a short horizon. Results estimated using this approach could differ on the breakpoint for the two periods. Besides, this approach does not provide any economic meaning in the results.

Second is the Winner-winner/Winner-loser method: this ranks funds based on pre- and post- periods and then measures the association between the two periods (pre- and post-period). Goetzmann and Ibbotson (1994) survey 728 funds over the period 1976-1988. They measure performance using a variety of time periods and performance horizons and put each fund into the category of either winner or loser, based on its median. They show that if a manager outperforms in the first period, he/she is likely to outperform in a subsequent period, which supports the concept of persistence in performance.

Brown and Goetzmann (1995) also employ this approach to analyse performance persistence on a yearly basis from 1976 to 1988. They find that, over 12 year periods, 8 years show evidence of persistence in performance. However, they show that this evidence is more likely due to repeat-losers rather than repeat-winners.

Similarly, Malkiel (1995) tests persistence in performance over the period 1971-1979 by constructing a two-way table presenting a number of winners (losers) which carries over to the year following. The author concludes that there is persistence in performance in most years during the 1970s. Nonetheless, the author notes that this result might be influenced by survivorship bias.

This approach mitigates some drawbacks from the first approach, as it can estimate performance on the thinner periods and the bias due to breakpoint specification is removed. However, some concern regarding economic meaning is still presented.

The third method is regression procedure: persistence in performance can be estimated using a cross-sectional regression procedure which regresses current performance on its lags. Hendricks et al. (1993) estimate the quarterly performance of mutual funds over the period 1976-1988 and employ time-average cross-section regression to examine persistence in performance. They find a positive persistence in performance for four quarters and reversal thereafter. In contrast, Dahlquist et al. (2000) employ a year-fixed effect, controlled for several factors, to estimate persistence in performance in Sweden. They find no evidence of performance persistence.

Fourth, the trading strategy portfolio: this approach mitigates the drawback of the above three approaches allowing for measures of both statistical and economic significance. In order to construct a trading strategy portfolio, first of all, the 'sorting rules' must be established. This includes specifying the sorting criteria and the number of factions. Once the funds are placed in a group according to the trading rules, a portfolio of funds is formed on the basis of either the equal weight or the value weighted method. Then the 'holding period' is specified. Portfolios are held up to the holding period and then rebalanced by repeating the portfolio formation process. This procedure would provide a set of time-series portfolios which can be used to test 'forward-looking' performance. However, a criticism of this approach is the decision for the sorting criteria. This is because funds are heterogeneous in that they contain great variation. Sorting them into narrower groups would help to reduce the variation in fund characteristics but, at the same time it would also reduce the power of the test. Therefore, to apply this approach, researchers need to trade off between the power of the test and the heterogeneity of funds.

Hendricks et al. (1993) employ a trading strategy portfolio to examine the economic significance of the hot hand phenomenon in mutual funds. They sort mutual funds into octile portfolios based on previous net returns ranging from one to eight quarterly periods and estimate the forward-looking performance of each portfolio using a single-factor model with various benchmarks. They conclude that selecting funds based on the past four quarterly returns outperforms the benchmark portfolio, suggesting short-term persistence in performance. They also find that funds which perform well (poorly) will give superior (inferior) performance in the near future, suggesting the "hot hands" ("icy hands") phenomenon. Nonetheless, the authors report that evidence of the "icy hands" phenomenon is stronger than for the "hot hands".

Elton et al. (1996) use a similar approach to investigate the performance of mutual funds over the period 1977-1993, controlling for survivorship bias. Consistent with Hendricks et al., they confirm that there is short-term persistence in mutual fund performance. In addition, when risk-adjusted performance is used to rank funds, they find persistence in performance in both short and long run periods.

Cahart (1997) argues that evidence of the "hot hands" phenomenon is a result of the momentum strategy employed by the fund manager. He surveys equity funds over the period 1962-1993 which are free from survivorship bias and constructs portfolios based on previous returns. Subsequently, he estimates performance using a single-factor model and his proposed four-factor model, which includes an additional factor capturing momentum strategy in fund managers. He shows that common factors in stock return, particular size and momentum, can explain short-term persistence in performance. However, there is still some evidence of persistence among worse performing funds which is still to be explained. Similarly, Daniel et al. (1997) show that when the momentum effect is controlled, the persistence in fund performance disappears.

In the U.K., Blake and Timmermann (1998) employ a large dataset over the period 1972-1995 and use a trading strategy portfolio approach to investigate persistence in performance in the UK. They find some evidence of persistence in performance among the best and worst performing funds.

Instead of the methods in the studies above, Bollen and Busse (2005) consider the daily return data of 230 mutual funds between 1985 and 1995, controlling for survivorship bias, to estimate persistence in mutual fund performance. The authors rank funds quarterly based on past return, constructing decile portfolios to estimate performance using various models. They find short-term persistence in performance even when the momentum factor is included. Nonetheless, performance persistence is short-lived and disappears over time.

2.4 Flow related performance

In the competitive market, it is expected that informed investors will allocate their cash to high performing funds and withdraw their cash from poorly performing funds. Therefore, outperforming funds would expect to receive high cash flows in the subsequent period. Nevertheless, if the fund experiences a great deal of cash flow, the cash position of the portfolio will increase, which results in a lower return in the near future. Finally, the market will reach equilibrium. Thus, according to this equilibrium process, the study of investment flow related performance can be viewed from two separate standpoints: first, looking at the relationship between performance and subsequent flows; and, second, looking at the relationship between performance and the lagged flows. These two situations can be examined using two common approaches; trading strategy portfolio or a cross-section regression approach.

2.4.1 Future flows and performance

If investors are rational and well informed, they will assign their money to high performing funds, but not if they are not. Therefore, one would expect to see a positive relationship between past return and future cash flows. Capon et al. (1996) survey over 3000 investors in the US using both questionnaires and telephone interviews. They reveal that financial performance is the primary factor in investment decisions, although other non-performance factors are also considered. Ippolito (1992) observes investor reaction to the signals of quality in mutual funds. 143 mutual funds over the period 1965-1984 are analysed, using a pooled cross-section regression model. He shows that investors move their money toward good performers and away from poor performers. Investors, however, react disproportionately in that they respond more strongly to well performing funds than to poorly performing funds.

Sirri and Tufano (1998) examine the relationship between performance and flows as well as the implications of the costly search for mutual fund flows. They examine a large dataset of mutual funds over the period 1971-1990. In the first part of their study, they employ a cross-section time-series regression to examine relationships. They reveal asymmetric purchasing decisions based on past performance information. Investors invest in the funds which perform well in the past and flee from poorly performing funds. Moreover, they find that investors prefer funds which are small, less risky and charge lower fees.

Furthermore, Del Guercio and Tkac (2002), Lynch and Musto (2003), Berk and Green (2004), Elton et al. (2004), Bollen (2007), Huang et al. (2007) also find that flows move into and out of funds in response to past performance. Most of these studies also confirm the convex relationship between flows and past performance.

In contrast, Warther (1995) studies the relationship between fund flows and returns at the macro level. The author divides fund flows into anticipated and unanticipated flows. The study finds that no relation exists between flows and lagged returns. However, returns are correlated with unexpected cash flows but unrelated to expected flows, which supports the view that there is a positive relation between flows and subsequent returns.

Outside the US, Sawicki (2001) examines performance and flow in Australia. She uses cross-section regression to estimate the relationship between flows and past performance controlling for size-, style- and year-effect. Her findings are consistent with the US finding that investors respond to past performance. However, results reveal that small and young funds influence the asymmetry effect on the relationship between performance and flow.

2.4.2 Past flows and performance

Flows could have a negative relation to performance in the subsequent period because, when large amounts of cash flow into the portfolio, fund managers are unable to adjust their portfolio immediately and this subsequently results in a lowering of mutual fund returns. Edelen (1999) investigates the relation of flows to mutual fund performance. In his study, he argues that mutual funds managers are engaged with liquidity-motivated trading which causes the lowering in performance of mutual funds and also of the market timing ability of fund managers. He samples 166 funds from 1985 to 1990 in order to investigate this hypothesis. He finds that funds statistically perform 1.6% lower than the market benchmark per year. However, once the effect of liquidity-motivated trading is controlled, performance become statistically insignificant, at -0.2% per year, and the evidence of perverse market timing is removed.

Nonetheless, Benson and Faff (2006) analyse the relevance of flows in performance evaluation, using Australian international equity funds during the 1990s and considering both flows relative to fund size and flows relative to sector flows. They point out that only flows relative to sector flows reduce the perverse negative timing in funds and these have no impact on abnormal returns.

In contrast, many studies document the opposite finding; that is, the positive relation between flows and the subsequent returns. Gruber (1996) explores the reason why there is still growth in the mutual fund industry even though much evidence indicates that fund managers do not add value. He investigates the returns on newly invested money in 227 mutual funds over the period 1985-1994. He shows that the average return on new cash flows is higher than the average return of all funds. He suggests that this is the "smart money effect", referring to investors' ability to select outperforming funds.

Zheng (1999) extends Gruber's study by investigating a large mutual fund sample between 1970 and 1993. He employs a benchmark-free performance measure, as proposed by Grinblatt and Titmann (1993), as well as the trading strategies approach. The author reveals that funds with new cash inflows perform better than funds with cash outflows in the subsequent period. However, the smart money effect is a short-lived phenomenon and investors cannot beat the market by investing in funds with high cash flows except in small funds. In addition, he concludes that this effect is not due to style or macroeconomic information but rather explained by fund specific information.

. Similarly, Sapp and Tiwari (2004) argue that the previous studies by Gruber and Zheng take momentum anomaly into account. Thus, they investigate whether the smart model effect can be explained by momentum strategy. They employ Cahart's four-factor model to control for the momentum phenomenon and examine funds for the period 1970-2000, using trading strategies and cross-section regression methods. Using a model without controlling for momentum, they find evidence of the smart money effect. However, the evidence disappears when the stock return momentum is controlled. They also use cross section regression to examine whether this is because an investor has the ability to identify momentum funds or simply chases past returns. The authors indicate that investors are naïve and are responding only to past returns.

Outside the U.S., Gharghori et al. (2007) examine whether the smart money effect exists in the Australian market. They survey 239 equity funds over the period 1990-2004 to construct trading strategy portfolios. Subsequently, they investigate the performance of these trading strategies portfolios using Jensen's single-factor, Fama and French's three-factor and Cahart's four-factor measures and allowing for time variation in risk exposures. They reveal that there is a smart money effect in Australia even when the momentum effect is controlled. Moreover, using cross-section regression, their results indicate that investors select funds on the basis of past performance rather than funds which use momentum strategy.

Keswani and Stolin (2008) investigate the smart money effect using UK data. They employ a more comprehensive dataset than previous studies do. Their data cover the period 1991-1999 and contain exact cash inflow and outflow information for both individual and institutional investors. They confirm that both individual and institutional investors are smart, although this is revealed by the cash inflows rather than the cash outflows of the funds.

2.5 Style Analysis

Mutual fund style helps investors to select funds based on their risk preference. The appropriate style enables an investor to effectively diversify. In the performance evaluation aspect, mutual fund style also allows us to identify the appropriate benchmark. Moreover, numerous studies find that the performance of funds varies across mutual fund styles. Therefore, mutual fund style is important only in the selection process of mutual funds. In general, mutual funds state their investment objectives in the prospectus, but only in a vague manner. Studies reveal that some funds do not follow their style objectives and change their style in order to make their performance look better. Nonetheless, in the major markets, there are some investment service companies, such as Morningstar and Lipper, which provide style classification information.

In classifying mutual fund style, there are two broad methods: the holdings-based method and the returns-based method. The holding-based method classifies funds on the basis of their holding characteristics. This method is widely used among practitioners. The main drawback of this method is that it needs to indicate the boundaries in differentiating characteristics which may not be clear. Furthermore, the results can be biased, due to window-dressing (Cuthbertson et al., 2006). The most common use of this approach is to investigate the characteristics of stocks contained in the fund. Morningstar, Inc. implements this approach to construct their style box classification. In their style box, funds are classified into 9 groups in the basis of size (large, medium, small) and style (value, blend, growth) based on the investment-weighted scores of the stocks held in the funds.

Alternatively, a returns-based classification style can be used for style analysis. This approach investigates the style of a mutual fund indirectly from its return. The advantage of this method is that the model is parsimonious, and simple to use. The simplest way to investigate this is to use the coefficients of factor loadings in the multifactor models, such as the Fama and French three-factor model, to investigate mutual fund style.

The key study in style analysis using the return-based approach was conducted by Sharpe (1992). The study advocates the 'asset class factor model', which divides the return of a portfolio into style and selection components. Sharpe uses the returns of twelve broad asset classes (constituting both stock and bond, both domestic and international markets) to form an asset class factor model and applies them to particular US mutual funds. His asset class factor model is defined by:

$$\tilde{R}_p = [\beta_{p1}\tilde{F}_1 + \beta_{p2}\tilde{F}_2 + ... + \beta_{pn}\tilde{F}_n] + \tilde{\varepsilon}_p \tag{2.6}$$

Given: $0 \leq \tilde{\beta}_{pn} \leq 1$

and: $\sum_{p=1}^{n} \tilde{\beta}_{pn} = 1$

where $\tilde{R}_p$ is the return on asset p, $\tilde{F}_n$ is the return on asset class n, β_n is the sensitivity of $\tilde{R}_p$ to factor $\tilde{R}_p$ and $\tilde{\varepsilon}_p$ is the non-factor component of the return on asset p.

Unlike ordinary regression, this regression follows a quadratic programming algorithm which requires constraints to the regression, given that all coefficients are non-negative and summed equal to one. It is possible to interpret coefficients as an asset class weighting.

The sum of the terms in the bracket represents the return generated from the style portfolio and the random error term ($\tilde{\varepsilon}_p$), which means that the returns which are not explained by the portfolio benchmark represent the value-added return generated from the portfolio manager's selection.

Sharpe's asset class factor model can be used not only in a portfolio's style analysis but also for performance evaluation (see Christopherson, 1997; diBartolomeo and Witkowski, 1997; Bogle, 1998; Buetow et al., 2000; Karatepe and Gokgoz, 2006). Nevertheless, Le Sourd (2007) point out two major drawbacks of Sharpe's asset class factor models. These are, first, that using a quadratic programming algorithm could distort the results of standard regression because some standard properties are unsatisfied and, second, that the abnormal return generated from this model does not have a risk-adjusted basis.

2.6 Empirical studies on emerging markets

The term 'emerging markets' was first introduced by the World Bank in the 1980s and defined as countries which are in the transition from developing to developed economies. More recently, the study of emerging markets has become more controversial and a number of studies reveal several differences between them and developed markets. Harvey (1995) claims that emerging markets exhibit high volatility and low correlation with developed markets. However, the standard asset pricing model fails to explain cross-section returns in this market, since emerging markets are not integrated with the world economy and there is a time variation in risk exposure. Bekaert and Harvey (2002, 2003) also argue that emerging markets are inefficient. Emerging markets usually suffer from infrequent trading; high transaction cost; and abnormal distribution of returns.

In addition, some researchers investigate the stock selection strategies in emerging markets and reveal that stock returns in emerging markets are predictable owing to certain fundamental characteristics. Claessens et al. (1995) investigate cross-section returns in 19 developing markets over the period 1986-1993 using several variables including, market returns, earning-to-price, price-to-book value, size, dividend, turnover, and exchange rate. They reveal that, in addition to market risk, firm size and turnover have explanatory power in stock returns in many countries, although the signs are reversed in the evidence from the US.

Conversely, Fama and French (1998) argue that the results in Claessens et al. are due to the sensitivity to outliers. They examine the value and growth premium in 16 emerging markets for 1987-1995. They reveal that the evidence from developed markets is inconsistent with the value and size premium in emerging markets. Nonetheless, they point to the unreliability of their results, since the sample period is short and the returns are highly volatile. Using a longer sample period, Rouwenhorst (1999) examines the return factors in 20 emerging markets over the period 1982-1997. In comparison to Fama and French, he concludes that return factors in emerging markets are similar to those in the US and in developed markets in that they exhibit momentum and small and value premium. Similarly, van der Hart et al. (2003) survey 32 emerging markets. They argue that stock returns can be explained by value, momentum and earning revisions but not for size, liquidity and mean reversion. Nonetheless, Griffin et al. (2003), examining momentum strategy in 39 markets, show evidence of momentum strategy among Asian markets.

In addition, some studies investigate the return factors in some specific emerging markets. For instance, Drew and Veeraraghanvan (2002) find a size and value premium in Malaysia; and Brown et al. (2008) reveal a momentum and a value premium in Hong Kong and Singapore, respectively.

In the mutual fund literature, in contrast to the extensive evidence from developed markets, studies in emerging market are scarce. Details of the empirical evidence in emerging markets are chronologically presented in Table 2.2 and its main details are described below.

For his PhD thesis Elsiefy (2001) investigates the risk and return characteristics of 7 equity funds in Egyptian markets over the period 1996-1999. He employs several performance measures, including the CAPM-based models; market timing models; and Fama's decomposition of returns (Fama, 1972). He reveals that over the period of his study Egyptian funds do not outperform the market. However, the number of underperforming funds is different for different measures used in the evaluation. Funds do not diversify and therefore he suggests that using total risk is more appropriate in the Egyptian context. In addition, he shows that performance does not change with the market conditions.

Roy and Deb (2003) take 89 Indian mutual funds over 4 years, 1999-2003 and examine the importance of using a conditional performance model which allows time-varying according to the economic conditions. They evaluate mutual fund performance and market timing models, using both unconditional and conditional single-factor models. Their conditional model includes 5 lagged information variables, namely, t-bill, dividend yield, the term structure of interest rates, a dummy variable for the month of April and a dummy variable for the tech rally. Inconsistently with the evidence from the US, their results suggest that, as a whole, Indian mutual funds are unable to beat the market. The conditional version makes funds look better and evidence of negative market timing is not present.

Soo-Wah (2007) explores 40 Malaysian funds over the period 1996-2000 using single-factor and market timing models. He also tests for benchmark sensitivity by employing two choices of benchmark: KLCI and the EMAS index. He finds inferior performance and poor market timing in these Malaysian funds. However, the choice of benchmark does not impact on performance evaluation, which contradicts the findings in developed markets (e.g. Grinblatt and Titman, 1994). Similarly, Fauziah Md and Mansor (2007) study mutual fund performance in Malaysia, using a longer sample period (1991-2001) than Soo-Wah used in his study; they employ the measures of Sharpe, Jensen and Treynor. Unlike Soo-Wah, they reveal that funds perform below the market and find no evidence of persistence in performance.

Another study in Malaysia was conducted by Fikriyah et al. (2007). These writers observe the difference in performance between conventional and Islamic funds over the period 1992-2001. Their sample is 65 funds, including 14 Islamic funds. Like the studies above, they employ standard measures, including the Sharpe, Jensen and Market timing models. Subsequently, they reveal that Islamic funds are less risky than conventional funds and perform better in bearish market conditions. Conversely, in bullish market conditions, conventional funds seem to perform better.

In the Thai market, as far as is known, only a few studies in fund performance have been published, some being in the form of scholars' dissertations. Results from these studies are, for example, those of Plabplatern (1997), who uses the portfolio holdings method to investigate the performance of Thai mutual funds from 1993 to 1997. He uses the quarterly data of 63 closed end funds. All funds have superior performance and half of them bear evidence of market timing. In contrast, Sakranan (1998), who uses a similar approach and time period, 1995-1997, to examine mutual fund performance, draws a different conclusion: that only 2 out of 98 funds show selectivity skills. Pornchaiya (2000) uses Jensen's single-factor measure to explore 77 funds over the period 1996-1999. He reveals that only two funds have superior performance, which is inconsistent with the two Thai studies listed above.

Vongniphon (2002) studies return and risk in 18 equity funds, using a longer and more up-to-date sample, from 1994 to 2000. He employs Sharpe and Treynor measures and also confirms the inferior performance of these funds. Likewise, Jenwikai (2005) uses Sharpe and Treynor measures to compare the performance of 62 equity funds to his self-constructed buy-and-hold portfolios. He reveals that equity funds perform worse than portfolios with buy-and-hold strategy.

The most recent and extensive research in mutual fund performance in Thailand is Nitibhon's (2004) dissertation. He considers 114 equity funds in Thailand from 2000 to 2004 and investigates performance using various methods including: Jensen's alpha (1968), Cahart's 4-factor model (1996), Ferson and Schadt's conditional model (1996) and Daniel's characteristic-based performance measures (1997). He reveals that Thai mutual funds perform better than the market but not enough to generate statistically abnormal returns. However, he reveals that using a conditional approach creates fairly similar results to those obtained from using unconditional models, which is inconsistent with the conclusions of Roy and Deb (2003), who examine funds in India,

Furthermore, there are some researchers who concentrate their studies solely on market timing performance, for example Srisuchart (2001) and Chunhachinda and Tangprasert (2004), who explore timing ability in the Thai mutual funds. Srisuchart explores equity and bond funds in the 1990s and Chunhachinda and Tangprasert examine 65 equity funds over 2001-2003. Both of these studies yield the same conclusion: that Thai equity fund managers have market timing ability. These results are also comparable to those of Khanthavit (2001), who employs an alternative technique in examining market timing ability in Thai closed end funds in the 1990s. He uses a Markov-switching technique and reveals that fund managers exhibit both selectivity and market timing abilities, although overall performance is not significant. However, these find managers tend to use their market timing ability when the market is up and their selectivity ability when the market is down.

Nonetheless, issues outside mutual fund performance evaluation have received less attention. Fauziah Md and Mansor (2007) look at the issue of persistence in performance in the Malaysian context as part of their study of mutual fund performance. They estimate performance annually over the period 1991-2001 and examine the correlation between past and current performance. They do not find persistence in performance for mutual funds in Malaysia. However, this contrasts with the evidence in Thailand. Watcharanaka (2003) reveals persistence in performance in Thai mutual funds over the period 1992-2002, using a cross-section regression approach in examining 62 funds. Nitibhon (2004) also examines persistence in performance for the Thai mutual funds. In his study, he constructs decile portfolios on the basis of past year returns and estimates performance using unconditional and conditional single-factor models. He reveals that only the top decile portfolios (high past returns) show significant positive performance.

Some studies explore mutual fund style in relation to performance. These include: Ferruz and Ortiz (2005), who investigate whether Indian mutual funds correspond to their classification. They employ factor analysis and cluster analysis and conclude that funds are very close to one another. Similarly, Acharya and Sidana (2007) employ cluster analysis to mutual funds in India over the period 2002-2006 and reveal the inconsistency between investment style and the returns obtained by mutual funds. In Malaysia, Lau (2007) applies Sharpe factor analysis to 43 funds over the period 1996-2000. He reveals that funds which contain large and high liquidity stocks perform better than others.

Regarding the factors related to fund performance in Thailand, Prasomsak (2001) investigates 77 mutual funds over the period 1998-2000, using fixed-effect regression of fund raw returns on market returns size, turnover and fund style. He claims that fund returns are positively correlated with market returns but negatively related to fund size and turnover. This finding is in contrast to the findings of Nitibhon (2004), who employs cross-section analysis and regress fund performance on size, value and growth factors. He reveals that fund returns are positively related to size and growth stocks.

In addition, the evidence from Taiwan suggests that large funds perform better than small funds (Shu et al., 2002). Tng Cheong (2007) explores the effect of fund size and expenses on mutual fund performance in Singapore over the period 1999-2004. He reveals that large funds perform insignificantly better than small funds and there is no difference in fund returns between high and low expenses funds.

A study in the flows of mutual funds was conducted by Shu et al. (2002). They investigate the investment flows of mutual funds in Taiwan over the period 1996-1990 and reveal the difference of behaviour between small- and large-amount investors. Both small- and large-amount investors tend to buy funds on the basis of short-term performance. However, large-amount investors are more rational and redeem funds on the basis of performance. In Thailand, Nitibhon (2004) estimates mutual fund flows of decile portfolios rank on the basis of the past year's returns. He claims that flows are not induced by the prior year return and suggests no evidence of a smart money effect in Thai mutual funds.

Reviewing the evidence from the emerging markets makes it clear that: first, mutual fund literature in this region concentrates mainly on performance evaluation. With various techniques and different samples, most of these studies claim no abnormal returns in mutual fund performance. Nevertheless, because these studies tend to use a small number of funds and survey a short sample period, their results are still questionable. This is also because, as mentioned above, emerging markets are highly volatile and there is a certain amount of evidence of structural breaks.

Second, the evidence suggests that emerging markets are inefficient and display several characteristics which distinguish them from to developed markets. In addition, there are other factors outside the market risk which have explanatory in stock returns, for example, size, value and momentum premium. Nevertheless, mutual fund studies in emerging markets mostly employ standard CAPM-based measures, such as the Sharpe ratio and Jensen's alpha and none of these studies take these effects into consideration.

Third, we know very little about other issues related to mutual fund performance. Evidence on persistence and flows, as well as other factors related to performance, is relatively small and still mixed.

2.7 Conclusions and suggestions for further research

To summarise, this chapter surveys several issues related to mutual fund performance which have been discussed in the literature. Topics connected with fund performance have been greatly extended in the past few decades. Many researchers have advocated a variety of performance measures as well as performance-related issues, in order to gain insightful information about fund performance. However, the results are still mixed. This is partly because of the differences in settings and study periods.

Most of the studies in mutual funds are central to investigating whether fund managers are able to give value added to investors. With regard to the measure used, one can conclude that fund managers do not offer abnormal returns, due to their fees and expenses. Nonetheless, more recent studies have altered their research to identify and predict outperforming funds by looking at their characteristics. The evidence suggests that funds in one particular style can perform better than those in others. Similarly, a number of characteristics, such as past returns, fees and expenses, and fund flows show evidence that style has the power to explain fund performance.

Unlike the markets in developed countries, the emerging markets have attracted little research in this area. While mutual fund performance in developed markets has been comprehensively investigated by means of varied and sophisticated measures, studies in emerging markets are still scarce and questionable. This is because the unique characteristics of emerging markets are ignored. These studies unhesitatingly employ techniques derived from the developed markets to estimate the performance in emerging markets. Further, studies in the emerging markets rely mainly on the principal approaches, which retain some limitations. To give an example, these measures are based on only one risk factor and the risk factor given is fixed through the evaluation period, which incurs some critiques of being negatively biased as regards portfolio performance, notably when a manager employs dynamic strategy. In addition, mutual fund studies in emerging markets usually survey short periods and cover only a small number of funds. More importantly, these studies primarily pay attention to performance itself, without looking at other aspects of fund performance, for example, style analysis, persistence, fund flows and the other determinants of performance. Consequently, all the above problems prevent us from fully understanding the mutual fund business in emerging markets and hence many puzzles still remained unsolved.

Thus, on the basis of the foregoing survey in the theory and evidence relating to mutual fund performance, the present study puts forward three main promising research ideas. First, there is a need to apply richer models in the literature to countries in the emerging market which have different characteristics from developed markets, and to examine whether the models and findings in developed market are comparable. Second, the liquidity effect is one of the major concerns in emerging markets which needs further investigation, while performance models for mutual funds in emerging markets also need to be developed. Third, factors related to performance need to be investigated further.

Table 2.1 Summary of main theories and empirical studies related in mutual fund performance in developed markets

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Sharpe (1966)	Extend Treynor's work and propose the Reward-to-Variability ratio (R/V).	34 US mutual funds 1954-1963	Treynor and R/V (Sharpe) ratios to examine performance. Rank correlation between two periods (1944-53 and 1954-63) for persistence in performance.	This study proposes a new performance measure and shows that the theoretical measure can apply to the practice. The difference in performance is due solely to differences in investment objectives which support the view of market efficient. Past performance partly explains future performance.
Treynor and Mazuy (1966)	Propose a model for measuring market timing ability (TM) and empirically investigate whether fund manager have the ability to anticipate major turns in the stock market	57 US mutual funds (Growth and Balanced funds) 1953-1962	TM market timing model	No statistically evidence that funds managers have successfully outguessed the market.
Jensen (1968)	Propose single-index measure (Jensen) to evaluate performance	115 US mutual funds 1945-1964	Jensen measure	Funds, on average, are unable to outperform the market benchmark even before deducting fee and expenses. At fund level, only 3 funds statistically outperformed the market.
Ippolito (1989)	Test for market efficiency and evaluate the overall efficiency the mutual fund industry	143 US mutual funds 1965-1984	Jensen measure to evaluate performance and pool cross-section time-series regression to	Using net of fee returns data, mutual funds returns are comparable to index funds referring to the presence of costly information. Portfolio

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			investigate impact of turnover, expenses and fees on performance.	turnover and management fee are unrelated to fund performance.
Grinblatt and Titman (1989)	Compare returns of active and passive funds using quarterly holdings data.	US mutual funds 1975 – 1985 Use two types of returns: actual returns (net of transaction costs) and gross returns (with transaction costs). The gross returns are constructed using quarterly data of portfolio holdings	The study estimate performance using Jensen measures with 4 sets of benchmark portfolios: (1) CRSP equal weighted (2) CRSP value weighted (3) F10 (Lehman and Modest, 1988) (4) P8 portfolios based on size, yield and past returns (Grinblatt and Titman, 1988)	Mutual funds display significant positive abnormal return when using gross returns, especially in aggressive-growth, growth and small funds. However, the superior performance is diminished when actual returns are used. Transaction costs are negatively related to fund size. Using gross return, performance is negatively to fund size. Survivorship bias in mutual fund performance is small (>0.5% pa)
Cumby and Glen (1990)	Evaluate performance of international funds	15 US international funds 1982-1988	Jensen and Positive Period Weighting	No abnormal returns. Only 3 funds have positive performance.
Sharpe (1992)	Propose a technique to determine mutual fund styles and performance	395 US funds 1985-1989	Use 12 asset classes and employ quadratic programming regression, which constrains the coefficients summed to 1 and each coefficient is lie between 0 and 1	Asset class factor model can help investment process by providing a view of investment decision and fund manager strategy.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Ippolito (1992)	Evaluate consumer reactions to signals of quality in the market for investment management	143 US mutual funds 1965-1984	Pooled regression and fixed effect of growth on past performance residuals	Investors react disproportionately. They move money in the industry toward good performers and away from poor performers
Fama and French (1993)	Examine factors to predict return of stock and bonds. (Fama-French 3-factor model: FF)	Stock returns in NYSE, AMEX, NASDAQ 1963-1991	Construct 25 mimicking portfolios based on size and book-to-market (B/M). Regress bond and stock factors of the mimicking portfolios	At least 3 stock market factors (market risk, size, B/M) and 2 bond market factors (maturity and default risk) can explain stock returns. Stocks have shared variation due to stock market factors and linked to bond returns through share variation on bond factor.
Grinblatt and Titman (1993)	Propose new performance measure and apply to study of mutual fund performance	155 US mutual funds 1975 – 1985	Introduce a new performance measure. The measure does not require benchmark but use portfolio holding information instead. The author then compare results of this measure to Jensen with 4 sets of benchmark: 1. CRSP equal weighted 2. CRSP value weighted 3. F10 (Lehman&Modest,1988) 4. P8 (Grinblatt&Titman,1988)	Results from this measure are similar to Jensen measure with P8 benchmark portfolio. In general, mutual funds have positive performance, especially in aggressive growth funds. There is also some evidence of persistency, particular among positive abnormal returns funds.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Grinblatt and Titman (1994)	Sensitivity of performance techniques to benchmark choices and the determinants of mutual fund performance	279 US mutual funds 1974-1984 And 109 self- constructed passive portfolios based industries and characteristics	3 performance measures; Jensen, PPW, TM with 4 set of benchmarks: 1. CRSP equal weighted 2. CRSP value weighted 3. F10 (Lehman&Modest,1988) 4. P8 (Grinblatt&Titman,1988) Cross-section regression is used to examine determinants of mutual fund performance.	Mutual fund performance is more sensitive to benchmarks than choice of measures. Inefficient benchmark leads to unbiased performance estimation. Among 4 benchmarks, CRSP value weight is the highest inefficient whereas P8 is the most reliable. The 3 measures display high cross-sectional correlation. This is due to funds have no timing ability and all 3 measure yield similar conclusion for fund performance. Using P8 benchmark, performance of mutual fund is undistinguished from zero. Very few funds have positive timing ability. Fund performance is positively related to portfolio turnover but not to size or to expenses.
Malkiel (1995)	Investigate performance, survivorship bias and performance persistence	239 mutual funds 1971-1991	Employ Jensen measure with 2 benchmarks for mutual fund performance. For persistence in performance, the author divide sample into two sub-periods as well as employ simulation of strategies.	Mutual funds insignificantly underperform the benchmark portfolio for both before and after expenses are included. Performance is negatively related to expense ratio. Performance persistence is existed during 1970s. Impact of the survivorship bias is more important than previous studies.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Fletcher (1995)	Evaluate selectivity and market timing performance	65 UK unit trusts 1980 – 1989	TM and HM market timing measures with four sets of benchmark portfolio.	UK trusts exhibit positive selectivity performance and negative timing performance across all benchmarks. Performance is sensitive to the choice of benchmarks.
Ferson and Schadt (1996)	Propose a conditional model which incorporate information variables	67 US mutual funds 1968-1990	Incorporate five lagged time varying information variables into Jensen, Four-Factor, TM and HM market timing.	The conditional model shifts funds to the right and become neutral. Time varying information variables are statistically and economically significant. There is an evidence of persistence in performance on the extreme performing mutual funds.
Ferson and Warther (1996)	Evaluate performance using the conditional performance	63 US mutual funds 1968-1990	Conditional version of Jensen and TM market timing models. The time varying variables are dividend yield and T-bills.	Using unconditional version, 60% of funds have negative performance and 60% of funds have negative market timing.The buy-and-hold portfolio also has statistically significant negative market timing which implying to the model misspecification. Using conditional model, alphas are centered near zero and the interaction variables are significant. The misspecification in market timing is also disappeared.
Elton et al. (1996)	Examines mutual fund predictability	188 US mutual funds 1977-1993	Use four-index model to evaluate performance and construct decile portfolios of funds formed based on	Past performance can predict future risk-adjusted performance for both short- and long-run. Poor performance funds are due to the

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			1- and 3-year past performance.	high expenses. Successful funds increase their revenue by increasing their size, not expenses.
Capon et al. (1996)	Investigate fund characteristics which are perceived as relevant for mutual fund investors' investment decision	3,000 US investors in 1991	Survey method: telephone interview 3,000 investors in the U.S. The survey focuses on 3 set of variables: information sources, selection criteria and purchase. Then, cluster analysis is used to analyse set of groups based on the use of information sources and selection criteria and examine mutual fund behaviour across the groups.	Most mutual funds investors are naïve and uninformed about their mutual fund investment. Although financial performance is the main factor for investment decision, investors also consider non-performance related variables (multi-attribute). Very small group of investors are defined as a knowledgeable investor.
Ciccotello (1996)	Relationship of size and mutual fund performance	US Equity funds 1982-1992	Rank funds into quintile on the basis of size and examine 5- and 10-year returns	Historical returns of large funds are superior to small funds. Only evidence from aggressive growth funds that size can explain fund return. Performance is decline with fund size.
Carhart (1997)	Explain persistence of mutual fund by stock common factors and investment costs	US Equity funds 1962-1993	Trading strategies: form 10 deciles portfolios based on past year reported returns and	Short-term persistence in equity mutual funds is explained by stock returns common factors (the use of momentum strategy) and investment

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			evaluate performance using Jensen measure and his proposed 4-factor model (Cahart) which include momentum factor in addition to the FF model.	costs. Therefore, no skilled of informed fund managers in the fund market.
Kothari and Warner (1997)	Empirical properties of performance measure	Construct 50 Random portfolios each month from 1964-1991	Use several measures including: Sharpe, Jensen, Treynor, Appraisal ratio FF and market timing models, and Track performance over 3-year periods.	Benchmark can lead to model misspecification. FF model is better than Jensen model
Lawrence et al. (1997)	Assess asset selection and timing abilities of portfolio managers	130 Canadian funds 1981-1988	Conditional APT model with time-varying risk premia and observable macroeconomic factors	Performance is negative and time varying beta increase values of the performance. Many funds exhibit dynamic behaviour
Cai et al. (1997)	Comprehensive study of Japanese mutual funds	1,151 Japanese funds 1978 - 1992	Employ Jensen, PPW and FF using both unconditional and conditional measures. Analyse at funds and portfolio levels.	Funds underperform the benchmarks by 3.6%-10.8% and fund managers tend to invest more in large and low B/M ratio stocks. FF benchmark is the most appropriate measure although the conclusion is robust to the methodologies and benchmarks used. The underperforming may be explained by the tax dilution effected caused by inflows of funds.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Daniel et al. (1997)	Develop and apply a new measure of mutual fund performance (DGTW: Characteristic-based benchmark)	UK funds 1975-1994	Develop the characteristic-based benchmark to measure fund performance (DGTW measure). The measure constructs 125 benchmarks based on size, b/m and past return; and matches them with portfolio holding of funds. The DGTW measure decomposes funds returns into 3 componemts: characteristic style (CS), characteristic timing (CT) and average style (AS)	The measure gives more insight details in performance and it is useful for funds which change their styles through time. They apply the measure to the US funds over the period 1975-1994 and reveal that aggressive and growth funds have selectivity ability but not characteristic timing ability.
Detzel and Robert (1998)	Examine whether style boxes of the Morningstar classification as useful in determining a mutual fund's size and style equity class	All US equity mutual funds classified by Morningstar 1993-2004	Estimate funds using 4-factor model, rank and sort funds into 9 portfolios. Then estimate a prediction model by regress return of funds on dummy variables of future equity classes.	Both Morningstar style and size/style class do not predict mutual fund future returns. Growth funds are more stable than value and blend funds. Large-cap funds are more stable than mid and small cap funds. Fund managers are more likely to change their style and fund classification drift considerably. As a result, active fund investors need to monitor their portfolio regularly.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Blake and Timmermann (1998)	Performance of UK unit trust manager and investigate evidence of the survivorship bias	2300 UK funds (survived and dead) 1972-1995	Multi-index model which include 3 variables: T-bills, bond, and dividend yield, both unconditional and conditional versions	UK unit trusts underperform the market by 1.8% pa. Results on unconditional are very similar to conditional model. Mutual fund performance varies across different asset categories. There is also evidence of persistence in performance and survivourship bias. Unit trusts outperform during their first year of existence and underperform when it closes to its termination date.
Sirri and Tufano (1998)	Examine performance and flows relationship and the implication of costly search for mutual fund flows	690 US mutual funds 1971-1990	Cross-section time-series regression, flows are regressed on past return, risk, and expenses, controlled for size and sectoral flows. Quintile portfolios are constructed to examine the different relationship across different performance level. Costly search is measured by size of family, marketing expenditure, and media coverage are included in the model to investigate implication of search cost	Consumers are asymmetrically based their purchase decision on prior performance information. They invest in funds that perform well in the prior period and flee from poor performing funds on the different rate. Consumers prefer funds with lower fees, less risk and small funds. Flows are also related to sectoral flows. They predict that, according to search cost, consumers would purchase funds that are easier or less costly for them to identify. They use 3 measure of cost to check this hypothesis and find that funds in

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			for fund flows	larger family grow more quickly but they are unable to observe that these funds have stronger performance-flow relationship. Funds that charge higher fee grow more slowly and there is a strong positive relationship of fee and performance (marketing effects performance) and, finally, they can't detect relationship of media and flows, as well as the spill-over effect.
Zheng (1999)	Investigate investors' ability in forecasting mutual fund performance (Smart money)	1,826 US mutual funds 1970-1993	PPW and Trading strategies methods; The trading strategy is conducted by forming portfolios according to money flows and measure performance using raw return, excess return, Jensen, and FF measures for both unconditional and conditional versions.	The study confirms smart money effect but only for short-term period and this effect reverses after 30 months. In small funds sample, funds with positive net cash flows outperform the market in the subsequently period.
Edelen (1999)	Relation between fund's risk-adjusted return and volume of liquidity-motivated trading (flows)	166 US mutual funds 1985-1990	Cross-section regression of abnormal returns as a function of cash in/out flows	Inferior performing and negative market timing are due to the cost of liquidity-motivated trading. Mutual funds underperform 1.6% per year (statistically significant) but after controlling for the effects of flow-

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
				related liquidity trading, average alpha reduces insignificantly to -0.2%
Dahlquist et al. (2000)	Study the relation between fund performance and fund attributes in Swedish market	Swedish mutual funds: 80 general equity funds 46 public savings equity funds 42 bond funds 42 money market funds 1993-1997	Jensen measure (unconditional and conditional versions) and Cross section analysis of alphas and fund attributes (size, fees, turnover, commission, flows, lagged performance)	Conditional model suggests that performance of regular equity is insignificantly positive. Equity funds with public savings, money and bond funds perform less well. Larger equity funds and high fee funds perform less well. Larger bond funds perform better. Active funds perform better than passive equity funds. There is a positive relation between lagged performance and current flows. There is an evidence of persistence in performance in money market funds.
Wermers (2000)	Examine whether fund managers have ability to select outperforming stocks that justify trading costs and expenses	US funds 1975-1994	DGTW and decompose fund returns and costs into several components using data in portfolio holding, fund’s expenses and turnover ratio	Funds hold stocks that outperform the market by 1.3% pa (0.7% of this figure is due to fund managers’ skill) but they underperform the market by 1% pa on the net return basis. The differences are attributed to the non-stock holdings 0.7% and cost/expenses 1.6%.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Sawicki and Ong (2000)	Examine performance of managed funds in Australia using conditional model	97 Australian balanced and equity funds 1983-1995	Use Jensen and TM measures, and incorporate with lagged information variable. Compare different of performance and persistence across fund type.	At all fund level, both models show insignificantly positive performance and evidence of the negative market timing. There are more superior funds than inferior funds. Conditional model shifts alphas to the right and makes funds look better. Dividend yield exhibits a statistically significant variable. Little evidence of persistence in performance.
Kothari and Warner (2001)	Study ability to detect abnormal performance of performance measures	50 Random selected equity mutual funds in 1996 and form simulated portfolios whose characteristics mimic actual funds.	Simulation procedure: The simulated funds contain 75 stocks each month from January 1966-December 1994, total 348 simulated funds. Portfolios are reformed annually. Use 5 models: Jensen, FF, Cahart and 2 characteristic-based measures, and examine distributional properties of performance measures	Mutual fund performance measures are reliable and have little ability to detect economically large magnitude, especially for a fund whose style characteristics differ from value-weighted market portfolio.
Sawicki (2001)	Examine investor response to past performance in the Australian wholesale funds market	55 Australian Balanced wholesale funds 1980-1995	Reclassify funds into three categories based on equity exposure and OLS regression estimation is used for regress flow on	There is a statistically positive significant relationship between flow and recent performance but no evidence of the convexity. Small and young funds potentially drive

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			lagged performance, controlled for size, growth and time-series correlation. Then, piecewise linear regression is used to measure the sensitivity of growth to performance in different regions.	the asymmetric effect.
Brown et al. (2001)	Explore reason of underperforming of mutual funds in Japan	1,275 Japanese equity funds 1978-1995	Generalized Style Classification (GSC) (Brown and Goetzman, 1997) for style classification and use style analysis (Sharpe, 1992) with a tax variable to control to control tax dilution effect.	The underperformance of Japanese mutual funds is because of the dilution effect. When tax dilution effect is controlled, alpha of Japanese mutual funds are indistinguishable from zero.
Chan et al. (2002)	Analyse product offered by mutual funds by looking at its characteristics and the information given	3,336 US mutual funds 1976-1997	Two style identification measures; characteristic-based and holding-based	Size and book-to-Market provide useful descriptors for fund style. Fund styles tend to cluster around a broad index although they are consistence in following their style. There is an evidence of style shifted among poor past performance. The approach based on portfolio characteristics does a better job in predicting future fund performance.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Sawicki and Finn (2002)	Investigate size- and age-effects to the fund performance	55 Australian wholesale funds 1980-1995	Reclassify funds into 3 groups based on objectives and asset allocation. Then they estimate a model using piecewise regression, allowing slope and intercept are varied for size and age. Nine difference performance measures are used for a lagged performance variable	The test confirms for the size- and age-effects where investors response to small young funds than large old funds. The results also show that small funds react disproportionately to high performance.
Fletcher and Forbes (2002)	Explore validity of different benchmark specifications	724 UK equity unit trusts 1982-1996	Form 2 groups of passive portfolios which are 10 industry portfolios and 27 securities portfolios formed based on size, book-to-market, and momentum. Then, estimate performance using various models: Excess return, APT Four-factor, FF and Cahart with both unconditional and conditional measures.	All five benchmark specifications have some degree of mispricing but the Cahart model does a reasonable job in explaining cross-sectional return although it still unable to capture returns in small stocks completely. UK unit trusts do not outperform passive strategy. 80% of unit trusts show negative performance and many trusts are negatively and statistically significant. Results also show evidence of significant time variation in performance. The results on beta exposures

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
				suggest that unit trusts have significant and positive market beta coefficient. SMB and HML factors are also positive and significant but momentum factor in Cahart model is close to zero which differs to the US results.
Otten and Schweitzer (2002)	Compare behaviour of European and the US mutual fund market	Aggregate data on 2,096 US and 506 European funds from 6 countries 1991-2007	Sharpe Style analysis and Structure-conduct-performance paradigm	European mutual fund industry is still lagged behind the US in term of size and the market importance. Banks are the main distribution channel in the continental European countries while broker and direct sales are the main distribution channels in the US. Furthermore, US mutual funds performance is poorer than European mutual funds.
Del Guercio and Tkac (2002)	Comparing flow and performance relation between mutual funds and pension funds	562 pension funds and 483 mutual funds during 1987-94	Pooled time-series cross-section regression of fund flows and lagged performance. The study measures flows using dollar flows, percentage flows and change in number of clients; measures performance using both raw and risk adjusted methods.	Pension fund flows are positively related to risk-adjusted performance and negatively related to tracking error. Mutual fund flows are related to unadjusted-risk performance and unrelated to tracking error. Quantitative performance is less important in pension funds. Flow-performance relationship in pension funds is linear which different to the convexity relationship in mutual funds.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Brown et al. (2003)	Analyse their relative performance of Japanese and foreign funds	3,072 Japanese equity funds 1998-2002	Generalized Style Classification and Sharpe's asset allocation	Both Japanese and foreign funds are similar in style. Funds insignificantly underperform the benchmarks. Before the de-regulation, Japanese funds yielded superior performance but then become inferior after that due to the huge inflows and style shifts.
Drew and Stanford (2003)	Performance of Australian superannuation funds	148 Australian superannuation funds 1991-1999	Four-index model (Gruber, 1996)	Australian funds underperform the market by 0.5% to 0.93% pa. Results support the importance of four-factor model although it fails to capture impact of investment style.
Abel and Fletcher (2004)	Examine performance of UK emerging market unit trust and impact of the choice of model	56 UK unit trust with emerging market objective 1993 – 2003	13 models of the stochastic discount factor (including both local and emerging market indexes)	No evidence of superior performance and the choice of model does not impact on performance
Otten and Bams (2004)	Examine statistical and economic importance of adding more factor to the Jensen's model	2436 US mutual funds 1962-2000	Jensen, FF, Cahart models with unconditional and conditional in alpha and betas. Use step-wise process to examine importance of the model.	Conditional models add statistic and economic relevances to performance measurement. The Cahart model is the best in explaining mutual fund returns. At the aggregated level, alphas do not change much between unconditional and conditional models. At style level, moving to the richer models have large impacts on the alphas in income funds.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
				In overall, US mutual funds generate insignificant negative performance. Size and B/M factors have explanatory power for all style portfolios. Momentum factor has explanatory power for only three style portfolios. The growth/income portfolio is not statistically exposed to the momentum factor. Conditional model improves performance of funds and makes funds, in overall, look better except income/growth and income portfolios which conditional model decrease performance.
Klapper et al. (2004)	Structure, growth, and determinants of mutual funds growth in different countries	Aggregate mutual funds Aggregate data from 40 countries 1992-1998	Panel OLS regression and analyse developed and developing countries separately	Equity funds dominate in Anglo-American countries and bond funds dominate in continental Europe and mid-income countries. Capital market development and its stability are the main determinant of mutual fund growth. However, market microstructure factors are more concerned in developed countries while macroeconomic factors are more concerned in developing countries.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Chen et al. (2004)	Examine relationship of size and fund performance	3439 US funds 1962-1999	Estimate performance using 1-, 3-, and 4-factor and use cross-section time-series regression	Performance is inversely correlated with fund size suggesting that liquidity plays important role in diseconomies of scale. However, performance increases with family size.
Sapp and Tiwari (2004)	Examine whether smart money effect is a result of momentum effect and if this is the case, are investors chase funds with momentum style or just simply chase funds with high past returns?	US funds 1970-2000 (cash flows is based on quarterly data)	Trading strategy: performance of portfolios constructed based on net cash flows. Performance is estimated using Cahart's four factor model. Then, Cross-sectional regression to explore the determinants of cash flows of funds and portfolios based on momentum loadings are used to investigate the second question.	Smart money effect is explained by momentum phenomenon. Investors do not have ability to identify momentum style of mutual funds, they are naively chase funds with high past returns.
Khorana et al. (2005)	Study a combination of fundamental economic and regulatory forces that help to explain where the fund industry has flourished	Aggregated data from 56 countries 1996-2001	Cross-sectional, regress fund size on variables related to law, supply, demand and market characteristics	Fund industry is larger in countries with stronger rules, law and regulation and where investors' right are better protected, and the countries which wealthier and have more educated populations, old industry, low trading cost, pension plan. Law regulation, supply, and demand affect the size of industry.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Bollen and Busse (2005)	Determine persistence in performance over short horizon period	230 US mutual funds Using daily data 1985-1995	Trading strategies: rank and construct deciles funds portfolios quarterly based on past abnormal return and measure risk adjusted performance the following quarter.	Top decile of funds portfolio generates a statistically significant abnormal return in the post-ranking quarter of 25-39 basis points. This abnormal return disappears when funds are evaluated over longer periods. This suggests that the persistence in performance persists for the short horizon.
Athanasios et al. (2005)	Evaluate performance based on risk and return	23 Greek Equity funds 1997-2000	Treynor, Sharpe and Jensen measures	Greek funds have positive performance. Beta is highly significant and less than one. There is a significant positive relationship between risk and return.
Bauer et al. (2005)	Investigate performance and style of ethical funds	103 ethical mutual funds from German, UK and US 1990-2001	Jensen's and Cahart's measure of ethical funds compare with the matching conventional funds (based on size and age criteria) Performance is also estimated within sub-period; and before subtracting for fees	Ethical funds performance is not statistically different from conventional funds. Ethical funds exhibit distinct fund style in that they are more growth oriented. Ethical funds only performed lower at the early years and already went through catch-up period.
Kacperczyk et al. (2005)	Investigate how portfolio holdings of fund manager change with public information. (Do fund	1,696 US equity funds 1993-2002	Rank portfolio by Reliance on Public Information (RPI) then calculate correlation to	Skill managers are less sensitive to the change in information in public. The traditional performance-based measures reflect manager skill

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
	managers use public information or their own skills?)		investigate relationship of RPN and size, expenses, and age. Regress RPI in performance and flows with control variables	
Benson and Faff (2006)	Examine impact of fund family characteristics on fund flows	1,418 Australian funds 1995-2006	Unbalanced panel time series data and pooled regression Regress fund flows on fund characteristics and fund family characteristics. Dummy variable for top performing fund is also incorporated to test whether top performing funds enjoy greater flows.	Investors favour fund families which are old, large, and implement specialisation strategies. Top performing funds within a family receive significantly greater flows. These imply that funds do not operate as a single entity but as a member of complex organisation.
Luis Ferruz et al. (2006)	Evaluate performance of Spanish mutual funds	225 Spanish equity funds 1994 – 2002	Conditional Jensen measure which incorporate 7 predetermined variables: dividend yields, T-bills, bond yield, variable that represent inverse relative wealth, term structure, quality spread, and dummy variable of January effect	Funds display negative alphas but performance improves when using conditional measure. The conditional measure also improves explanatory power of the model

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Bergstresser et al. (2006)	What benefits do broker-channel mutual fund consumers enjoy in exchange for these loads and 12b-1 fees?	1998-2002	Compare characteristics of brokers funds and direct funds using T-test and multiple regression	Brokers focus on smaller, younger funds that are not converted by major rating services. However, Broker channel funds fail to provide tangible advantages and consumers pay extra fee to buy funds with higher fee and expenses funds. Broker fund underperform direct funds
Bauer et al. (2006)	Examine performance, persistence, and effect on fees on performance	143 New Zealand mutual funds including domestic and international equity funds and balanced funds 1990-2003	Jensen, 4-factor, TM and conditional models with 3 information variables (90 day T-bill, dividend yield, Term structure). For persistence in performance, rank and construct portfolios based on previous return. For fund characteristics, use cross-section regression to regress fund characteristics (size, fee, age, load) with performance.	Mutual funds insignificantly underperform the market and no evidence of market timing ability. Performance is still not statistic significant when using 4-factor model. Momentum is a driver in international funds but reverse to the domestic funds. There is more exposure to small cap and growth oriented funds. When predetermined variables are included, performance of balance funds is negatively significant. There is evidence of short term persistence in performance but this is driven by underperforming funds (icy hand). Equity fund performance is positively related to size and expense ratios and negatively related to load funds.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Comer (2006)	Propose multifactor market timing for hybrid funds and examine whether it is superior than TM measure	56 Balanced and Flexible funds 1981-2000	The proposed timing measure follows multifactor by Lehman and Modest which include 4 stocks, 4 bond indices and 2 additional variables which are quadratic returns of stock and bonds. Then, estimate and compare results to TM measure	TM measure is biased because there is correlation between bond and quadratic term. Multifactor market timing shows a superiority power than TM market timing and not spurious. With Multifactor market timing, there is a small evidence of market timing during 1981-1991. During 1992-2000, hybrid funds have an evidence of significant market timing and balanced funds is a driver of timing ability.
Benson and Faff (2006)	Investigate importance of flows to the measuring fund performance of international funds	93 Australian international equity funds 1989-1999	Use the conditional TM model plus a variable in exchange rate, lagged net flow of funds and lagged sector flow. Evaluate mutual funds at both aggregate and fund levels.	Australian international funds are unable to outperform the market and have negative market timing. The results show the significance of incorporating fund flows. The flow variables improve fund performance and increase R-square of the estimation.
Matallin-Saez (2006)	Performance and seasonality of Spanish mutual	220 Spanish mutual funds 1998-2004	Multi-index model plus a quadratic term variable capturing timing and a dummy variable for seasonality.	Performance of Spanish mutual funds is not significant from zero. There is evidence of seasonality but no evidence of market timing. The omission of style benchmarks leads to greater evidence of negative market timing and positive seasonality.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Kosowski et al. (2006)	Examine mutual fund performance that explicitly control for luck	US mutual funds 1975-2002	Use various performance models and use information criteria to choose the most appropriate model which is appeared to be 4-factor model. Conditional and unconditional versions give very similar result. Therefore, results will focus on unconditional four-factor model. Then Bootstrap analysis is employed to look at the extreme value.	Performance of best/worst managers is not solely due to luck. There is a superior performance among growth oriented funds and no evidence of ability among managers of income-oriented funds.
James and Karceski (2006)	Performance differences between retail and institutional funds and performance differences of the degree of investor oversight	US funds 1991-2001	Performance is estimated using 5-factor model (Cahart + international equity factor) Cross-section regression: Regress performance on fund characteristics; and flows on performance	Large institutional funds outperform other funds and they are less sensitive to the past returns. Institutional funds with low degree of oversight perform worse than other funds both before and adjusting for expenses.
Steven (2007)	Apply theory performance model to the practitioners approach	US mutual funds 1927-2005	FF	Only few funds outperform the market benchmark.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
Heaney et al. (2007)	Investigate time-changing in alpha performance	74 Australian equity international funds 1995-2005	Investigate both fund and industry level using equal weight and value weight to calculate portfolio of funds. For performance, use International CAPM (ICAPM) with a quadratic term for market timing variables and 4 information variables, and allow both alpha and beta to change over time with information variables. 24- and 36-month rolling windows are used for investigate variation in alphas.	International equity funds have negative and significant performance in traditional model. When information variables are incorporated, performance is insignificant different from zero. There is an evidence of time variation in alphas, means that, over the study period, the alphas is not constant.
Gharghori et al. (2007)	Examine whether smart money effect exists in Australia and to examine whether momentum explain this effect. And to find determinants of cash flows	239 Australian equity funds 1990-2004	Trading strategies portfolios are constructed on the basis of cash flows. Then, Jensen, FF, Cahart, both unconditional and conditional versions are estimated. Subgroup of funds is classified by size are also constructed to control for size effect. Then, cross-section time-series average is used for	Evidence of smart money and it is slightly stronger in small funds. Momentum effect does not explain smart money in Australia. Past returns and past cash flow of funds can explain cash flows of funds.

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			examine determinants of cash flows.	
Bollenn (2007)	Explore investor decision making in Social Responsible (SR) funds	205 SR funds 1980-2002	Control the differences in portfolio composition by using matching procedure to match SR funds to conventional funds with risk exposure criteria. Then compare SR funds with matched conventional funds. OLS regression estimating is used to estimate flow-performance relation, using net flows as a dependent variable and past dummy variables of performance as independent variables.	SR funds have lower monthly volatility and investors in SR fund are more sensitive to positive returns and less sensitive to negative returns than convention funds. This implies that preference of SR investors can be presented by conditional multi-attribute utility function
Geoffrey and Travis (2007)	Examine investor timing ability of their cash using cash flow data	7,125 US mutual funds 1991-2004	Investor timing performance (performance gap) is calculated by the differences between geometric returns and dollar weighted returns. Positive results mean investors have negative	Investor timing decisions reduce investor average returns by 1.56% annually. The poor timing is significantly associated with better performing funds. The underperforming is negatively correlated with value-style funds but positively correlated with momentum-style funds. Load fees, turnover and age are positively

Author(s)	Objectives	Data & Sample	Methodology	Conclusion
			timing performance. Cross section regression is used to examine determinant of performance gap.	correlated with underperforming funds.
Hubner (2007)	Examine performance of performance measures	72 US mutual funds 1993-2004	Compare Information ratio and the alpha with his Generalized Treynor Ratio (GTR). FF and Cahart's are used to calculate the performance	GTR measure provides superior results. Using FF and Cahart model to generate the alphas increases in the adjusted R-squares compared to the simple market model.
Keswani and Stolin (2008)	Investigate smart money effect in the UK using cash inflows and outflows data and differentiate between individual and institutional investors	UK funds 1992-2000 (cash flows is based on monthly data)	Estimate performance of money flow-based portfolios using Cahart's four factors model	There is smart money effect in the UK and this is not driven by momentum phenomenon. The effect is attributed by buying decision in both individual and institutional investor. They re-investigate smart money effect in the US for the period post-1991 and reveal comparable results.

Table 2.2 Summary of main theories and empirical studies related in mutual fund performance in emerging markets

Author	Objectives	Data	Methodology	Results
Plabplatern (1997)	Selectivity and market timing abilities	63 Thai Closed end funds 1993-1997	Portfolio holding	Almost all funds have positive selectivity. 25 out of 63 have evidence of market timing
Sakranan (1998)	Performance of mutual funds	34 Thai equity funds 1995-1997	Portfolio holding approach	Only 2 funds have selectivity skills and all funds have market timing ability. No persistence in performance.
Pornchaiya (2000)	Performance	77 Thai closed and open end funds 1996-1999	Jensen measure	Overall underperform: All closed end funds have negative alphas, and only 2 out of 55 open-end funds have positive performance.
Srisuchart (2001)	Market timing	Thai close and open funds (Equity and Fixed income funds) 1990-2001	Jensen, TM, HM, Kon&Jen (switching regression), Kon	Equity funds have better market timing ability while fixed income funds are better in selectivity ability.
Prasomsak (2001)	Determinants of equity funds' returns	33 Thai Equity open end funds and 11 Thai close end funds 1998-2000	Use market model for calculate return and employ cross-section regression with fixed effect	Market returns, size, turnover are related to funds' returns but fund type and turnover are not. Returns are positively correlated with market's returns and small funds are likely to have higher return.
Khanthavit (2001)	Performance	35 Thai Close end funds 1990-2000	Markov-Switching which is a technique to accommodate the switching strategies of the	In overall, fund managers do not have ability to beat the market but this is not because they do not have market timing or stock selection

Author	Objectives	Data	Methodology	Results
			funds with respect to the state of the market	ability. That is because they choose to concentrate on a certain ability with respect to the market condition
Elsiefy (2001)	Examine risk and return characteristics of mutual funds, optimal portfolios selection and the impact on economic factors on stock market and mutual funds	7 Egyptian equity funds 1996 - 1999	3 performance evaluation, measures; CAPM, market timing and decomposition of returns. The Arbitrage Pricing Theory (APT) model is employed to investigate the relationship between economic factors and performance. The economic factors used are: inflation, exchange rate, interest rate, government borrowing gross domestic product.	Overall, funds underperformed the market regardless to any benchmark used. However, number of underperforming funds is not the same for three measures. Funds are not diversified and market conditions do not affect the fund performance. Results from APT model suggest that fundamental economic variables fail to explain returns in Egyptian market.
Shu et al. (2002)	Different in the behaviour of investors who invest small amounts of money and those who invest large amount	Taiwanese mutual funds 1996-1999	Use Fama-Macbeth method to estimate relationship between mutual fund flows and past performance and set of control variables (e.g. Size, fee, turnover, and stand deviation). Fund flows are inflows, outflows and net flows.	Small amount investors mostly invest in large funds. They make a purchase based on short-term past performance and redeem funds to realise short term profits. On the other hand, large amount investors tend to buy small funds and insensitive to short-term performance but they tend to buy winners and sell losers.

Author	Objectives	Data	Methodology	Results
Vongniphon (2002)	Return and risk of open-equity funds	18 Thai equity funds 1994-1996 and 1997-2000	Sharpe and Treynor measures	During the study period, Thai equity funds underperform the market.
Roy and Deb (2003)	Effect of incorporating lagged information variables into the evaluation	89 Indian mutual funds 1999-2003	Jensen and TM, MH for both unconditional and conditional versions. Conditional model includes four predetermined variables, T-bills, dividend yield, term structure, dummy variable for April and dummy variable for tech rally.	Mutual funds outperform the market and using lagged information variables improve performance and the alpha performance shifts to the right
Watcharanaka (2003)	Determinants of the cash flows of funds, persistence and fee effects	62 Thai open equity funds 1999-2001	Cross-section regression of cash flows on several characteristics	NAV is positively related to fund flows. Size and interest rate are negatively related to fund flows. No evidence of persistence in performance.
Pakut et al. (2003)	Investigate the seasonal behaviour, specifically Month-of-the-Year Effect and Day-of-the-Week Effect	Thai stock market returns 1990-1999	Time series regression with dummy variable of each month	No evidence of Month-of-the-Year but Day-of-the-Week effect persists. Stock returns are positive and high on Friday while negative and low on Monday.
Friis and Smit (2004)	Relationship between performance of fund	30 South African companies within 57 unit	Use market excess return to estimate performance	Managers with qualifications perform better than those managers

Author	Objectives	Data	Methodology	Results
	managers and their qualification.	trusts 1996-2002	and questionnaire method to collect fund manager qualification. The regress performance with fund manager qualification.	without qualification
Nitibhon (2004)	Performance of Thai Equity funds	114 Thai open-end funds 2000-2004	Jensen, Cahart for both unconditional and conditional versions, and Portfolio holding approach	Funds present no statistic significant abnormal return. No evidence in persistence in performance.
Chunhachinda and Tangprasert (2004)	Timing abilities of Thai mutual funds	65 Thai open end equity funds 2001-2003	TM, Volatility timing model (Busse, 1999) $r_i = \alpha + \beta(r_m) + \gamma_i(\sigma_m - \bar{\sigma}_{m)}(r_m)$ Use GARCH (1,1) to estimate because the degree of autocorrelation and heteroscedasticity	Using Weekly data 54% exhibit market timing ability 55% exhibit volatility timing ability Using Monthly data: 4% exhibit market timing ability 12% exhibit volatility timing ability
Jenwikai (2005)	Performance of an investment portfolio and compare performance of investment portfolio and a mutual fund	62 Thai Equity funds 1991-2004	Sharpe and Treynor measures	Investment portfolio has better returns than the mutual fund with regard to market conditions.

Author	Objectives	Data	Methodology	Results
Timotej et al. (2005)	Fund performance of Slovenian mutual funds	Slovenian mutual funds 1997-2003	Sharpe, Treynor, Jensen, and Appraisal ratio measures	Slovenian funds have positive performance.
Karatepe and Gokgoz (2006)	Estimate the investment styles and return distributions of Turkish equity mutual funds	15 Turkish mutual funds 2001-2002	Sharpe's style analysis with 8 asset classes	53% of Turkish mutual funds represent the passive management.
Soo-Wah (2007)	Sensitivity of selectivity and timing performance to the choice of benchmark	40 Malaysian funds 1996-2000	Jensen and TM with 2 choices of market benchmarks	Fund managers underperform the market and have poor market timing ability. Benchmark used does not have an impact on performance.
Fauziah Md and Mansor (2007)	Performance of Malaysian unit trusts	110 Malaysia trusts (EQ, BL, Bond funds) (1991-2001)	Use 7 measures: Raw, Market adjusted, Jensen, Adjusted Jensen, Sharpe, Adjusted Sharpe, Treynor	Overall, funds have inferior performance. Bond funds show superior performance. No evidence in persistence in performance.
Ferruz and Ortiz (2005)	Investigate whether the fund classification given can clarify them	244 Indian mutual funds 2001-2002 (daily)	Factor analysis and cluster analysis	Risk is the key factor that influence Indian mutual funds and their styles are very close to one another
Acharya and Sidana (2007)	Classify Indian mutual funds using cluster analysis	100 Indian mutual funds 2002-2006	Cluster analysis using Euclidean distance to cluster 10 dimension of fund returns	There is an inconsistency between the investment style/objective classification and the return obtained by funds.

CHAPTER 3

INSTITUTIONAL BACKGROUNDS AND SAMPLE SELECTION

3

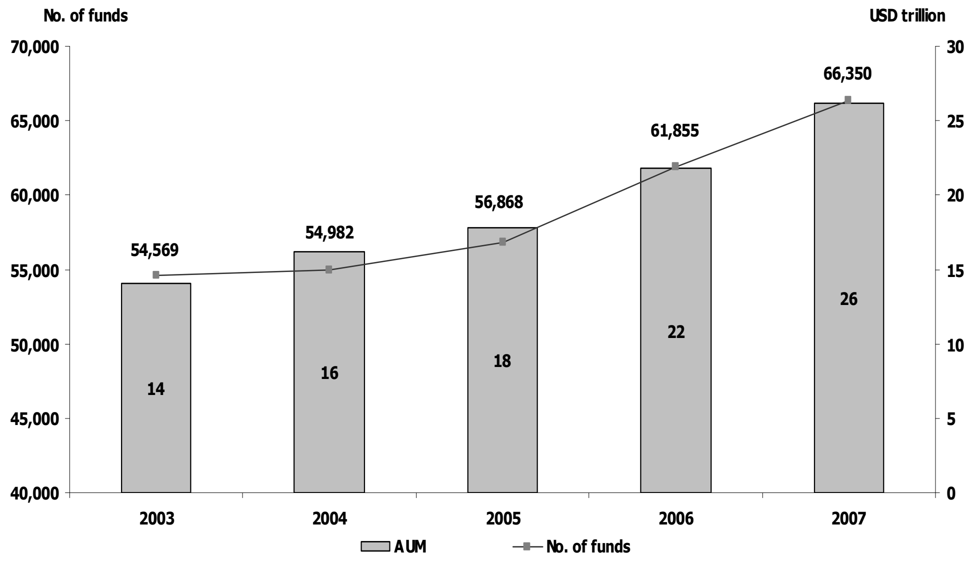
Abstract

This chapter reviews the institutional environment of mutual funds in Thailand and describes the sample which will be used in subsequent chapters. The business of mutual funds has grown dramatically in this country and gained in importance. Thai mutual funds include a special type called tax-benefit funds, which give investors favourable tax treatment, conditional upon long-term investment. The Thai mutual fund market is less competitive and controlled by a few bank-owned management companies. Furthermore, information related to performance is not publicly available and the banks are the main distribution channel, implying that investors value service rather than performance. The latter part of this chapter sets out to justify the sample selection which will be used in the rest of the thesis. In total we consider 230 Thai mutual funds, comprising both equity and flexible funds over the period 2000-2007. The data are free from survivorship bias.

3.1 Introduction

A mutual fund, or as the UK often refers to it, a unit trust, is an investment fund type of collective investment scheme (CIS) – a term which includes all forms of retail investment fund, regardless of their legal structure – by pooling money from investors to invest in a diversified portfolio of stocks, bonds and/or other assets and hiring a professional fund manager to manage the portfolio. The mutual fund form of investment is long established and provides several benefits to investors, such as diversification, professional management, liquidity, flexibility and convenience. Undoubtedly mutual fund investment has become significant all over the world and its popularity and consequently the demand for it have steadily risen. According to the Investment Company Institute (2008), by the end of 2007, assets of mutual fund investment worldwide totalled more than 26 trillion US dollars, with more than 66,350 funds. These amounts rose by more than 78% of the total in 2003 (Figure 3.1). Despite the growth of the mutual fund industry worldwide, the size and institutional arrangement of mutual fund investment are different in each country, which may influence the characteristics of fund managers and investors, as well as the performance of the mutual funds. Klapper et al. (2004) investigate the determinant of mutual fund development in both developed and emerging countries. They point out that mutual fund investors in developed countries are concerned with market microstructure, while those in emerging countries are focused more on macroeconomic factors. Furthermore, they find that mutual funds are more developed in countries with more stable capital markets. Similarly, Khorana et al. (2005) examine mutual fund investment in 56 countries and reveal that the mutual fund industry is larger in countries which have stronger laws and regulations, and where populations are wealthier and better educated.

Figure 3.1 Worldwide mutual fund assets and the growth in the number of mutual funds, 2003-2007



Source: Investment Company Institute (2008)

In emerging markets, mutual funds have gained more recognition in the past decade alone. After the Asian financial crisis, investors sought more secure forms of investment and mutual funds investment is believed to be among these. Likewise, governments in many emerging countries promote retail investment funds in order to boost investment in the capital market as well as to encourage long-term savings. Subsequently, mutual fund investment in emerging countries has grown significantly during the past decade. In the Asia Pacific region, mutual fund assets in emerging markets, such as those of the Philippines, India and Thailand, experienced higher growth than those of developed countries, such as Japan and New Zealand (Figure 3.4).

Notwithstanding the growth in the mutual fund industry, the mutual fund business in each country is unique in some respects, in emerging markets in particular, where mutual funds serve not simply as an investment vehicle, but also as a government tool to boost the financial market. Hence, it is necessary to understand the structure and characteristics of funds in these countries.

Subsequently, the main purpose of the chapter to come is to explain the characteristics of the Thai mutual fund industry which this thesis will consider as an exemplar of all the emerging markets. Thai mutual funds are chosen in this study because several of their characteristics are in line with what is typical of emerging markets. For instance, in the past decade, the annual growth rate of the Thai equity market is very closely comparable with the growth of the MSCI Emerging Markets index (the annualized growth of the Thai index is 12.36% compared with 11.69% for the MSCI Emerging Markets index) (MSCI, 2010). Moreover, over the past ten years, the Thai market has been ranked on its market potential between 12^{th} and 19^{th} out of 26 emerging countries by the International Business Center at Michigan State University (GlobalEDGE, 2010). This position lies in the middle range of the other emerging countries. The equity market efficiency index of Thailand in 2004 was 4.0 compared to 4.42 as the average for 33 emerging markets (Gregoriou, 2009). The Thai market can also well stand for the Asian Emerging markets as a whole since these markets are highly correlated (ibid.).

In addition, as noted in the Introduction, the mutual fund industry in Thailand is one of the fastest growing in the Asia/Pacific region in the past decade and has become more important to the capital market over time. The data on mutual funds in Thailand are also more accessible than in other emerging countries, which allows the more comprehensive investigation in this issue.

Subsequently, the first part of this chapter highlights some key characteristics of the industry. It reviews the development and current situation as well as pointing to some key motivating aspects related to the study. Then, in the latter part, this chapter seeks to justify the sample of mutual funds from which its conclusions are drawn.

The overview is meant to improve understanding of the mutual fund environment in Thailand and allow readers to compare and contrast it with that of mutual fund investment in other countries. Furthermore, it will help to set up testable hypotheses from the institutional point of view. Therefore, it is hoped to benefit both academics who wish to conduct research related to mutual funds in Thailand and practitioners who are dealing with these funds.

The rest of this chapter is organised as follows. The next section, 3.2, provides an overview of the mutual fund business in Thailand. Section 3.3 gives some motivating aspects related to the institutional environment. Section 3.4 describes the mutual fund sample which will be used in this study. Section 3.5 draws some conclusions from the details presented.

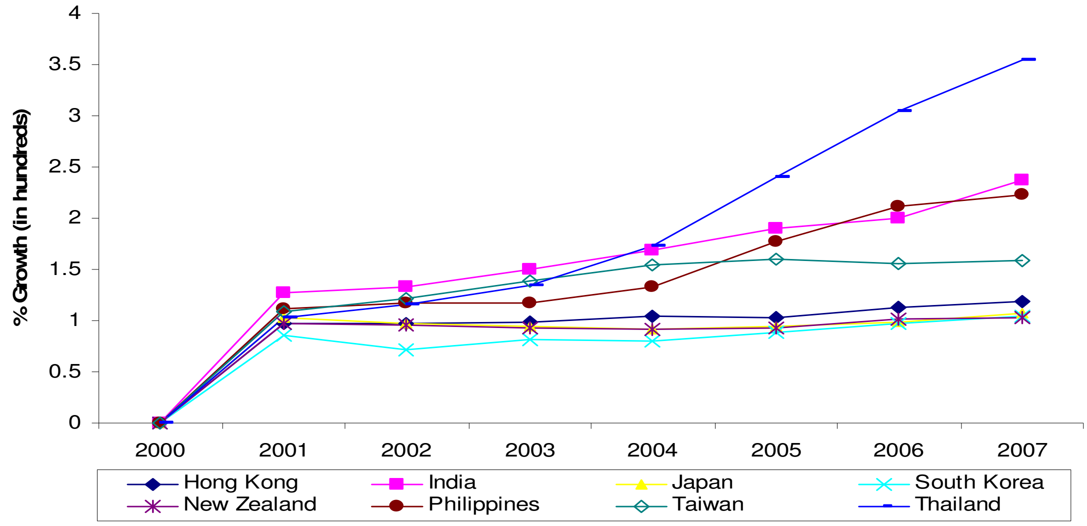
3.2 An overview of the mutual fund business in Thailand

3.2.1 Mutual fund development

The mutual fund business in Thailand was formally initiated in 1975, when the government of Thailand and the International Finance Corporation (IFC) collaborated to establish the first management company in Thailand, named the Mutual Fund Public Co., Ltd. This was no more than a management company in Thailand between 1975 and 1992. During this period, the company operated 22 funds; 12 domestic and 10 international funds. In 1992, the Congress approved the Securities and Exchange Act BE 2535 (AD 1992), which allows wholly-owned subsidiaries of banks and other financial institutions to operate mutual fund business. This allowed several new management companies to be set up. At the end of 2007, Thailand had 21 management companies, made up of 821 mutual funds, with total assets valued at more than 1,400 billion Baht (SEC, 2008).

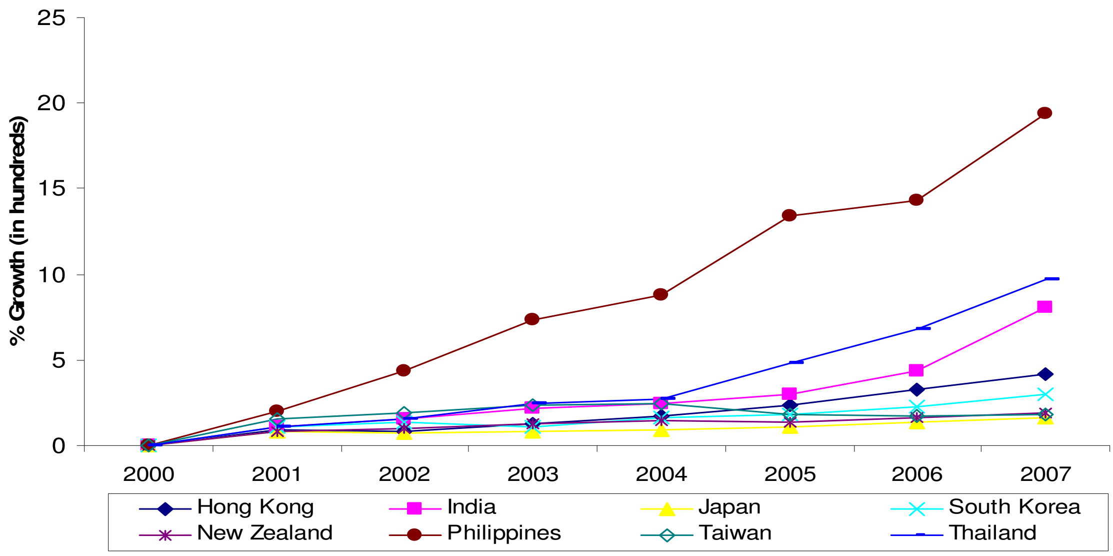
Within the Asia Pacific region, the Thai mutual fund industry has in the past decade been one of the fastest growing, even though the contribution of this industry to the economy still lags behind the contribution made in other parts of the region. Klapper et al. (2004) in their study of the growth of mutual funds around the world reveal that Thai mutual fund assets grew by more than 35% between 1993 and 1998. This brings Thailand to third place in the Asia/Pacific continent, after New Zealand and Hong Kong. This growth figure is also higher than in such developed countries as the US (22.4%) and the UK (20.9%) during the same period. In contrast, Klapper et al point out that the total assets of Thai mutual funds were only 1.04% of GDP, which was the second lowest figure for the Asia/Pacific region and much lower than that of the US (41.95%) and the UK (15.07%). Additionally, the Investment Companies Institute (ICI) Fact Book (2008) provides more recent data of mutual fund development in some major countries. Combining data from the Security Exchange Commission of Thailand and the ICI Fact Book allows us to compare the growth and importance of the mutual fund business in Thailand to those of other countries within the same region. Figures 3.2 and 3.3 exhibit mutual fund growth in the Asia/Pacific region in terms of the number of funds and asset values, respectively, from 2000 to 2007. They show clearly that the Thai mutual fund business had the fastest growth. Over the period, mutual funds in Thailand experienced the highest growth in term of fund quantity (Figure 3.2) and the second highest growth, after the Philippines, in term of asset growth (Figure 3.3).

Figure 3.2 Growth of number of funds for Asia/Pacific countries, 2000-2007



Source: ICI Fact Book (2008) and SEC (2008)

Figure 3.3 Growth of mutual fund asset values for Asia/Pacific countries, 2000-2007

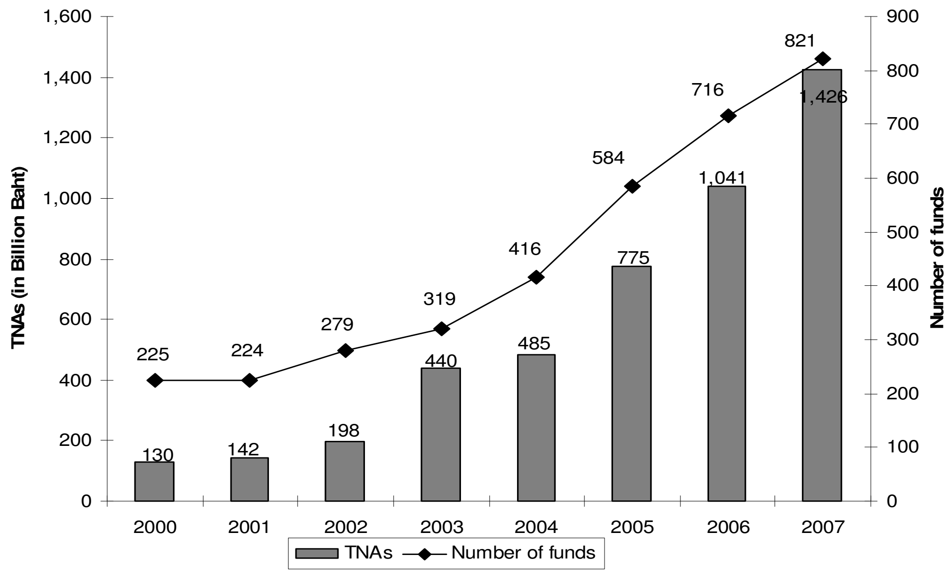


Source: ICI Fact Book (2008) and SEC (2008)

More recent data on Thai mutual fund development are provided by the Security Exchange Commission of Thailand (2008). Figure 3.4 illustrates the remarkable growth of mutual fund investment in Thailand between 2000 and 2007. Mutual fund total assets rose by more than ten-fold in those seven years, from 130 billion Baht in 2000 to more than 1,400 billion Baht by the end of 2007. In spite of the growth in asset values, the number of funds also increased from 225 funds in 2000 to 821 funds by the end of 2007, nearly four times the original total in seven years. Similarly, Figure 3.5 reveals the proportion of investment in asset management to GDP, which rose from 7.9% in 2000 to 24.1% in 2007, while the proportion of bank savings to GDP dropped slightly, from 71.7% in 2000 to 50.8% in 2007.

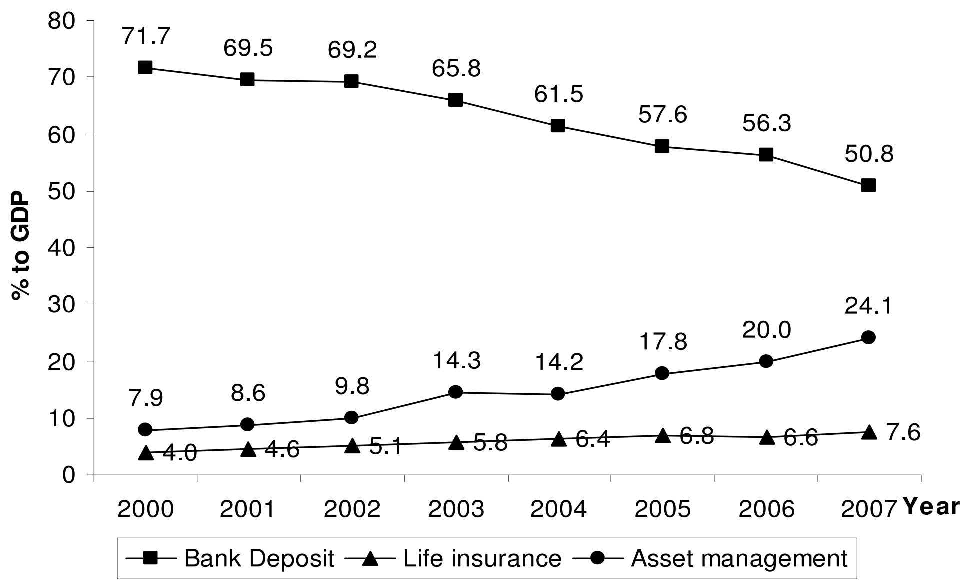
Nonetheless, the high growth of mutual fund business in Thailand began in earnest only in 2003-2004, after the tax-benefit mutual fund types were introduced. The tax-benefit mutual fund will be further described in section 3.2.2.1, below. Nevertheless, this evidence attests to the strong increase in demand and importance over a fairly short period in relation to other countries in the same region.

Figure 3.4 Growth in Thai mutual funds 2000-2007



Source: Security Exchange Commission of Thailand (2008)

Figure 3.5 Savings to GDP classified by investment type in Thailand, 2000-2007



Source: Security Exchange Commission of Thailand (2008)

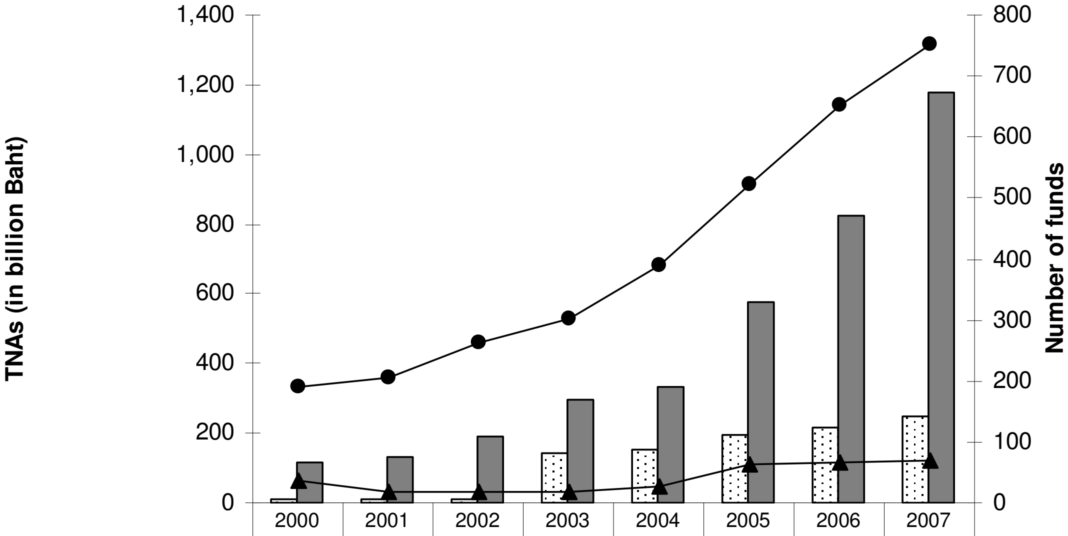
3.2.2 Mutual fund classification

In Thailand, mutual funds can be broadly classified into closed-ended funds and open-ended funds. The former kind offers a fixed number of shares, which cannot be redeemed until the maturity date. Therefore, closed-ended funds are traded in the exchange market in order to provide investors with liquidity. Closed-ended funds can be sold at either a discount or a premium, which is determined by the supply and demand in the market.

In contrast, the latter kind, open-ended funds, offers unlimited numbers of shares which can be sold or redeemed at any time through the fund's management company or selling agents. Open-ended funds are bought and sold at their own price, called the Net Asset Value (NAV), which is determined by the total value of the fund's assets at current market value minus current liabilities and divided by the number of shares.

The 1990s saw a number of closed-end funds in the Thai market. However, their value dropped substantially over the financial crisis. A decade later, open-ended funds began to gain more recognition, owing to a government campaign emphasizing its advantages benefits over closed-ended funds, in that they provide more flexibility and liquidity. Consequently, the number of open-ended funds has increased sharply and some closed-ended funds have been converted to open-ended funds. Below, Figure 3.6 shows the growth of open-ended compared to closed-ended funds. It reveals that, over the past decade, the growth of open-ended funds is much greater higher than closed-ended funds. Currently, more than 90% of the mutual funds in Thailand fall into the open-ended category, accounting for more than 80% of all mutual funds' assets (SEC, 2008).

Figure 3.6 Number of funds and total asset values (TNAs) classified by type (closed-ended vs. open-ended)



	2000	2001	2002	2003	2004	2005	2006	2007
TNAs (Closed)	12,053	10,027	8,931	142,066	151,997	197,544	218,436	249,169
TNAs (Open)	117,465	131,956	188,758	298,139	332,982	577,848	822,261	1,177,232
Number (Closed)	35	18	17	17	28	62	65	70
Number (Open)	191	206	262	302	388	522	651	751

Source: Security Exchange Commission of Thailand (2008)

In most developed countries, mutual funds managers provide information relating to their investment policy and investment style[5]. This informs investor about their investment strategy and helps investors to select funds based on their own preferences. In contrast, information on investment style is not provided in Thailand.

The Association of Investment Management Companies (AIMC) – an organization responsible for overseeing management companies in Thailand - largely classifies Thai mutual

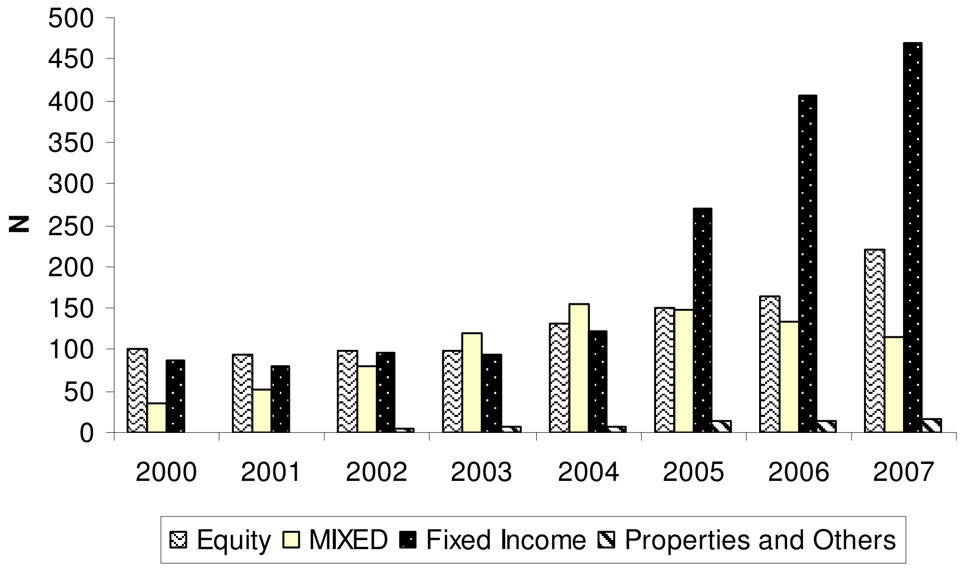
5 Investment policy is classified by asset class, for example, equity funds, bond funds and balanced funds.
Investment style is classified by the types of stock which are selected to go into the portfolio, for example, growth funds and value funds.

funds only on the basis of the investment policies under five broad classifications. First, *Equity funds* are mutual funds which invest primarily in equity instruments. Second, *Fixed income funds* are funds which have the investment policy of investing in debt instruments, such as government bonds and corporate bonds. Fixed income funds can also be classified according to the duration of their assets; for example, short-term fixed income funds invest in debt instruments which have less than one year's time-to-maturity and long-term fixed income funds invest in debt instruments which have more than one year's time-to maturity. Third, *Mixed funds* are mutual funds which invest in a combination of different classes of asset, namely, balanced funds and flexible funds, where the portfolio holding depends on the fund manager's decision. The difference between these two mixed funds is only the proportional requirement of the portfolio holding. Fourth, *Property funds* are mutual funds which primarily invest in property and, finally, o*ther funds* are mutual funds which do not fall into any of the previous groups, for example, foreign investment funds, index funds, guaranteed funds, sector funds and funds of funds.

Figures 3.7 and 3.8, respectively, show the changes in the number of funds and the asset values classified by investment policies according to their AIMC category. These reveal that equity, mixed and fixed income funds were of equal importance in the Thai mutual fund business until 2005, when fixed income funds started to play the major part in the market. The annual growth made by mutual funds classified by investment policy is also provided in Appendix A.1. In addition, Table 3.1 provides more information by presenting mutual funds as fractions numerically classified by investment policy. We see that in 2000-2001, around two-thirds of the market capitalization (67.31%) was held by fixed income funds, even though equity funds were the highest in quantity (45.33%), followed by fixed income funds (38.67%) and mixed funds (15.56%). After this, mixed funds gained more public interest and they controlled the market between 2002 and 2004. Indeed, from 2000 to the present, mixed funds have increased their overall dominance in the market. More than half of the mutual fund market is dominated by fixed income funds in terms of both assets and numbers of funds. By the end of 2007, fixed income funds accounted for 66.37% of the total mutual fund assets and 57.13% of the total fund quantity. Mixed funds accounted for 18.70% of total mutual fund assets and 14.01% of the quantity of funds. Equity funds accounted for 10.95% of total mutual fund assets and 26.92% of the quantity.

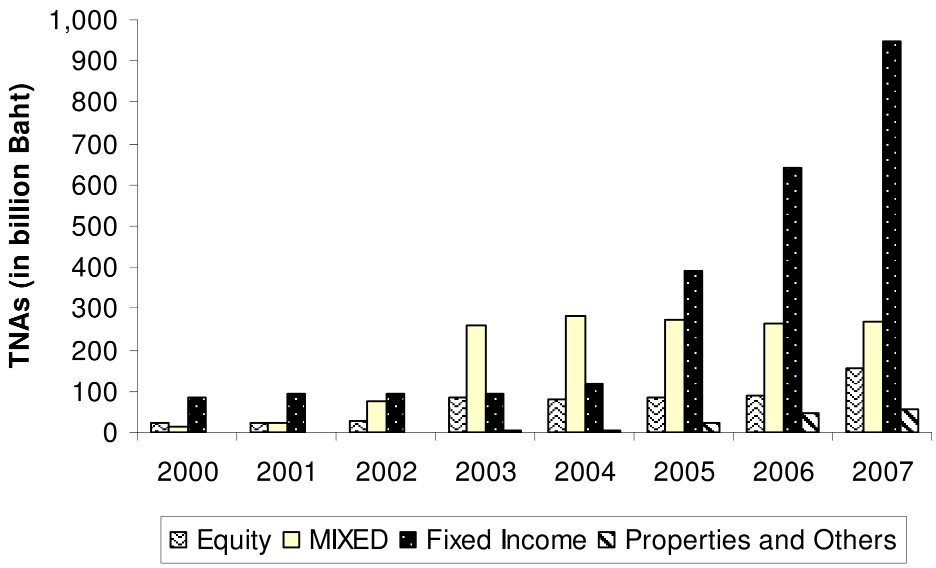
These figures are in contrast to the data before the Asian crisis as presented by Klapper et al. (2004). He shows that between 1993 and 1998, equity funds in Thailand represented 59% of all mutual fund assets and bond funds accounted for around 37% of mutual fund assets. This suggests that, before the Asian crisis, equity funds were most important but, after it, equity funds became less significant, giving way to fixed income funds. Nevertheless, Klapper et al. (2004) suggest that equity funds in middle-income countries are less important than those in high-income countries for three main reasons: lack of confidence in investors' local markets; low risk tolerance among investors; and the use of overseas funds by more sophisticated investors.

Figure 3.7 Number of fund classified by policy 2000-2007



Source: Security Exchange Commission of Thailand (2008)

Figure 3.8 Total Net Asset values (TNAs) classified by fund policy 2000-2007



Source: Security Exchange Commission of Thailand (2008)

Table 3.1 Thai mutual funds classified by investment policies

The table presents the percentages of Thai mutual funds classified by investment policy from 2000 to 2007 by asset values (panel A) and by number of funds (panel B).

	2000	2001	2002	2003	2004	2005	2006	2007
Panel A: Asset values								
Equity	19.7%	17.0%	13.8%	18.9%	16.5%	10.7%	8.6%	11.0%
Fixed income	67.3%	65.5%	47.2%	21.4%	24.1%	50.5%	61.5%	66.4%
Mixed	12.4%	17.0%	38.0%	58.7%	58.5%	35.6%	25.5%	18.7%
Others	0.6%	0.5%	1.0%	1.0%	0.9%	3.0%	4.5%	4.0%
	100%	100%	100%	100%	100%	100%	100%	100%
Panel B: Numbers of funds as %								
Equity	45.3%	41.5%	35.5%	31.0%	31.7%	25.9%	22.9%	26.9%
Fixed income	38.7%	35.3%	34.4%	29.2%	29.3%	46.4%	56.7%	57.1%
Mixed	15.6%	22.8%	28.7%	37.6%	37.5%	25.5%	18.6%	14.0%
Others	0.4%	0.5%	1.4%	2.2%	1.4%	2.2%	1.8%	2.0%
	100%	100%	100%	100%	100%	100%	100%	100%

3.2.2.1 The tax-benefit funds

The immense change in mutual fund investment in Thailand occurred in 2002, when the government announced the establishment of a new mutual fund scheme, called the Retirement Mutual Fund (RMF), as a way of encouraging people to save for their retirement. This aim of this scheme was also to satisfy the demand of the World Bank's 'three pillars' pension system by providing an alternative form of retirement savings[6]. The RMF funds are offered in all the mutual fund investment policies so that investors can choose the funds which take account of their attitudes to risk. The RMF funds give up to 15% income tax relief (or 300,000 Baht, whichever is the smaller[7]) as well as capital gains tax exemption, but, at the same time, they

[6] This scheme relates to the third pillar of the three proposed by the World Bank (1994). The first pillar is public pensions, the second is occupational pensions and the third is personal pensions

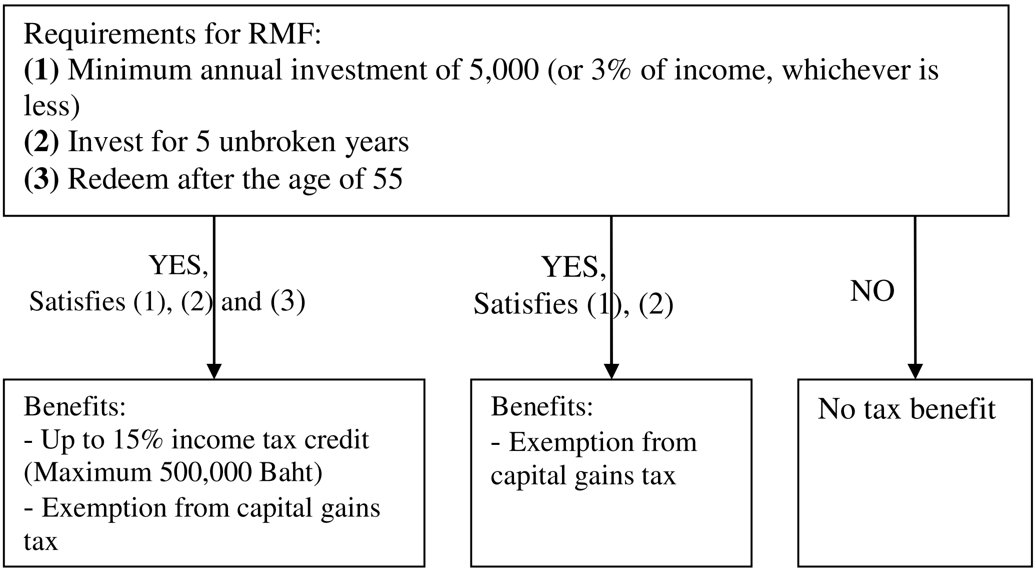
[7] The amount was raised to THB500,000 at the beginning of 2008

make some stipulations: a minimum continuous investment of 5,000 Baht (or 3% of annual income, whichever is the smaller) for 5 years and the chance to redeem the fund only after the age of 55.

Since the successful establishment of RMF funds, it has experienced significant new cash flows. Subsequently, these affected the growth not only of the RMF mutual funds but the mutual fund industry as a whole. This can be seen from the emergence of many new mutual funds and the growth of asset values in recent years. Therefore, in 2004, the government announced another new mutual fund scheme aiming to strengthen the capital market by increasing the proportion of institutional investors in the market for long-term investments. The new mutual fund scheme was called the Long-Term Mutual Fund (LTF). Like the RMF funds, the LTF fund also offered the same 15% income tax relief, only with slightly different requirements: this fund does not require a continuous investment but it cannot be redeemed until the end of its first 5 years. Furthermore, the LTF funds can be redeemed twice a year, on dates specified in the prospectus[8]. In addition, since the aim of LTF funds is to promote long-term investment in the capital market, LTF funds are available only as equity mutual funds. Below, Figures 3.9 and 3.10 summarise the requirements and benefits of the RMF and LTF funds in turn. Then Table 3.2 sets out the main differences between general, RMF and LTF funds.

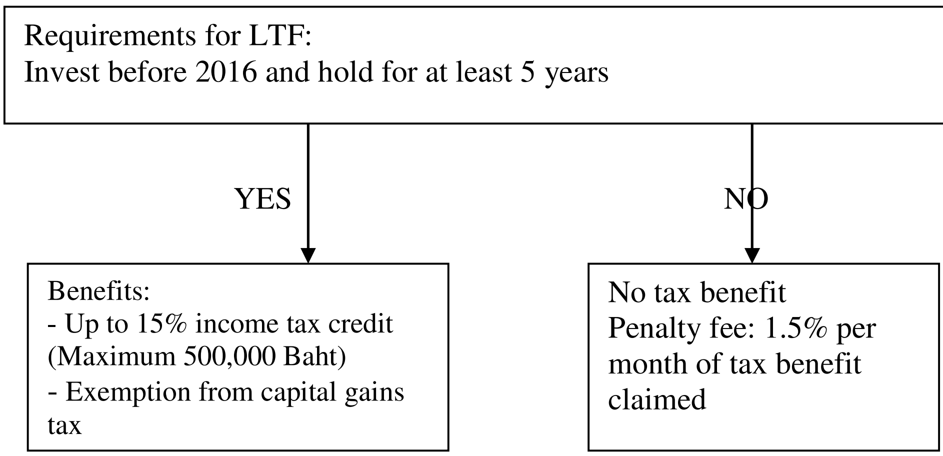
[8] From December 2008, this condition was relaxed and investors can now redeem their funds at any time.

Figure 3.9 Benefits and requirements of retirement mutual funds (RMF)



Source: Author

Figure 3.10 Benefits and requirements of Long-term equity mutual funds (LTF)



Source: Author

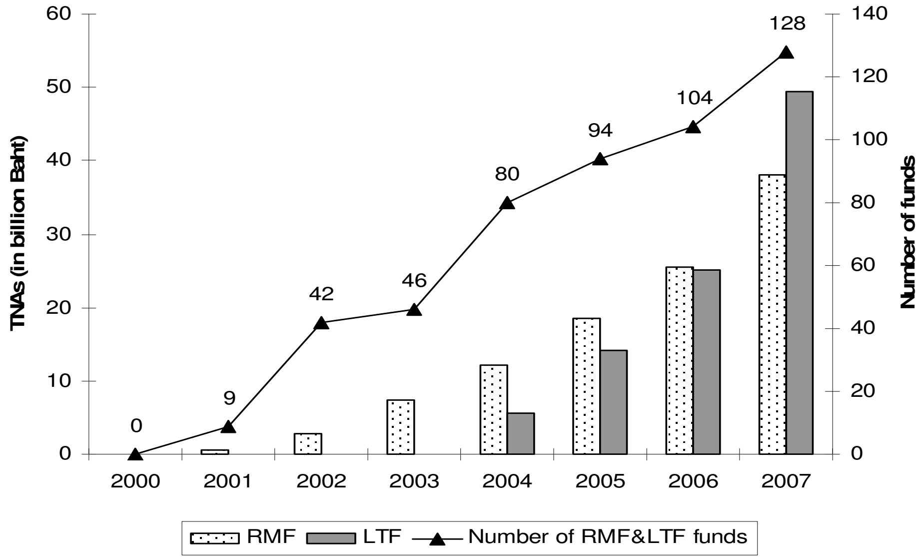
The RMF and LTF funds received much public attention, among high-income investors in particular, because they reduced the high income tax normally due. Figure 3.11 and Table 3.3 represents the growth of RMF and LTF funds in comparison to general funds. As of December 2007, there were 75 RMF funds and 53 LTF funds. The total asset values of the RMF funds were around 38 billion Baht and of LFT funds were around 49 billion Baht. These values altogether account for approximately 6% of all mutual fund assets. Although this considers only a small fraction of the market, the growth of RMF and LTF funds has risen remarkably over time and has been much faster than the growth of general mutual funds.

Table 3.2 The differences between General, RMF and LTF funds

The table presents the main differences between general funds, retirement mutual funds (RMF) and long-term mutual funds (LTF). [a] The ceiling was raised to 500,000 Baht from January 2008 [b] Conditions for the redemption date were relaxed from December 2008.

Characteristics	General funds	RMF funds	LTF funds
1. Investment policy	Any (Equity, Mixed or Bond funds)	Any (Equity, Mixed or Bond funds)	Equity fund only
2. Tax benefits	No	Income tax credit (15% of total income, max. 300,000 Baht [a])	Income tax credit (15% of total income, max. 300,000 Baht [a])
3. Minimum investment	No	3% of annual income or THB5,000 (whichever is less)	No
4. Frequency of investments	No	5 consecutive years	No
5. Holding period	No	Until the age of 55	5 years
6. Switching between funds	Yes	Yes	Yes
7. Specified redemption date	No	No	Yes (twice a year, on a specified date [b])

Figure 3.11 Number and asset value of RMF and LTF funds, 2000-2007



Source: Security Exchange Commission of Thailand (2008)

Table 3.3 Growth of tax-benefit and general mutual funds from 2000 to 2007

The table presents the growth of general mutual funds and the two types of tax-benefit fund, Retirement mutual funds (RMF) and long-term equity funds (LTF) from 2000 to 2007. Panel A, columns 2-4 present the Total Net Asset values (TNAs). Columns 5-7 present the number of funds. Panel B shows the average annual growth rate of asset values and the number of funds.

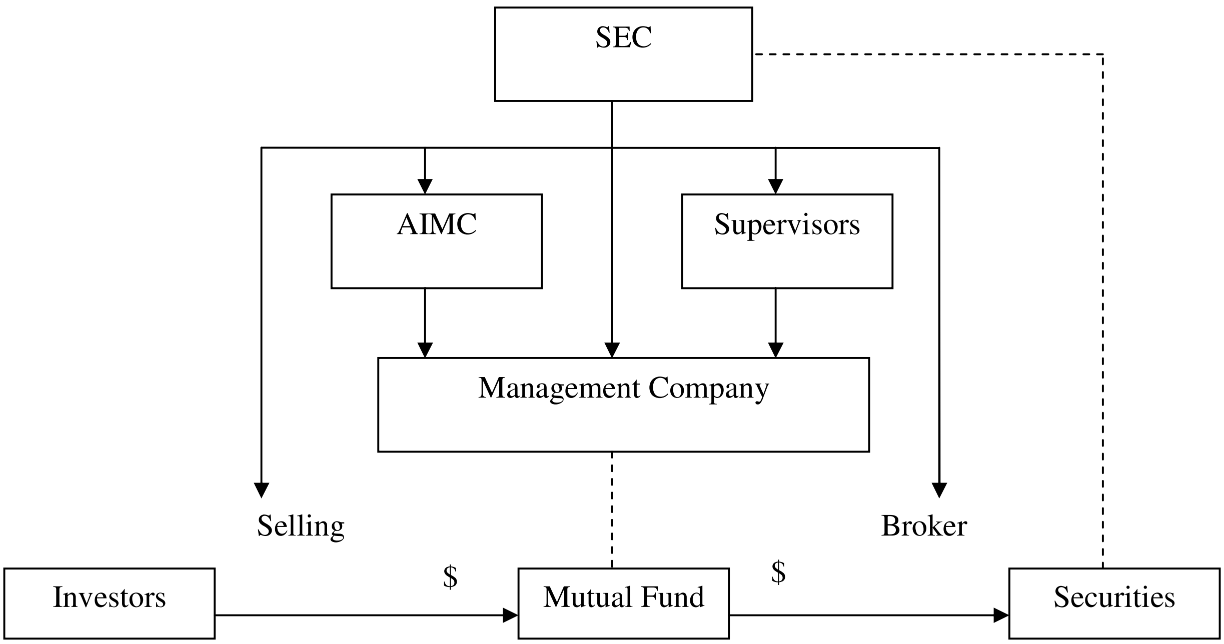
Year	TNAs (in Million Baht)			Number of funds		
	RMF	LTF	GENERAL	RMF	LTF	GENERAL
Panel A: Asset values and Numbers of funds						
2000	--	--	117,465.00	--	--	191
2001	--	--	131,441.74	--	--	197
2002	2,836.21	--	185,921.79	42	--	220
2003	7,281.59	--	290,857.41	46	--	256
2004	12,237.88	5,633.94	320,744.12	58	22	330
2005	18,455.88	14,176.47	559,392.12	64	30	458
2006	25,475.24	25,186.42	796,786.12	70	34	581
2007	38,016.85	49,408.05	1,139,215.39	75	53	676
Panel B: Annual Growth rate						
2001-02	--	--	11.90%	--	--	3.14%
2003-07	72.58%	86.92%	45.31%	12.49%	34.61%	25.45%

Source: Security Exchange Commission of Thailand (2008)

3.2.3 Organisational structure

In Thailand, mutual funds are highly regulated. Mutual fund licenses are issued by the Ministry of Finance. Once a mutual fund is registered, it becomes a separate legal entity from the management company which set it up. Mutual funds are regulated by the Securities Exchange Commission of Thailand (SEC) under the Securities Act of 1992 (B.E. 2535). Several organisations are involved with the operation of mutual funds, as shown in the diagram of Figure 3.12.

Figure 3.12 Structure of the Thai mutual fund business



Source: Author

The *fund management company* is the institution which initiates the mutual fund. This is also called the mutual fund family or mutual fund complex. In Thailand, a fund management company is usually a subsidiary of either the bank or some other financial institution. The management company is responsible for the general operation of the fund and hires a fund manager to manage the fund portfolio according to the objectives and policies described in the prospectus. An asset management company generally offers an array of mutual funds from which investors can select funds at will and also allows investors to switch between funds at low cost. However, if a mutual fund company grew too big, it would probably control the market and subsequently reduce market competition. As of December 2007, there were 21 management companies in Thailand; a company can own anything from 2 to 68 mutual funds (on average, 35 funds) with total asset values of around 68 billion Baht (Table 3.4).

Table 3.4 Number and total asset values owned by asset management companies

The table presents the asset values and numbers of mutual funds in Thailand at the end of 2007 classified by asset management company. TNA refers to the total asset values and N refers to the number of mutual funds.

	Closed-ended		Open-ended		Total	
	TNA	N	TNA	N	TNA	N
Panel A: Asset management company						
1. Aberdeen Asset Management	0.0	0	22,198.4	14	22,198.4	14
2. Asset Plus Fund Management	94.1	1	18,599.9	30	18,694.0	31
3. Ayudhya JF Asset Management	694.7	1	42,765.4	47	43,460.1	48
4. BBL Asset Management	0.0	0	136,092.8	47	136,092.8	47
5. BT Asset Management	2,216.5	4	13,848.0	23	16,064.5	27
6. Finansa Asset Management	0.0	0	3,419.1	5	3,419.1	5
7. ING Funds (Thailand)	16,216.5	6	40,270.0	46	56,486.5	52
8. Kasikorn Asset Management	2,111.3	1	229,783.6	2	231,894.8	3
9. Krungthai Asset Management	26,257.1	37	19,423.6	31	45,680.7	68
10. Manulife Asset Management	0.0	0	3,035.1	5	3,035.1	5
11. MFC Asset Management	162,038.8	7	25,048.9	56	187,087.7	63
12. One Asset Management	4,427.2	3	11,200.1	32	15,627.3	35
13. Phillip Asset Management	0.0	0	423.5	3	423.5	3
14. PrimaVest Asset Management	656.5	1	25,170.5	29	25,827.0	30
15. SCB Asset Management	8,590.2	1	292,904.2	64	301,494.4	65
16. Seamico Asset Management	0.0	0	160.1	2	160.1	2
17. Siam City Asset Management	13,674.1	5	20,242.6	25	33,916.7	30
18. Thanachart Fund management	0.0	0	70,853.3	53	70,853.3	53
19. TISCO Asset Management	58.5	1	14,533.7	39	14,592.2	40
20. TMB Asset Management	11,216.5	1	127,167.5	51	138,384.0	52
21. UOB Asset Management	917.0	1	60,091.8	51	61,008.8	52
Panel B: Summary Statistics						
Mean	11,865.2	3.3	56,058.7	31.2	67,923.9	34.5
Standard deviation	35,121.1	8	78,361.4	20	83,595.8	22.1
Minimum	0.0	0	160.1	2	160.1	2
Maximum	162,038.8	37	292,904.2	64	301,494.4	68

Table 3.5, below, gives the concentration ratios of the four largest fund companies at the end of 2007. The concentration ratio determines the market structure of the industry calculated by the size of the largest firms (usually the four largest) in relation to the whole industry. The concentration ratio of the Thai mutual fund industry is well over 60%, implying that the market is highly controlled by a few particular fund companies. Furthermore, these companies are bank-owned companies. This is also consistent with previous results from Kasikorn Research (2005),

stating that funds are concentrated in 5 major asset companies and that the large-bank-owned asset companies hold a high market share.

Table 3.5 Concentration ratio
The table presents the concentration ratio at the end of 2007 calculated as the asset values of the four biggest asset management companies in relation to the total of mutual fund assets.

	Concentration ratio
Closed-ended mutual funds	87.57%
Open-ended mutual funds	66.76%
Total (Closed- and Open-ended funds)	60.21%

The fund company sells its own mutual funds to investors or uses a *selling agent* (or *distribution channel*). The selling agent/distribution channel provides the link between the mutual fund and the investors and charges a percentage of the price as commission. In contrast to the developed markets, where brokers and direct sales are the main distribution channels, the main distribution channels in Thailand are the banks and the brokers. The Security Exchange Commission of Thailand (2000) reveals that banks are the main distribution channels and account for a market share of more than two thirds. Generally, Thailand mutual fund brokers are financial institutions, such as security or insurance companies. Bank-owned asset management companies use banks as their distribution channels, while non-bank-owned asset management companies use a greater variety of distribution channels. However, banks have many branches and, therefore, bank-owned mutual funds are more accessible (Kasikorn research, 2005).

There are also institutions which provide a link between mutual funds and the stock market. These include *brokers* and *custodians.* A broker trades securities on behalf of the mutual funds, while a custodian holds the assets of mutual funds. As a legal requirement, a custodian is responsible for making and receiving payments for the fund assets bought and sold, as well as paying for the fund's expenses. There is also the *registrar* who is accountable for the related administration.

On top of this, there are three main government entities involved with the operation of mutual funds. First, the *Association of Investment Management Companies (AIMC)* is an association which is charged with supervising all asset management companies; it sets guidelines for reporting standards. This organisation provides the most complete information on all mutual funds operating in Thailand. Second, s*upervisors* are responsible for supervising fund managers and making sure that their actions are aligned with each fund's objective. Finally, the *Securities and Exchange Commission of Thailand (SEC)*, under the Securities and Exchange Act BE 2535, oversees not only management companies, but also selling agents, brokers, custodians, supervisors and AIMC. As a part of the SEC regulations, all mutual funds are required to register with the SEC and must provide a prospectus describing such necessary details as the name, type, fees and expenses of each fund. Furthermore, they have to report their financial statements monthly, as well as any other relevant information regarding changes to their portfolio.

3.2.4 Net asset values, fees and charges of mutual funds

In Thailand, management companies offer only one share class[9]. Mutual funds are bought and sold at the net asset values (NAVs) which are determined by the current market values minus

[9] In some countries, management companies offer multiple share class. Each class is different in term of how investors pay fees. However, all classes represent only one portfolio.

liabilities and any prior charges. These prior charges involve the general operation costs of mutual funds, such as management fees, trustee fees, registrar fees and advisory fees. These fees are deducted as a percentage of the fund's asset values and regarded as indirect charges to the customers.

There are also some fees – the load fee, exchange fee and unit transfer fee – which are associated with particular transactions and are directly collected from investors at the time of the transaction. The *load fee* is a percentage charge for the purchase or sale of mutual funds; it can be viewed as the commission paid to the brokers. There are two general types of load fee, front-end fees (or sale charges), which are paid when investors buy shares in a fund; and back-end fees (or deferred sale charges), which are paid when investors redeem funds. The *exchange fee (or switching fee)* is the fee charged for exchanging or transferring funds within the same fund family; and the transfer fee is charged for transferring to another fund family. Even though it is impossible to obtain data on mutual fund fees in Thailand, a study by Kasikorn Research (2005) suggests that fees and charges are not very different from one Thai mutual fund to another. Watcharanaka (2003) reveals that Thai mutual funds fees are around 1.5% (ranging between 0.9% and 1.7%).

3.3 Mutual fund data

3.3.1 The Sample

Data pertaining to Thai mutual funds are obtained from the Association of Investment Management Companies (AIMC). Our sample period is from June 2000 to August 2007 because the AIMC does not retain data on anything before this period. Over our sample period, there were 966 funds in the initial sample, in which defunct funds are also included. AIMC classifies mutual funds on the basis of investment policy. We excluded closed-end funds, fixed-income funds and funds which changed their policy over the study period. Subsequently, our sample size was narrowed down to 357 funds. We also eliminated funds with a specific policy – for instance, guaranteed funds, international funds, index funds, sector funds – since they have a different kind of risk exposure and, as a result, they would require different benchmarks to measure their performance. This reduced our final sample to 230 funds. Since in Thailand only one class of share is offered, this number of reported funds not overstated. Table 3.6 shows how the final sample was derived from the initial sample.

Accordingly, our sample comprises 3 kinds of mutual fund investment policy, namely, equity funds, flexible funds and balanced funds. Balanced funds are treated among the flexible funds because they are relatively similar in term of their strategy and asset holding. The total of 230 funds is made up of 166 equity funds and 64 flexible funds, including both general funds and two tax-benefits fund plans (RMF and LTF funds). Since the two tax-benefits plans reveal similar concepts and purposes, both RMF and LTF funds are treated as a single category, called 'tax-benefit funds'.

Table 3.6 Fund sample selection

The table shows how the initial sample was reduced to the final sample used in this study. The data are obtained from the AIMC from June 2000 to August 2007. The data are free from survivorship bias. [a] Fixed income funds are funds which invest predominantly in money and bond markets. [b] Special funds are funds with a specific policy, including guaranteed funds, international funds, index funds and sector funds.

	Fund numbers
Total number of funds served by the AIMC over the period June 2000 - August2007	966
Funds deleted:	
Closed-ended funds	125
Funds which changed their investment policy	12
Fixed income funds[a]	472
Special funds[b]	127
Final number of funds to be used	230

Table 3.7 outlines the number of funds in the sample for each year from 2000 to 2007. Column 3-6 shows the number of funds classified by investment and tax-benefit policy. Over the study period, the number of funds ranges from 103 to 194 funds. Thus, we are confident that this study is robust in regard to sample size. At the end of study period, our data account for around a quarter of all funds in the market[10]. However, this represents a small fraction of the whole. Because fixed income funds have dominated the mutual funds business for the past few years, our sample includes both equity and flexible funds, which play a major role in the capital market.

10 As of June 2007, there were 821 funds with total assets of 1,426 billion Baht (SEC, 2008)

Table 3.7 Number of funds in the sample for each year

The table presents the number of funds in the sample in each year from June 2000 to August 2007. Column 3-6 number of funds is classified by investment policy.

Year	ALL	Number of funds			
		General equity	General flexible	Tax equity	Tax flexible
2000	103	84	19	--	--
2001	104	83	21	--	--
2002	125	85	26	7	7
2003	135	89	31	7	8
2004	164	92	39	23	10
2005	177	99	39	28	11
2006	183	98	41	33	11
2007	194	101	38	45	10

The Association of Investment Management Companies (AIMC) provides weekly data of the total net asset values (TNAs) and net asset values (NAVs). NAVs account for capital gains dividends (reinvested) and administration fees (subtracted). The weekly NAVs data are then calculated to give the weekly continuously compounded returns as in the equation below.

$$R_{p,t} = \ln\left(\frac{NAV_{p,t}}{NAV_{p,t-1}}\right) \tag{3.1}$$

where $R_{p,t}$ is the continuously compounded return of mutual fund p at time t and $NAV_{p,t}$ is the net asset value (NAV) of mutual fund p at time t.

This study employs weekly return data in the analysis, unlike many studies of mutual fund performance. Los (1998) argues that fund managers make decisions and trade on a weekly basis. Thus, using weekly data can increase the precision with which the styles and strategies used by fund managers are identified. Nevertheless, monthly data are also used in testing the robustness of the results. In addition, weekly data make an adequate time-series in estimating risk-adjusted performance on a yearly basis. This makes our analysis of the determinants of mutual fund performance more comprehensive and enables us to control for the year effect.

A summary of fund characteristics during the period studied is presented in Table 3.8. Panel A shows the fund characteristics classified on the basis of investment policy. The sample is dominated by equity funds, as it is clear that a number of funds in column 2 and total asset values (TNAs) in column 4 account for nearly two-thirds of the sample. Nonetheless, the average size of the flexible funds is larger. The average size of the flexible funds asset values is somewhat below 700 million baht, compared to 430 million for equity funds. The average life of a fund in our sample is 227 weeks or about 4 years. Furthermore, the last column shows evidence of large positive cash flows during 2000-2007 in both equity and flexible funds, although equity funds enjoyed greater cash inflows than these flexible funds did. The insight details in fund characteristics are in Panel B, which classifies mutual funds into 4 sub-samples: general equity funds, general flexible funds, tax-benefits equity funds and tax-benefit flexible funds. Although both tax-benfit equity and flexible funds are smaller and have less asset value than general funds, they received higher cash inflows during the period studied. In particular, the tax-benefits equity funds received almost ten times as much in cash inflows than the general equity funds.

Table 3.8 Fund characteristics

The table reports the characteristics of Thai mutual funds grouped by investment policy and tax purpose. Age refers to the life (in weeks) of mutual funds from June 2000 to August 2007. N and TNA respectively refer to the number of funds and the total net assets in THB million, in August 2007. Size refers to the average market capitalization (in THB million). NCF refers to the net cash flows of funds in the sample period. The table shows means and medians (in parentheses).

	N	Age	TNA	Size	NCF
Panel A: Classified by investment policy					
Equity funds	166	230.51	82,598.58	428.85	75.74
		(204)		(205.8)	(-5.94)
Flexible funds	64	216.39	35,826.53	699.78	39.25
		(231.5)		(293)	(-2.23)
All funds	230	226.60	118,425.11	503.91	112.19
		(218)		(232.5)	(-10.08)
Panel B: Classified by investment policy and tax purpose					
General Equity funds	120	279.28	51,594.70	467.18	9.34
		(373)		(240.2)	(-21.02)
Tax-benefits Equity funds	46	105.98	31,003.88	330.99	86.70
		(107)		(156.2)	(8.14)
General Flexible funds	50	227.04	27,098.32	722.59	22.40
		(234)		(306.5)	(-5.05)
Tax-benefits Flexible	14	178.36	8,728.21	618.31	23.24
		(218)		(168.3)	(7.85)

3.3.2 Survivorship bias

The survivorship bias is pointed out by Brown et al. (1992), in that if the funds which are unable to survive for the whole period of the study (dead/defunct funds) are eliminated from the sample, it can upwardly bias the performance measurement. A number of studies consider the effect of this phenomenon. Evidence of overestimation are, for instance, in Elton et al (1996), who estimate this bias in the US mutual fund market as 0.9% per annum and Otten and Bams (2004), who document a severe bias of survival in alpha overestimation of up to 0.64% per year. Moreover, look-ahead bias may arise if we include only funds with a longer period of time in the test. The data provided by AIMC in their database include all defunct, surviving and new funds.

Thus, our sample is not affected by these biases. Nevertheless, Table 3.9 reveals the difference in annual returns between all funds (including dead and surviving funds) and surviving funds in our sample. The differences, in column 8, are quite small in our sample, (0.4% per year). This suggests that the survivorship bias is less severe in Thailand than in the developed market. Nonetheless, in order to ensure that our sample is not affected by these biases, all new, dead and surviving funds are included in the sample.

Table 3.9 Survivorship bias

The table compares the mean returns of all funds and surviving funds in the sample. Fund returns are calculated on the basis of an equally weighted portfolio of funds in a particular style. The return data are annualised and net of expenses. SD refers to standard deviation. N refers to number of funds. Column 2-4 reports summary statistics of all fund samples, including dead funds. Column 5-7 reports the summary statistics of the surviving fund sample. The survivor bias, in column 8, is calculated by subtracting the mean return of the surviving fund portfolios from the mean returns of all fund portfolios.

	All funds			Surviving funds			Survivor
	Mean	SD	N	Mean	SD	N	bias
Panel A: All sample							
ALL	0.1142	0.0277	230	0.1180	0.0282	193	0.004
Panel B: Classified by investment and tax policies							
General Equity	0.1164	0.0301	120	0.1195	0.0300	102	0.003
Tax Equity	0.2120	0.0226	46	0.2078	0.0223	43	-0.004
General Flexible	0.0892	0.0219	50	0.0951	0.0234	37	0.006
Tax Flexible	0.1760	0.0213	14	0.1426	0.0207	11	-0.033

3.4 Conclusions and suggestions for further research

This chapter gives an overview of the mutual fund business in Thailand as well as describing the data used for the remaining study. In sum, the establishment of mutual fund investment in Thailand dates as far back as the 1970s, although its development began only in the past decade.

Nonetheless, its growth and importance have become more significant over time. Currently, the mutual fund business in Thailand is among the fastest growing in the Asia/Pacific region.

With this rapid growth, the mutual fund business in Thailand possesses some characteristics which distinguish it from other major markets. Subsequently, on an overview of the Thai mutual fund industry in Section 3.2, we find two key motivation aspects based on the institutional characteristics which can be seen by students of Thai mutual funds.

The first institutional motivation relates to the unique fund styles. Thailand has two types of exclusive tax-benefit mutual fund: retirement mutual funds (RMF) and long-term equity funds (LTF). These tax-benefit funds allow investors to enjoy income tax shelter for up to 15% of their income when it is tied up in a long-term investment agreement. Mutual funds of this kind have become popular and received great cash inflows compared to general funds. Nonetheless, their unique requirements suggest that the clientèle for them is not the same as for general mutual funds. Similarly, significant cash inflows over time potentially impact on a fund's systematic risk and subsequently its performance (For example, see Warther (1995), Ferson and Schadt (1996), Edelen (1999)).

Nevertheless, reviewing the literature on Thai mutual funds in Chapter 2 shows that none of the studies in Thailand takes these fund types into account and examines them specifically. Thus, it is still unknown how these tax-benefit funds perform in relation to general funds and whether tax-benefit fund managers are able to make use of the restrictions imposed by the tax-benefit funds to earn addition returns. As a result, general and tax-benefit funds should be considered separately in order to compare and contrast the differences in the performance of fund managers and strategy which they use. Moreover, the policy implications of the two tax benefit schemes should be examined.

The second institutional motivation relates to the mutual fund environment in Thailand. Despite its rapid growth, this business is still immature. The Thai mutual fund business is not competitive and is highly controlled by a few bank-owned fund companies. More importantly, information related to each investment style and its past performance is not publicly available. Mutual fund advisors or league tables do not exist.

Furthermore, mutual funds are broadly classified only by investment policy (for example, equity, flexible and bond funds). As a result, it is difficult for investors to make any decision based on performance. Therefore, it would be advisable to investigate what strategy and style they apply within this less competitive market. In addition, it would be interesting to follow how less well-informed or uninformed investors behave in this kind of market.

In order to investigate such issues, this study takes 230 funds from 2000 to 2007 as a sample. The sample comprises equity, flexible and balanced funds. Flexible and balanced funds are combined in a single group. This study also further classifies funds into either general and tax-benefit funds in order to compare and to investigate the impact of the restrictions imposed on the tax-benefit funds. Finally, the sample includes defunct, new and surviving funds and, hence, is free from survivorship and look-ahead biases.

CHAPTER 4

PERFORMANCE OF THAI MUTUAL FUNDS

4

Abstract

This chapter looks in some depth at the performance of mutual funds in Thailand during the period 2000-2007. We find no evidence of stock selection or market timing ability in Thai fund managers. Flexible fund managers adjust their portfolios dynamically, using information from treasury bills and dividend yield, while equity fund managers are more passive. Fund investment styles are fairly homogeneous. Most of them follow medium capitalisation, blend investment style and relatively passive. Large-cap blend funds style yields marginally superior risk-adjusted returns. The performance of tax-benefit funds is superior and statistically different from that of general funds. Finally, mutual fund performance measures are found to be sensitive to data frequency and the model used.

4.1 Introduction

In the past few decades, fund performance measurement has become a popular area in the financial literature. A number of studies have introduced various extensive performance evaluation techniques and sought to measure the performance of funds to see whether fund managers can earn more than the expected returns. Furthermore, understanding mutual fund performance is a key to portfolio management. It allows fund managers to recognise their position and helps investors to understand fund managers' strategies and to select the portfolio which best meets their preferences.

However, due to the demand and the availability of data, studies in mutual fund performance are based mainly in the US and other developed markets. In emerging markets, these studies are limited and inconclusive. Possibly due to the lack of data available and the regulatory differences in each country, only a few studies have investigated whether findings from these developed markets carry over to the emerging markets.

This concern is potentially important, because mutual fund investment in emerging markets has lately extended to a remarkable degree. Furthermore, these emerging markets have distinctive characteristics which are different from those in developed markets, for example, in their volatility, liquidity, inefficiency and regulatory arrangement (Beakaert and Harvey, 2002). Thus, evidence from the developed markets may not give the best explanation of mutual fund performance in emerging markets.

In addition, most of the studies in mutual performance in this region are still based on prevailing performance measures – such as the Sharpe, Treynor and Jensen ratios –which are based on one fixed risk factor. This undermines the robustness of their results, since many researchers argue that asset returns can be explained by other factors in addition to market risk; and these factors are unstable over time (Fama and French, 1992; 1998; Ferson and Warther, 1996; Rouwenhorst, 1999; Barry et al. 1992). Furthermore, most of these studies employ a small sample and survey fund performance over the 1990s, which is relatively out-dated. As a result, there is an unclear picture of the performance in emerging markets of mutual funds.

Thailand is one of the emerging countries where mutual fund investment did not gain much public attention until quite recently. However, for many years now Thai mutual funds have been exceptionally welcomed and their growth has rapidly increased. For instance, the ratio of investment in asset management to GDP was only 7.9% in 2000 but within seven years had risen to 24.1%. This is contrast to the dropping ratio of bank savings to GDP, which was 71.7% in 2000 and went down to 50.8% in 2007 (SEC, 2008)[11]. Furthermore, the asset values of mutual fund investment increased ten-fold and a number of funds increased four-fold within seven years (SEC, 2008). The mutual fund business in Thailand is still relatively new and immature, despite being fast-growing. One of the main concerns is the availability of information on mutual funds. This is because, in Thailand, complete information about mutual funds can be obtained only from the Association of Investment Management Companies (AIMC). However, this institution provides only the raw returns, standard deviation, and information ratios of mutual funds. Furthermore, unlike developed markets, Thai mutual funds are classified only by investment policy (such as equity funds, fixed income funds and flexible funds) and provide no detail of investment styles (such as growth funds and value funds). Thus an unclear picture of mutual fund investment in Thailand emerges, leading to investors hesitating to invest there. A research survey

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[11] See for Chapter 3, Figure 3.3

by the Securities Exchange Commission Thailand (SEC, 2000) suggests familiarity in the fund company is as important as its performance in buying mutual funds. About 70% of mutual fund investors purchase mutual funds through commercial banks and invest for more than a one-year period. Similarly, Kasikorn Research (2005) finds that investment companies which are owned by large commercial banks dominate the mutual fund market although they do not make higher profits than the others. They suggest that this is because bank-owned investment companies have larger distribution channels and investors are more reliant on well-known bank-owned investment companies.

In addition, Thai mutual funds have two unique types of fund: retirement mutual funds (RMF funds) and long-term equity funds (LTF funds), which were established in 2002 and 2004, respectively. These form part of the government plan to enhance stability in the capital market and also to encourage long-term and individual retirement savings for investors. These two types of fund can be viewed as *'tax-benefit funds'* because they offer investors a full tax deduction to contributions of up to 15% of annual income (or maximum THB 300,000), in exchange for making a long-term investment in them[12]. Subsequently, tax-benefit funds have drawn much attention in Thailand, especially among middle- and high-income investors. Nonetheless, in order to gain the tax benefits, the funds carrying them require a longer investment horizon and this may also cause changes in fund managers' strategies and could generate a liquidity return premium (Aragon, 2007).

Even though tax-benefit funds exhibit different characteristics from those of general funds and they have become more important to the mutual fund business in Thailand, no studies

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[12] See Chapter 3, Section 3.2.2 for details

have separately investigated these tax-benefit funds specifically. Furthermore, as in other emerging countries, the studies of mutual fund performance in Thailand are still limited; based on a conventional approach; and use scanty information. For example, the most extensive search has been produced by Nitibhon (2004); this investigates Thai equity mutual fund performance over a 4-year period, using various performance measures. He concludes that equity mutual funds in Thailand produce no statistically significant abnormal returns. However, he does not look at tax-benefit funds separately nor divide his results according the strategies being used by fund managers. Hence, his work does not offer a clear understanding of mutual fund performance in Thailand.

Even though the efficient market hypothesis (EMH) suggests no abnormal return in an efficient market, the vast investment in mutual fund assets has led to a great many mutual fund studies worldwide. However, these studies predominantly use data from the developing countries. In emerging markets, the rapid growth also brings a huge demand for information about mutual funds but, unfortunately, research on this issue is still insufficient. Moreover, the unique characteristics of mutual funds and also the differences in industry environment and investor preferences have brought up the question whether the findings about them from the developed markets can carry over to the emerging markets. For these reasons, a study of mutual fund performance in an emerging market is to be recommended.

Accordingly, in this chapter, I critically assess some evidence of the mutual fund performance in the Thai market. The underlying purpose of this study is to revisit mutual fund performance in an emerging market, using Thailand as a case study. This seeks to address three main issues: first, how do Thai mutual fund managers perform on the risk-adjusted basis?

Second, what strategies do fund managers employ in adjusting their portfolio? And, third, are performance and strategy used different for general funds and tax-benefit funds?

This study contributes to the literature on mutual fund performance in several ways. First, it fills a gap in studies of mutual fund performance, which has rarely been examined outside the developed markets. This study applies models from the literature to a specific emerging market, Thailand, and also compares and contrasts the findings from the previous literature to see whether results from the US and other developed markets carry over to emerging markets. Second, this study uses a more recent and complete dataset than do previous studies in Thailand and the dataset is free from survivorship bias. Third, we include both equity and flexible funds in our dataset and control for the different investment policies by looking at the performance of each separately. This also allows us to compare the differences in performance and strategy to be observed between the two fund styles. Fourth, this study examines the performance of tax-benefits fund types separately and compares results between one and another. This gives us a clearer understanding of the policy implications of these types of mutual fund which can provide evidence for policy makers in Thailand, as well as those in other countries who wish to implement this kind of policy for themselves. Finally, this study also examines the sensitivity of performance measures, portfolio formation methods and also the frequency of the data used.

In total, this study considers 230 Thai mutual funds from June 2000 to August 2007 and evaluates performance using both unconditional and conditional measures. I find, first, that, consistently with the evidence from developed markets, Thai mutual funds, as a whole, do not have abnormal return or timing ability. Mutual funds insignificantly underperform the market by 1.12% per year, somewhat lower when using conditional measures. However, the performance over the period studied is not stable. Mutual funds perform better and very close to zero before

2002 but then worsen afterwards. Second, the multifactor model is economically and statistically significant for mutual fund performance in Thailand. Third, the style of Thai fund managers is fairly homogeneous and passive. They favour mid-cap and blend (value and growth) style stocks, even though large-cap and blend funds perform better than other fund styles. Fourth, fund managers adjust their portfolios dynamically using macroeconomic factors. However, flexible fund managers are more likely to use dynamic strategies than are equity fund managers. Fifth, the performance of tax-benefit funds is higher than and significantly different from that of general funds. Finally, the performance of mutual funds is sensitive to the models and time intervals used in the study but not to the portfolio formation method.

The rest of the chapter is organised as follows. Section 4.2 gives a literature survey of mutual fund performance in both developed and emerging markets. Section 4.3 describes the data and the rationale of the models used in this paper. Section 4.4 presents the empirical results of the research. Section 4.5 presents the results of robustness tests and, finally, section 4.6 draws some conclusions and makes suggestions for future research.

4.2 Previous evidence and hypotheses

In an efficient capital market, stock prices reflect all available information. Therefore, it is not possible to earn at a greater rate than the market by using information, in particular when transaction costs are considered (Fama, 1970). Examining the performance of fund managers is one approach to investigating market efficiency. Related studies related in mutual fund performance include that of Jensen (1968) finds that using net returns and gross returns, respectively, that, during 1945-1964, US funds perform 1.1% and 0.4% per year less than the market and only 39 funds have positive alphas. Similarly, Grinblatt and Titman (1989), Ippolito (1989), Cumby and Glen (1990) and Malkiel (1995) use Jensen's performance measure to investigate US mutual funds and draw the same conclusion: that mutual fund performance is indistinguishable from zero. Outside the US, Cai et al. (1997) have investigated mutual fund performance in Japan from 1981 to 1992 and find severe underperformance. In the UK, Blake and Timmermann (1998) have investigated unit trusts for the period 1972 to 1995 and find inferior performance of 1.8% per annum.

Writers who examine the market timing ability of mutual fund managers include Treynor and Mazuy (1966), Kon (1983), Ferson and Warther (1996), Rao (2000), Matallin-Saez (2006), and Benson and Faff (2006). Their studies suggest that there is no evidence of market timing ability in fund managers. However, the findings are in contrast to the conclusions of Comer (2006), who discovers significant timing ability in the US hybrid funds during the 1990s.

Studies in mutual fund performance in emerging markets include that of Roy and Deb (2003) who investigate the performance of 89 Indian mutual funds and produce evidence of their outperforming the market and this is similar to the empirical evidence from Slovenian mutual funds produced by Timotej et al. (2005). In contrast, Fauziah Md. and Mansor (2007) and Soo-Wah (2007) study the performance of mutual funds in Malaysia. Their results suggest that Malaysian mutual funds are unable to beat the market. Soo-Wah (2007) also finds evidence of poor market timing on the part of Malaysian fund managers. In Thailand, some empirical research has been done on mutual fund performance, using a wide range of data and methodology, although most of these studies are based on dissertations. For example, Plabplatern (1997) finds overall positive performance and 25 funds show market timing ability. Pornchiya (2000) applies Jensen's traditional model to equity funds for the period 1996-1999 and concludes that equity funds in Thailand are unable to outperform the market. Srisuchart (2001), Karinchai (2001) and Vongniphon (2002) use Jensen's traditional approach to measure performance and draw a similar conclusion: that mutual funds in Thailand do not provide abnormal returns. Sakavongsivimol (2002) finds that 4 fund companies provide positive returns, while the returns of another 6 fund companies are not different from zero. Khanthavit (2001) concludes that Thai fund managers perform indistinguishably from zero. He suggests that this is not because they do not have selectivity or timing ability but because they choose to concentrate on timing ability during bullish markets and concentrate on the ability to be selective in bearish markets. In addition, Sakranan (1998) and Chunhachinda and Tungprasert (2004) find evidence of timing ability among fund managers in Thailand.

Reviewing the literature on mutual fund performance reveals mixed findings. In particular, studies of mutual fund performance in emerging markets are still narrow in scope, use short periods of observation and survey limited numbers of funds. Their claims are tested later in the first two hypotheses:

$H_{4.1}$: Thai mutual fund managers do not have selectivity ability

$H_{4.2}$: Thai mutual fund managers do not have market timing ability

Roll (1977, 1978) argues that the market portfolio is unobservable and, therefore, that Jensen's measure can be sensitive to different portfolio benchmarks. Grinblatt and Titman (1994), Fletcher (1995) and Kothari and Warner (1997) investigate performance using different benchmarks and confirm that performance is sensitive to the benchmark used, although this is contrast to evidence from emerging markets. Soo-Wah (2007) suggests that the benchmark used has no impact on mutual fund performance in Malaysia.

The more recent studies have evaluated mutual fund performance using multi-benchmark models and are moving toward more sophisticated performance measures. For example, Gruber (1996) employs a multifactor model and finds that mutual funds under-perform the benchmark by 0.65% per year. Ferson and Schadt (1996) examine 67 open-ended funds in the US market, using their proposed measure, which includes 5 time-varying variables. Their results show insignificantly positive performance. They also reveal that the use of their measure improves fund performance and that the additional variables, such as treasury bill, dividend yield and term structure in particular, are statistically significant in the model. Similarly, Cahart (1997) suggests a four-factor model which includes three variables in addition to the market benchmark capturing size, book-to-market and momentum strategies. He concludes that there is only slight evidence that any mutual fund manager can beat the market. Size and momentum factors account for most of the explanation in US mutual fund returns.

In Australia, Sawicki and Ong (2000) employ Ferson and Schadt's conditional measure. They find positive performance in Australian funds between 1983 and 1995 and confirm the statistical significance of incorporating lagged information variables, in particular the dividend yield, in the model. They confirm that the conditional model shifts the alphas to the right and makes funds look better. In contrast, Gharghori et al. (2007) find that incorporating the conditional measure slightly lowers the apparent performance in equity funds in Australia.

Kothari and Warner (1997) and Fletcher and Forbes (2002) support the claim that multifactor models are superior to Jensen's single index model and give a better explanation of cross-section returns. Similarly, Otten and Bams (2004) reveal that Cahart's four-factor model is the best available to explain mutual fund returns and the conditional model gives statistical and economic importance to the performance measurement.

The additional variables used in multifactor measures provide evidence of explaining stock returns not only in the developed markets, but also in the emerging markets. For instance, Fama and French (1993, 1998) suggest that the size and value premium is evident in developed markets, as well as in emerging markets. Rouwenhorst (1999) also concludes that emerging market stock exhibits momentum and that small and value stocks outperform growth stocks. Similarly, Drew and Veeraraghavan (2002) suggest that there is a size and value premium in Malaysia. Brown et al. (2008) reveal the momentum premium in Hong Kong and the value premium in Singapore, while Taiwan shows a reversed value premium. In contrast, Griffin et al. (2003) examine momentum strategy in 39 international markets and conclude that Asian markets provide the weakest evidence of this.

As a result, the multifactor models are potentially applicable also to the emerging markets. Nevertheless, only a few studies in emerging markets have employed multifactor models for assessing mutual fund performance. Roy and Deb (2003) adopt Ferson and Schadt's conditional measure for Indian mutual funds. They conclude that the performance of mutual funds in India improves when the conditional variables are incorporated. Only one study using multifactor measures in Thailand has been conducted, the one by Nitibhon (2004). Its results show insignificantly positive returns of equity funds. It also reveals that there is no evidence of momentum strategies among Thai fund managers and that only winning fund managers adjust their portfolios dynamically according to the return of the risk-free rate. Therefore, a further three hypotheses may be posited:

$H_{4.3}$: Thai fund managers employ dynamic strategies in adjusting their portfolios.

$H_{4.4}$: Thai fund managers employ size, book-to-market and momentum strategies in adjusting their portfolios.

$H_{4.5}$: Fund style has an impact on mutual fund performance.

There are also hypotheses which are drawn from the institutional perspective of introducing the tax-benefit mutual funds in 2002. These tax-benefit funds have encouraged the immense growth of the Thai mutual fund business. They give up to 15% tax relief but they are also restricted as long-term investments. Effectively, these funds can also be viewed as load mutual funds charging an indirect back-end fee, which is the fee charged for redeeming funds. Ippolito (1989) reveals that load mutual funds perform 3.5% higher than no-load funds do.

In theory, the restriction in tax-benefit funds is likely to have a positive impact on fund performance for two main reasons. First, it reduces the 'cost of liquidity-motivated trading'. General open-ended mutual funds give flexibility to investors, since they are allowed to buy and redeem their shares at any time. However, this benefit can be costly because it forces a fund manager to engage in uninformed trading. Consider a fund manager with a target efficient portfolio; when there are significant cash inflows into the portfolio, a larger cash position is created, which results in the lowering of the portfolio beta. Conversely, when fund managers experience a cash outflow shock, they are also forced to liquidate their portfolio immediately and cannot trade on private information efficiently. Subsequently, fund flows will have a negative impact on fund performance. Nonetheless, the tax-benefit funds restrict investors from liquidating their share for a certain time period and, therefore, the negative impact of doing so is expected to lessen.

Studies of the impact of fund flows on performance include the following: Warther (1995) finds a negative relation between fund beta and money flows. Edelen (1999) shows that once the effect of liquidity trading is controlled, the mutual fund's abnormal return increases from -1.6% to -0.2%. Nonetheless, Benson and Faff (2006) analyse the relevance of flows to performance evaluation, using Australian international equity funds during the 1990s. They point out that only flows relative to sector flows reduce the perverse negative timing in mutual funds and they have no impact on abnormal returns.

The second reason for the possible impact of restriction on performance is that it creates a longer investment horizon. Amihud and Mendelson (1986) note the 'clientèle effect' in which longer horizon investors have a positive relation to the expected returns because they hold less in liquid assets and the return increases with illiquidity. This is consistent with the conventional belief in mutual fund literature that active fund managers are unable to outperform a passive buy-and-hold portfolio. Nonetheless, the impact of a longer investment horizon on mutual fund performance has never been studied thoroughly, since mutual funds typically do not have restrictions attached to them.

Restrictions are indeed more common on hedge fund investments than on mutual funds. They include such features as lockup provision, a redemption notice period, redemption frequency and minimum investment. Therefore, studies on the impact of restrictions on performance in the hedge fund literature are well documented. Liang (1999) finds that hedge fund performance is positively related to the lockup period. Similarly, Bali et al. (2007) reveal the higher expected return in hedge funds with lockup provision than those without. Liang and Park (2007) argue that the higher returns in lockup hedge funds can be explained by the illiquidity premium. Aragon (2007) finds that hedge funds with lockup restrictions outperform non-lockup funds by 4%-7% per year. He also reveals a positive relation between share restriction and illiquidity assets and suggests that the outperforming in lockup hedge funds is to be attributed to the share illiquidity premium. Liang and Park (2008) show that onshore hedge funds impose a higher degree of share restriction. Nevertheless, offshore hedge funds collect a higher illiquidity premium, 4.4% per year, compared to 2.7% per year for onshore funds. Moreover, Agarwal et al. (2008) suggest that share restrictions are important drivers of hedge fund returns. In contrast to the findings above, Joenväärä and Tolonen (2008), who find that hedge funds with lockup generate 3.8%-5.4% lower Sharpe ratios than non-lockup funds do in the period from 1995 to 2006.

Although mutual funds do not commonly impose restrictions, theory and empirical evidence from the hedge fund literature above suggest the positive relation between restriction and fund performance. Therefore, one could expect that the restrictions imposed on the tax-benefit funds in Thailand would yield similar results. However, because the tax-benefit funds are types of fund unique to Thailand, this issue has never been addressed before. Accordingly, the two following hypotheses based on the institutional framework are:

$H_{4.6}$: There is no difference in mutual fund performance between two sub-periods.

$H_{4.7}$: Performance of tax-benefit mutual funds is different from that of general mutual funds

4.3 Data and Methodology

4.3.1 Mutual fund sample

This study considers equity and flexible open-ended mutual funds in Thailand from June 2000 to August 2007. In total, there are 230 mutual funds, made up of 166 equity funds and 64 flexible funds. Data on weekly funds data are collected from the AIMC and used to calculate continuous weekly returns[13]. The sample is free from survivorship bias, since the sample includes both surviving and dead funds.

In order to assess the performance of Thai mutual funds, this study analyses mutual funds at three levels; overall level, investment policy level and individual level. The first two levels use the equally weighted portfolio approach to combine funds together. For the overall level, all 230 mutual funds are included. Similarly, for the investment policy level, mutual funds are formed on the basis of their investment policy, as either equity or flexible funds, which results in two investment policy portfolios. At the individual level, mutual funds with less than 24-week observations are excluded in order to ensure that estimation is robust for the sample size. Because of this filter, survivorship and look-ahead biases may arise. Nevertheless, results in the previous chapter (see Table 3.9) reveal that the differences are rather small compared to the evidence in developed markets. Thus, we expect these biases to be very low.

Table 4.1 presents descriptive statistics of returns for mutual fund portfolios which calculate with an equally weighted approach. Panel A shows the results from aggregate and

[13] See Chapter 3, Section 3.4 for details.

investment policy levels; and Panel B shows the results of portfolios which are further classified into either general or tax-benefit fund styles.

Table 4.1 Descriptive statistics of weekly returns for fund portfolios

The table reports descriptive statistics of the weekly returns for fund portfolios from June 2000 to August 2007. Portfolios are constructed using the equally weighted method. SD refers to standard deviation. N refers to the number of funds included in the portfolio.

	Mean	SD	Min	Max	N
Panel A: Aggregated and investment policy portfolios					
Aggregated portfolio	0.00208	0.02775	-0.1175	0.09483	230
Equity funds portfolio	0.00220	0.02972	-0.1251	0.09979	166
Flexible funds portfolio	0.00176	0.02194	-0.0876	0.07091	64
PANEL B: General vs. Tax-benefit funds portfolios					
General equity funds portfolio	0.00212	0.03012	-0.1251	0.09979	120
General flexible funds portfolio	0.00165	0.02191	-0.0876	0.07091	50
Tax-benefit general funds portfolio	0.00370	0.02255	-0.0716	0.06795	46
Tax-benefit general funds portfolio	0.00311	0.02133	-0.0647	0.05983	14

4.3.2 Performance measures

4.3.2.1 The Jensen measure

The first measure we use in measuring mutual fund performance is the Jensen measure. This measure is a well-known performance measure, which is widely used among academics and practitioners. Its method is a single factor regression and was proposed by Jensen (1968), who built this model based solely on the Capital Asset Pricing Model (CAPM). Jensen's estimated regression equation is as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + \varepsilon_t \qquad (4.1)$$

where $(R_{pt} - R_{ft})$ and $(R_{mt} - R_{ft})$ are, respectively, the excess return on portfolio p and on the benchmark portfolio over the risk-free rate (R_{ft}) at time t; β_p is the parameter estimating the unconditional beta of portfolio p; ε_{it} is the random error of portfolio p. The intercept of this model, α_p, is called Jensen's alpha. It measures the ability of the fund manager to forecast future returns. A fund with buy-and-hold strategy is expected to yield a zero intercept. If a fund manager performs better (worse) than the relative benchmark returns, then the Jensen's alpha will be positive (negative).

4.3.2.2 Market timing

Market timing ability is the ability of a fund manager to adjust his portfolio according to market conditions. We use the work of Treynor and Mazuy (1966) in measuring market timing which allows the fund risk factor to fluctuate over time based on the size of market return. If the fund manager is able to time the market, he will incur raised portfolio risk when the market is going up and lowered portfolio risk when the market slows down. Consequently, the fund's market beta is not linear. Treynor and Mazuy (1966) capture this non-linear relationship by including a square term of the market returns as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + \gamma_p (R_{mt} - R_{ft})^2 + \varepsilon_t \qquad (4.2)$$

where R_{pt} and R_{mt} is the returns of fund and market portfolio, respectively. This study also considers the dummy variable market timing approach as a check of robustness in results. The dummy variable market timing approach allows the beta to be changed only between up and down market conditions (Henriksson and Merton, 1981).

$$R_{pt} - R_{ft} = \alpha_p + \beta_m (R_{mt} - R_{ft}) - \gamma_p D_t (R_{mt} - R_{ft}) + \varepsilon_{pt} \qquad (4.3)$$

where D_t = 1 if the market is down (R_{mt} - R_{ft} < 0), and zero otherwise. The coefficient of the square term (γ_p) in both Equations (4.2) and (4.3) represents the timing ability of the fund manager. If the fund manager is able to predict the direction of the market correctly, the coefficient will be positive and significant, but if he is not, the opposite result will occur.

4.3.2.3 Four-factor model

A number of studies argue that there are other factors outside market returns which can explain the cross-sectional returns of stocks. For instance, Fama and French (1992, 1993) examine the cross-section average returns on 25 stock portfolios which are sorted by size and book-to-market value (BE/ME). They find that cross-section stock returns can be best explained by the return of the market portfolio and two mimicking portfolios related to the size and value premium. Jegadeesh and Titman (1993, 2001) also point out the momentum anomaly by which cross-section stock can be explained by the prior year return.

In consequence, Cahart (1997) extends Jensen's single index model to a multifactor model by proposing the four-factor model, which incorporates a variable to capture size and value risk premiums, as well as the momentum effect. Cahart's four-factor model is:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + \beta_{2p} SMB_t + \beta_{3p} HML_t + PR1YR_t + \varepsilon_t \qquad (4.4)$$

where SMB_t is the size premium factor, which is the difference between returns on small stock portfolios and large stock portfolios. HML_t is the value premium, which is the difference in return between a portfolio of high BE/ME stocks (growth stock) and a portfolio of low BE/ME stocks (value stock portfolio). PR1YR is the difference in returns between a portfolio of a past year (winner) and a portfolio of a past year (loser).

4.3.2.4 Conditional measure

Ferson and Schadt (1996) argue that there is a time variation in risk and returns which is due to three main factors: first, the change in betas of the underlying assets; second, the change in portfolio weight of the value; and third, the alteration in portfolio weights by the fund manager. Therefore, the unconditional performance measures mentioned above are biased, since it is assumed that the risk factors are fixed over time. However, if a fund manager follows active strategies and adjust his portfolio according to the change in macro economic conditions, the performance measure will be upwardly biased and unreliable. Furthermore, in the semi-strong form of the efficient market, the use of readily available public information should not be judged a superior performance. For this reason, Ferson and Schadt (1996) propose a conditional model which assumes that portfolio conditional beta is a linear function of a set of public information variables.

$$\beta_p Z_{t-1} = \beta_{0p} + \beta_p' Z_{t-1} \tag{4.5}$$

where Z_{t-1} represents a vector of predetermined variables lagged t period. These variables are public information variables which previous studies have shown to have predictability power for the returns and risks of stocks and bonds. There are a number of macroeconomic variables which could be used; for example, dividend yields, yield spread, interest rate and seasonal effect. By multiplying the market return to $\beta_p Z_{t-1}$ the conditional Jensen measure is obtained:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{0p}(R_{mt} - R_{ft}) + \delta_p' \, [(R_{mt} - R_{ft})Z_{t-1}] + \varepsilon_t \tag{4.6}$$

where Z_{t-1} is the information variables at time t-1, which is the interaction term to capture the variability in beta; and δ_p is the vector of parameter which measures how much the conditional beta varies with respect to the vector of public information variables.

4.3.3 Benchmarks and variables

Since our data are local mutual funds which invest primarily in the stock exchange of Thailand, the Stock Exchange of Thailand Index (SET index) is chosen as a market benchmark portfolio. The SET index is value-weighted, comprising all stocks listed in the Stock Exchange of Thailand (SET). Its returns are extracted from the DataStream database[14].

Nevertheless, performance can be sensitive to the choice of benchmark (Grinblatt and Titman, 1994; Kothari and Warner, 1997). We also consider the SET50 and SET100 indices as alternative benchmarks but the results are not different when the choice of benchmark changes. This is because the SET50 and SET100 indices cover more than 75% of Thai market capitalization. Moreover, the bond index is also considered as a benchmark for measuring flexible fund performance. However, we disregard this index because the data are only available from 2002, which is not enough to cover our study period.

The Bank of Thailand's 7-day repurchase rate (Repo rate) is used as a risk-free rate factor, since its maturity date is close to that of our mutual fund data. The data are also collected from the DataStream database. These data are displayed in an annual yield and we subsequently adjust to the weekly continuous returns using the following formula:

$$R_{w,ft} = \sqrt[52]{(1 + R_{a,ft})} - 1 \tag{4.7}$$

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[14] The return index represents the theoretical aggregate growth in value of the constituents of the index. The index constituents are deemed to return an aggregate daily dividend, which is included as an incremental amount to the daily change in price index. The calculation is as follows:

$$RI_t = RI_{t-1} * \frac{PI_t}{PI_{t-1}} * \left(1 + \frac{DY}{100 * n}\right)$$

where RI_t = return index on day t; RI_{t-1} = return index on previous day; PI_t = price index on day t; PI_{t-1} = price index on previous day; DY = dividend yield of the price index; n = number of days in the financial year (normally 260) where $R_{a,ft}$ is the 7-day repurchase annual rate

In order to estimate Ferson and Schadt's conditional measure, this study employs 3 predetermined economic variables, namely, treasury-bill yield, dividend yield and a dummy variable of the January effect. The choice of our variables is based on the evidence from previous studies, which reveal the importance of these variables in the conditional model for both developed and emerging markets (see, for example, Ferson and Schadt (1996); Cai et al. (1997); Ferson and Harvey (1999); Roy and Deb (2003); Nitibhon (2004)). In addition, choosing these macroeconomic variables is also in line with a study by Klapper et al (2004), who suggest that investors in emerging markets focus on this information more than they do on market microstructure factors. A vector of predetermined variable is defined:

$$Z_{t-1} = [TB_{t-1} \quad DY_{t-1} \quad JAN_{t-1}] \tag{4.8}$$

The conditioning predetermined variables are the 7-day repurchase rate (TB_{t-1}), dividend yield of the value weighted SET index (DY_{t-1}) and the January dummy variable (JAN_{t-1}). These data are obtained from DataStream database.

To estimate Cahart's four-factor model, as specified in Equation 4.3, SMB, HML and PR1YR variables are self-constructed following Fama and French (1992, 1993) and Cahart (1997), using Thai stock data. We include all the stocks listed in the Stock Exchange of Thailand, excluding those stocks with negative book-to-market value. At the beginning of each year all stocks are allocated into either small (S) or big (B) groups using the median of the market capitalization. Stocks are also assigned to High (H), medium (M) and low (L) book-to-market value, based on 30%, 40% and 30% breakpoints, respectively. Thus, we obtain six groups of stocks based on size and BE/ME and form the six value weighted portfolios according to this (SH, SM, SL, BH, BM, BL). These portfolios are then re-balanced at the start of every year. The return of small minus big portfolios (SMB) is calculated from the difference between the average of three small portfolios (SH, SM, SL) and three large portfolios (BM, BH, BL). The return of the mimicking portfolio related to value premium, HML, is calculated from the difference between the average of two high BE/ME portfolios (SH, BH) and low BE/ME portfolios (SL, BL). Likewise, the portfolio mimicking momentum strategy, PR1YR, is constructed following the method of Cahart (1997), which is to take the difference between the equally-weighted portfolios of previously high and low returns. The summary statistics and correlation matrixes of the variables used in this study are presented below.

Table 4.2 Descriptive statistics and correlation matrix of the risk factors

The table gives descriptive statistics and the correlation matrix for the risk factors. R_m is the excess returns of SET index. SD is the standard deviation of the returns. SMB, HML and PR1YR are the returns of the portfolios mimicking size, value and momentum premium, respectively. TB and DY refer respectively to the 7-day-treasury-bill yield and the dividend yield from the Thai stock market.

	Descriptive statistics		Correlation matrix					
Variable	Mean return	SD	R_m	SMB	HML	PR1YR	TB	DY
R_m	0.0023	0.0330	1	-	-	-	-	-
SMB	0.0027	0.0230	-0.252	1	-	-	-	-
HML	-0.0029	0.0366	-0.069	0.518	1	-	-	-
PR1YR	0.0081	0.0262	-0.023	0.119	0.088	1	-	-
TB	0.0004	0.0002	-0.030	0.019	-0.055	-0.316	1	-
DY	2.9420	0.8790	0.011	0.013	-0.091	-0.543	0.765	1

4.4 Empirical results

This study analyses mutual funds based on portfolios and individual funds. At portfolio level, an all-fund portfolio and two style portfolios are estimated. The advantage of using the portfolio method is that it outlines an overall picture of mutual fund performance as well as letting us directly compare the differences between fund styles. However, the limitation of using the portfolio method is that it pools and uses the average return of these mutual funds without considering its variations. In addition, the results may be sensitive to the methods for portfolio construction. In this study, we base our results on the equally weighted method, which assumes that we invest the same amount of money in each fund. Nevertheless, in section 4.5.2 we test the sensitivity in results for the portfolio construction method.

Although the portfolios of mutual funds give a brief outline of mutual fund performance, it is unable to differentiate funds which perform well from the rest. As a result, the present study also analyses mutual performance at individual level in order to provide a clearer picture of mutual fund performance. At the individual level, mutual funds with less than 24-week observations are excluded from the results in order to avoid sample size bias. Also, a small sample is unlikely to follow normal distribution and may bring more chance of hypothesis-testing errors, even though excluding some funds from the sample may have the consequences of survivorship and look-ahead bias. We expect this effect to be small, in any case. The Ordinary Least Square (OLS) estimation is used for the analysis. This section shows empirically the results of Thai mutual fund performance. Section 4.4.1 discusses the performance of mutual funds in terms of both selectivity and timing abilities. Section 4.4.2 analyses the strategies used by fund managers. Section 4.4.3 analyses the performance of funds within two sub-periods. Section 4.4.4 compares differences in performance between general and tax-benefit funds and section 4.4.5 examines mutual fund style and also investigates performance according to style.

4.4.1 Performance

4.4.1.1 Overall performance

This section examines the overall performance of Thai mutual fund managers by first looking at the summary statistics of mutual fund returns in comparison to market returns and the returns of treasury-bills and then examines risk-adjusted performance using Jensen's measure in both unconditional and conditional approaches. The data are analysed on both portfolio and individual levels.

Table 4.3 gives the summary statistics of returns for fund portfolios in each category. The table analyses the basic performance of mutual funds for the whole sample period (columns 2-5) as well as the 2 sub-periods, June 2000 to December 2001 (columns 6-9) and January 2002 to August 2007 (columns 10-13) using raw returns, total risk, excess returns and the Sharpe ratio. The summary statistics of individual funds are in Appendix A.2. The inequality of the two unequal sub-periods is mainly due to two factors. First, there is a big difference in economic situation between the two periods. The market was quite slow during 2000-2001 and the GDP growth rate was only 2.2% in 2001. This contrasts with 2002, when the market picked up and become a bullish market with a GDP growth rate of well over 5% in 2002, rising to 7% in 2003. Second, there was a dramatic change in the environment for mutual fund investment from the beginning of 2002, when tax-benefits funds were introduced. These created enormous public interest in mutual fund investment, which subsequently brought large cash inflows into the industry. The evidence of this can be seen in Table 4.1, where positive cash flows are shown to be mainly caused by tax-benefit funds.

The results from panel A suggest that, overall, mutual funds generate average raw returns of 11.42% per year, which is below the average return from the market (15.18% per year). Equity funds produce average returns higher than flexible funds, 12.13% compared to 9.59% p.a. The variability of mutual funds returns over a 7-year period are presented in column 3. Although the returns of mutual funds are lower than the market returns, their returns are also less volatile than investment in the stock market. The Sharpe ratio, in column 5, shows the measurement of excess returns compared to the total risk (standard deviation). This measure gives the unit of reward received when taking an extra unit of risk. The results suggest that investment in the stock market earns a Sharpe ratio of 0.066, which is slightly higher than either the equity or flexible funds (0.059 and 0.060 respectively). Therefore, it can be concluded that during the period 2000 – 2007, mutual fund managers still performed less well than the market, after adjusting for total risk. Columns 6-9 give evidence of the returns in the period from 2000 to 2002, which betrays evidence of the economic recession. The average losses on the stock market are well below 10% per annum in this sub-period. However, in the bear market mutual funds perform particularly well in relation to the market. Equity and flexible funds yield -8.62% and -4.65% per annum respectively. Similarly, the variability of mutual funds is considerably lower than that of the market. These make the Sharpe ratios of mutual funds superior to the market. In contrast to the period after 2002, when the market was markedly going up, the average raw returns from the market were more than 23% per year. The mutual funds show lower mean returns and standard deviation. The Sharpe ratio of the overall market was 0.118, which was higher than either the equity or the flexible fund portfolio (0.101 and 0.096, respectively)

Mutual funds are further classified into tax-benefit and general fund styles, which are shown in panel B. Between 2002 and 2007, tax-benefit funds produced higher returns than general funds for both equity and flexible fund styles. The average raw return from tax-benefit equity funds was 21.2% per year, compared to 10% in general equity funds. Similarly, the return for tax-benefit flexible fund portfolios was 17.55% per year, while it was 13% in general flexible funds. The Sharpe ratios in the last column also confirm that tax-benefit funds portfolios outperform general funds in this period.

In sum, the findings of basic performance lead us to conclude that Thai mutual funds underperform the market when raw returns and the Sharpe ratio are considered. Flexible funds have lower raw returns than equity funds but their returns are also less volatile. Therefore, flexible fund portfolios have a greater Sharpe ratio than equity fund portfolios. Although, the Sharpe ratio are commonly used in practice and the results show that both funds underperform the market benchmark, the Sharpe ratio can only be used in ranking funds in relation to their peers but it provides no statistic or economic meanings. Therefore, the results of the Jensen model, using both unconditional and conditional measures, are presented in Table 4.4. This model, based on the capital asset pricing model, gives an intercept (alpha) estimation, which refers to the fund performance in relation to the benchmark return. Using this measure allows us to explore mutual fund performance without comparing other funds.

Table 4.3 An overview of the performance of mutual fund portfolios

The table reports the descriptive statistics of the mutual funds returns in the sample between June 2000 and August 2007. Funds are grouped by investment policy and construct equally weighted portfolios. Mean return is the percentage of annualized return. Mean excess return is the weekly return in the excess of 7-day treasury bills. The Sharpe ratio is the proportion of mean excess return to standard deviation. In panel A, SET represents the returns of the SET index; ALL represents a portfolio of all the mutual funds in our sample; EQUITY stands for a portfolio of equity funds; FLEXIBLE for a portfolio of flexible funds. In Panel B, GEN-EQ stands for a portfolio of general equity funds; GEN-FLEX for a portfolio of general flexible funds; TAX-EQ for a portfolio of tax-benefits equity funds; and TAX-FLEX for a portfolio of tax-benefits flexible funds.

	Whole sample period				June 2000 - December 2001				January 2002 - August 2007			
	Mean Return (% pa)	Standard Deviation	Mean Excess Return	Sharpe ratio	Mean Return (% pa)	Standard Deviation	Mean Excess Return	Sharpe ratio	Mean Return (% pa)	Standard Deviation	Mean Excess Return	Sharpe ratio
Panel A: SET index; aggregated and investment policy portfolios												
SET index	15.18	3.30	0.228	0.069	-10.31	4.13	-0.24	-0.058	23.44	3.02	0.357	0.118
ALL	11.42	2.78	0.164	0.059	-7.93	3.29	-0.19	-0.058	17.46	2.61	0.262	0.100
EQUITY	12.13	2.97	0.176	0.059	-8.62	3.52	-0.20	-0.058	18.66	2.80	0.281	0.101
FLEXIBLE	9.59	2.19	0.132	0.060	-4.65	2.47	-0.12	-0.050	13.89	2.11	0.202	0.096
Panel B: General vs. Tax-benefit portfolios												
GEN-EQ	11.64	3.01	0.167	0.056	-8.62	3.52	-0.20	-0.058	18.00	2.85	0.271	0.095
GEN-FLEX	8.92	2.19	0.120	0.055	-4.65	2.47	-0.12	-0.050	13.01	2.11	0.187	0.089
TAX-EQ	21.20	2.26	0.326	0.145	--	--	--	--	21.20	2.26	0.322	0.143
TAX-FLEX	17.55	2.13	0.267	0.125	--	--	--	--	17.55	2.13	0.263	0.123

Table 4.4 summarises performance using Jensen models based on both unconditional and conditional measures. Results at portfolio level are presented in panels A and B. This suggests that, at both overall and investment policy levels, mutual funds do not have abnormal returns. The alpha of the all-fund portfolio is statistically insignificant below the market by 0.023 percent per week or about 1.19 percent per annum[15]. At the investment policy level, the average performance of the flexible fund was -0.015% per week (-0.78% p.a.), which was better than the equity fund (-0.023% per week or -1.19% p.a.). Performance estimated with the conditional measure is presented in columns 4 and 5. When time-varying predetermined variables are included, the alphas are still insignificant even though there are somewhat below the unconditional measure. With the conditional measure, mutual funds averagely insignificantly under-perform 0.034% per week below the market (-1.75% p.a.).

The adjusted R-squares vary from 93% to 95%. These very high adjusted R-squares are consistent with the literature (e.g. Ferson and Schadt 1996; Sawick and Ong, 2000) and can be interpreted to show that fund managers employ a passive strategy, following the market closely but not performing so well. Since the data used in this study do not include fees and expenses, the underperforming may be due to the expenses and fees, as pointed out in Jensen (1968) and Malkiel (1995). Nevertheless, because the available data are limited, this study is unable to further investigate the performance of mutual funds before deducting fees and expenses.

[15] Annual Percentage is calculated using a compounded annual return

Table 4.4 The Jensen performance measure

The table reports the results of estimations of Jensen's unconditional and conditional measures at overall level, investment policy level and individual level in panels A, B and C, respectively. The measure estimates funds for June 2000 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's (1980), in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method. Alpha indicates the abnormal returns of the portfolio. R^2 represents the adjusted correlation coefficient. The conditional measure, in columns 4-5, is estimated using 3 time-varying variables; treasury-bill yield, dividend yield and the dummy variable of the January effect. The Wald test, in the last column, is under the null hypothesis that additional variables in the conditional measure are jointly equal to zero. Panel C presents the number of funds with positive and negative abnormal returns. The number of funds with negative abnormal returns is presented in square parentheses [ ]. Funds with less than 24-week observations are excluded. Sig 5% refers to the number of funds for which abnormal performances are significant at a 5% level.

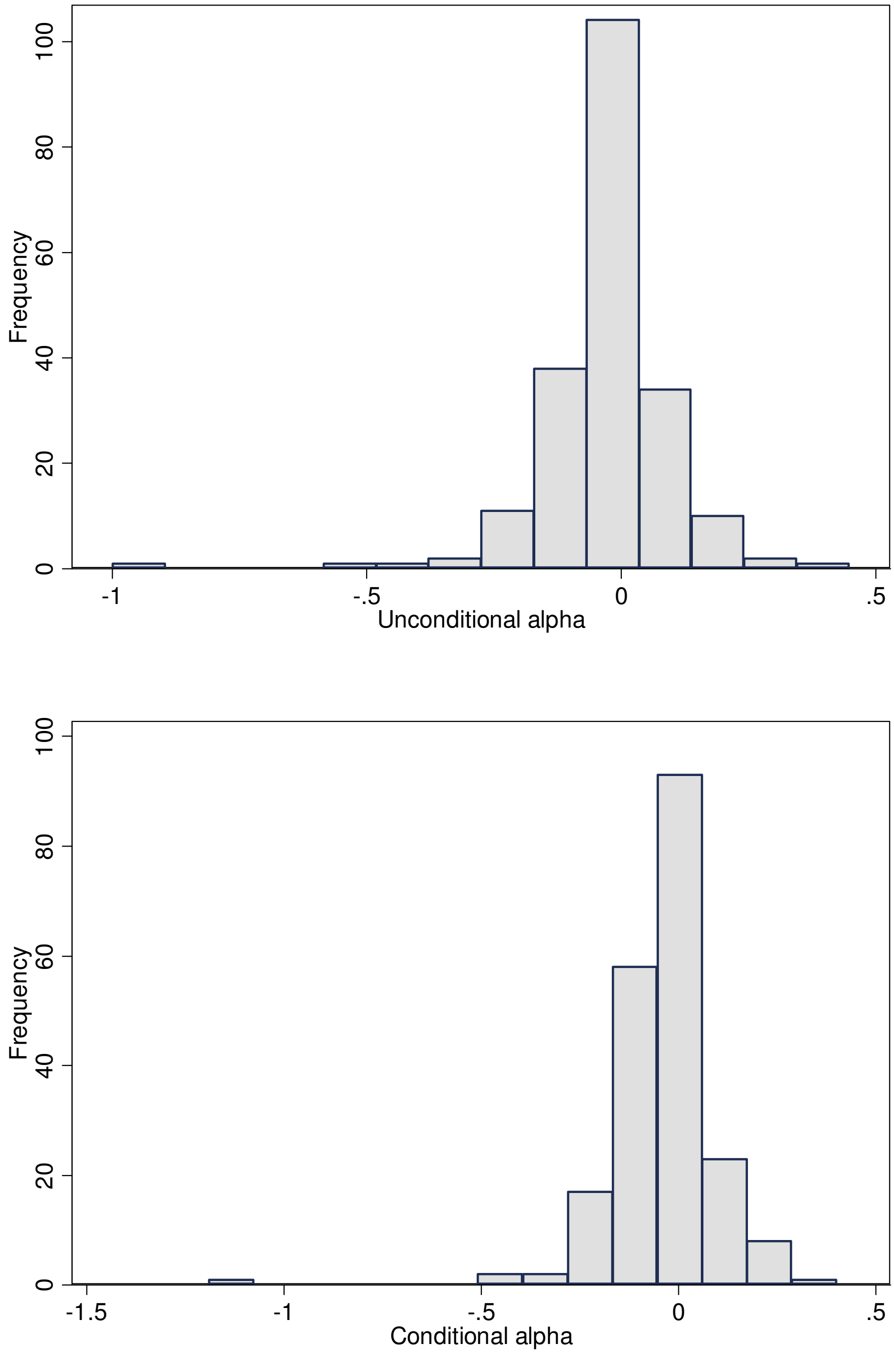
	Unconditional		Conditional		Wald test
	Alpha	R^2	Alpha	R^2	(p-value)
Panel A: Overall level					
ALL	-0.00023	0.949	-0.00034	0.95	1.14 (0.33)
	(-0.69)		(-1.1)		
Panel B: Investment policy level					
EQUITY	-0.00023	0.941	-0.00037	0.942	1.5 (0.22)
	(-0.61)		(-1.04)		
FLEXIBLE	-0.00015	0.934	-0.0003	0.939	3.89 (0.01)
	(-0.5)		(-1.14)		
Panel C: Individual level (Number of positive and negative [ ] funds)					
	All	Sig 5%	All	Sig 5%	
All funds	83 [122]	14 [9]	69 [136]	14 [12]	
Equity funds	64 [82]	13 [4]	52 [94]	11 [4]	
Flexible funds	19 [40]	1 [5]	14 [42]	3 [8]	

There is some evidence from previous studies to suggest that the predetermined economic variables in the conditional measures are statistically significant in measuring mutual fund performance (Ferson and Schadt, 1996; Roy and Deb, 2003; Otten and Bams, 2004). In order to test the statistical significance of the conditional measure for Thai mutual fund performance, the Wald test is employed. The null hypothesis of this test is that the time-varying coefficients of all predetermined variables in the conditional measure are jointly equal to zero. The values and the p-values (in parentheses) of Wald test are presented in the last column. The results suggest that the hypothesis of the Wald test cannot be rejected for all fund portfolios. However, it is highly significant for the flexible funds portfolio (p-value equals 0.0093). This implies that flexible fund managers employ macroeconomic information and adjust their portfolio dynamically and also that the conditional measure is statistically important in evaluating flexible funds, but not equity funds.

Panel C estimates mutual fund performance individually. We show figures for a number of positive and negative funds. Since funds with less than 24-week observations are eliminated, there remain 205 mutual funds for estimations at this level. The results suggest that only a few funds was statistically significant. Only 14 and 9 out of 205 funds performed in a way which was positively or negatively significant to the market (6.83% and 4.4% respectively). Nevertheless, there are more negative than positive performance funds. 83 funds produced positive alpha returns, while 122 funds had negative alphas. Similarly, a conditional measure does not improve the mutual fund performance at this fund level and the number of positive funds marginally decreased in both equity and flexible funds. With the unconditional measure, there are 83 positive and 122 negative performing funds, whereas with the conditional measure there are 69 positive and 136 negative performing funds. Moreover, the number of funds with statistically significant performance perceptibly increases. However, using the conditional measure, the performance of 14 and 12 funds is respectively positively and negatively significant. Figures for summary frequency distributions of unconditional and conditional estimates are shown below in Figure 4.1.

Figure 4.1 Frequency distributions of unconditional and conditional estimates

These figures present frequency distributions of the mutual performance estimated by unconditional (Jensen, 1968) and conditional (Ferson and Schadt, 1996) measures. The performance for each fund is estimated over the period June 2000-August 2007.



A study by Ferson and Schadt (1996) suggests that the unconditional performance measure leads to negative performance because the betas of mutual funds are negatively related to the expected market return, which moves together with its volatility. Therefore, when time-variation in beta is controlled, mutual fund performance will improve and shift the alphas to the right. Studies by Ferson and Warther (1996), Sawicki and Ong (2000) and Roy and Deb (2003) also confirm these findings. However, our results are in contrast to these findings and indicate that moving from unconditional to conditional measures slightly lowers mutual fund performance and does not give much change in the distribution of alphas. As a result, we can conclude that these inconsistent findings may be due to the positive covariance between the mutual fund betas and the expected market return. Our findings are similar to those of Blake and Timmermann (1998) and Otten and Bams (2004), who conclude that the conditional measure does not much change mutual fund performance and to that of Ghargohri et al. (2007), who also find slightly poorer performance when applying a conditional measure to Australian mutual funds.

Thus, the results from this section lead us to conclude that mutual funds in Thailand do not, overall, show abnormal returns during the period studied. This is consistent with previous studies of Thailand, such as those of Srisuchart (2001) and Vongniphon (2002), which examine mutual fund performance during the 1990s and find it to be insignificantly inferior. Furthermore, our study finds that using Ferson and Schadt's conditional measure is statistically significant in flexible funds but brings no economic significance to any of them. This is because the alphas are only slightly lower when moving from Jensen's unconditional measure to a conditional one. This is also comparable to Nitibhon (2004), who employs both Jensen's measure and a conditional measures to Thai mutual funds during the period 2000-2004 and concludes that they show no statistically significant abnormal return and the results from conditional performance measure are not much different from those produced by Jensen's measure.

4.4.1.2 Selectivity and market timing abilities

Timing ability is the ability of a fund manager to adjust his portfolio's risk according to the expected change in economic situation. The timing ability model separates timing ability from selectivity ability and if the manager has timing ability the square term of the market return should be positive and significant. Table 4.5 presents evidence of market timing ability using Treynor and Mazuy's model (1966). There is no evidence of timing ability among Thai mutual fund managers, since the slope coefficients for the quadratic term of the return on market portfolio (gamma) are insignificant in both the equity and flexible funds portfolios. This result is consistent for both the unconditional and the conditional Jensen's measure. The individual level in panel C also confirms this result, for only 36 out of 205 funds are statistically significant and only 15 of those can guess the market correctly. This is similar to most previous studies of market timing in mutual funds in developed markets, which find that significant timing ability is apparent in only a few funds (see, for example, Treynor and Mazuy (1966), Ferson and Warther (1996) and Matallin-Saez (2006). However, this contradicts previous finding in Thailand by Chunhachinda and Tungprasert (2004), who reveal that, during the period 2001-2003, half of Thai equity fund managers showed timing ability.

Moreover, market timing ability is poorer when the conditional measure is used. With the unconditional measure, the slope coefficients of equity and flexible fund portfolios are 0.41 and 0.02, respectively. They become 0.305 and -0.068, respectively, when the conditional measure is applied. Again, this conflicts with the findings of Ferson and Schadt (1996) and Ferson and Warther (1996), who claim that perverse market timing ability is removed when the conditional measure is used. As pointed out in the previous section, the possible explanation of this is that the covariance between mutual fund betas and the expected market returns may be positive, an indication which moves in the opposite direction to the US market.

Table 4.5 The market timing performance measure

The table reports the results of estimations of timing ability using Jensen's unconditional and conditional measures at overall level, investment policy level and individual level in panels A, B and C, respectively. The measure estimates funds for June 2000 to August 2007 using ordinary least square. T-statistics, adjusted for heteroscedasticity using White's (1980), in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method. Alpha indicates the abnormal returns of the portfolio. Gamma is the coefficient of the quadratic variable representing market timing ability. R^2 represents the adjusted correlation coefficient. The conditional measure, in columns 5-7, is estimated using 3 time-varying variables; Treasury-bill yield, dividend yield and the dummy variable of the January effect. Panel C presents the number of funds with positive and negative market timing ability. The number of funds with negative market timing ability is presented in square parentheses [ ]. Funds with less than 24-week observations are excluded. Sig 5% refers to the number of funds for which market timing ability is significant at a 5% level.

	Unconditional			Conditional		
	Alpha	Gamma	R^2	Alpha	Gamma	R^2
Panel A: Overall level						
ALL	-0.00059	0.328	0.95	-0.00059	0.248	0.95
	(-1.45)	(1.08)		(-1.47)	(0.86)	
Panel B: Investment policy level						
EQUITY	-0.00069	0.41	0.94	-0.00068	0.305	0.94
	(-1.53)	(1.33)		(-1.54)	(1.03)	
FLEXIBLE	-0.00017	0.0235	0.93	-0.00024	-0.0676	0.94
	(-0.38)	(0.05)		(-0.59)	(-0.2)	
Panel C: Individual level (Number of positive and negative [ ] market timing)						
All funds		103[102]			103[102]	
All funds with 5% sig.		15[21]			5[18]	
Equity funds		85[61]			86[60]	
Equity funds with 5% sig.		15[14]			5[12]	
Flexible		18[41]			16[42]	
Flexible funds with 5% sig.		0[7]			0[6]	

4.4.2 Investment strategy of fund managers

To understand the investment strategy of fund managers and the sources which generate excess return in mutual funds, this study employs the multi-factor model and examines its risk factor loadings. This study consider two multi-factor models: Cahart's four factor model (Cahart, 1997) and the conditional measure (Ferson and Schadt, 1996). The conditional measure captures time varying strategies among fund managers by letting the market risk vary over time in relation to economic conditions. Therefore, employing the conditional measure allows us to explore the dynamic strategy of fund managers.

Nevertheless, to ensure that the set of economic variables used in this study can predict the returns in the Thai market, the weekly excess returns of the market are regressed with four lagged values of macroeconomic variables, which were normally used in previous studies as a set of information variables. These variables include Treasury bill yield (TB), dividend yield (DY), slope of term structure (TERM) and a dummy of the January effect (JAN). The slope of term structure (TERM) is a constant maturity 10-year government bond yielding less than the three-month Treasury bill. Definitions and sources of data for the other variables are as explained in section 4.3.3, above. The method of Ordinary Least Square (OLS) with robust standard errors is used. The estimated regression and the t-statistics (in parentheses) are presented:

$$R_{m,t} = -0.00058 - 0.258TB_{t-1} + 0.587DY_{t-1} - 0.175TERM_{t-1} + 0.0158JAN_{t-1} \qquad R^2=0.03$$

$$(-0.04) \quad (-2.26) \quad (1.77) \quad (-0.73) \quad (2.01)$$

This estimation confirms that all the predetermined variables which are used in this study have predictability power for the market return for the sample period. Treasury bill yield is negatively correlated with the market return at a 5% significance level. Dividend yield and the January effect dummy are positively correlated at 10% and 5% significant levels, respectively. Therefore, if a fund manager uses economic variables to adjust his/her portfolio rightly, the coefficients of predetermined variables in the model must be significant with the signs given above. The adjusted R-square for the regression is quite low, equalling 0.03. However, this is consistent with the study by Cai et al. (1997), who show that the Japanese market returns one period ahead can be explained by dividend yield, short-term interest rate and term spread with around 6% R-square value.

Table 4.6 highlights the beta coefficients estimated from both unconditional and conditional measures. The beta of each portfolio represents the sensitivity or risk of the portfolio in relation to the overall market. The value of beta indicates the change of portfolio returns for a unit change of the market return. While the unconditional measure assumes beta to be fixed over the period studied, the conditional measure allows betas to dynamically change over time. The second column of Table 4.6 presents beta coefficients estimated from Jensen's conditional model. All beta coefficients are positive and highly and statistically significant for both equity and flexible funds. The estimated beta coefficient of the flexible funds portfolio is 0.64, which is lower than the equity funds portfolio (0.88). Therefore, this proves that flexible funds are less closely correlated to the market as its degree of asset combination rises. Columns 2 to 6 present the beta coefficients estimated from the conditional measure. This measure assumes that fund managers actively adjust their portfolio according to the macroeconomic conditions and allow the market risk to vary over time. Hence, the factor loadings of these variables show us whether fund managers adjust their portfolios dynamically using these economic variables.

The results in columns 3-6 of Table 4.6 indicate that fund managers employ dynamic strategies and use macroeconomic information correctly. Treasury bill and dividend yield are the most commonly used by fund managers. This can imply that fund managers would increase the market risk exposure when dividend yield increases and do the opposite for the treasury bill yield. The treasury bill yield is negatively significant at a 10% level in the equity funds portfolio, while it is 5% significant in the flexible funds portfolio. Furthermore, dividend yield is also positively highly significant but only in the flexible funds portfolio. Similarly, at the individual level, 26 (17%) and 39 (27%) equity funds statistically respond to the Treasury bill and dividend yield, respectively, compared to 14 (24%) and 21 (36%) for the flexible funds. Therefore, it can be concluded that both equity and flexible funds managers employ dynamic strategies but the flexible fund managers are more active than the equity fund managers. Nonetheless, this is consistent with the studies in developed markets although in not as pronounced a form as they exhibit. For example, in the US market, Ferson and Schadt (1996) and Ferson and Warther (1996) find that dividend yield and Treasury bill yields are important predictors and Sawicki and Ong (2000) find that Australian fund managers adjust their portfolios according to dividend yield information. More importantly, this is also comparable to the study of mutual fund performance in Thailand by Nitibhon (2004), who suggests that winning fund managers adjust their portfolio according to Treasury bill and dividend yield.

Table 4.6 Fund factor sensitivities

This table reports the beta coefficients estimated from Jensen's unconditional and conditional measures. The beta coefficients of unconditional beta (β_p) are presented in the second column and are estimated from the following regression:

$$r_{pt} = \alpha_p + \beta_p \, r_{mt} + \varepsilon_t$$

where r_{pt} and r_{mt} are, respectively, the excess return on portfolio p and on the benchmark portfolio over the risk-free rate at time t.

The last four columns present the beta coefficients estimated using the conditional measure from the following regression:

$$r_{pt} = \alpha_p + \beta_{0p} \, r_{mt} + \beta_{1p} \, (r_{mt} * TB_{t-1}) + \beta_{2p} \, (r_{mt} * DIV_{t-1}) + \beta_{3p} \, (r_{mt} * JAN_{t-1}) + \varepsilon_t$$

where TB, DIV, JAN are the treasury-bill yield, dividend yield, and dummy variable of the January effect, respectively. The regressions are estimated for June 2000 to August 2007 using ordinary least square. T-statistics, adjusted for heteroscedasticity using White's (1980) model, are in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method. Panel C presents the number of funds with positive and negative coefficients. The number of funds with negative coefficients is reported in square parentheses [ ]. Funds with less than 24 weeks observations are excluded. Sig 5% refers to the number of funds for which the coefficient is significant at a 5% level. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

	Unconditional	Conditional			
	β	β_{rm}	$\beta_{t\text{-}bill}$	β_{div}	β_{jan}
Panel A: Overall level					
ALL	0.82***	0.784***	-1.55*	3.65	0.0254
	(51.08)	(13.19)	(-1.67)	(1.23)	(0.68)
Panel B: Investment policy level					
EQUITY	0.875***	0.836***	-1.86*	4.17	0.0417
	(48.78)	(12.88)	(-1.84)	(1.29)	(0.97)
FLEXIBLE	0.643***	0.52***	-1.86**	7.75***	-0.027
	(39.81)	(10.66)	(-2.33)	(3.24)	(-0.49)
Panel C: Individual level (Number of positive and negative [ ] funds)					
All funds	203[2]	193[12]	61[144]	136[69]	121[83]
All funds with 5% sig.	201[0]	159[6]	12[28]	45[15]	18[5]
Equity funds	146[1]	142[4]	40[106]	100[46]	89[56]
Equity funds with 5% sig.	146[0]	119[2]	6[20]	30[9]	7[4]
Flexible	57[2]	51[8]	21[38]	36[23]	32[27]
Flexible funds with 5% sig.	55[0]	40[4]	6[8]	15[6]	11[1]

In addition, a number of studies in asset pricing argue that some factors outside the market risk can also explain the returns of securities. This evidence is robust not only in developed but also in emerging markets (Fama and French, 1993, 1998; Rouwenhorst, 1999; Brown et al., 2008). Thus, fund managers may adjust their portfolios according to these factors. Moreover, many studies have confirmed the superiority of the multifactor model to the traditional single factor measure (Kothari and Warner, 1997; Fletcher and Forbes, 2002; Otten and Bams, 2004). Therefore, in addition to the conditional measure, this study also employs Cahart's four-factor model as a representative of the multifactor models, capturing the size, book-to-market and momentum strategies, in addition to the market benchmark.

Evidence of using additional risk factors among Thai fund managers is highlighted in Table 4.7. Panels A and B estimate Cahart's four-factor model, using unconditional and conditional measures, respectively. With the unconditional four-factor model, in panel A, both equity and flexible funds portfolios are the more exposed to growth stocks as the slope coefficients of the HML factor, representing the value premium of high book-to market stocks, at -0.033 and -0.027, respectively. These two values are statistically significant at a 1% level. The SMB factor, representing the size premium of small stock, is also positively significant for the equity funds portfolio, which implies that equity fund managers favour small over large cap stocks. However, the momentum factor (PR1YR) is not statistically significant and is close to zero in any portfolio. This means that fund managers give more weight to small and growth stocks in their portfolios and less to the momentum strategy. Moreover, the equity funds portfolio is more significant for these coefficients than the flexible funds portfolio, implying that equity fund managers rely on risk factors based on stock characteristics more than do flexible fund managers.

Our findings differ from much of the previous evidence in developed markets, which suggests the widespread use of momentum strategies (Grinblatt et al., 1995 ; Daniel et al., 1997; Cahart, 1997; Otten and Bams, 2004; Bauer et al., 2006; Gharghori et al., 2007). However, they are similar to those in a study by Fletcher and Forbes (2002), who reveal that the momentum factor is close to zero for UK unit trusts. Similarly, Griffin (2003) suggests that Asian markets offer the weakest evidence of momentum strategy, while Nitibhon (2004) finds no evidence of momentum strategy among Thai mutual fund managers.

Panel B of Table 4.7 displays the conditional version of the four-factor model, where each coefficient is the linear combination of the average unconditional beta and a vector of beta-responsive coefficients with respect to the factors[16]. When the conditional variables are included, the explanatory powers of all risk factors disappear. There remains only the size factor in the flexible funds portfolio, which remains statistically significant. Therefore, this confirms that flexible fund managers employ economic information to a higher degree than equity fund managers do.

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16 $R_{p,t} = \alpha_p + (\beta_p^{Rm} + \beta'_p z_{t-1})R_{m,t} + (\beta_p^{SMB} + \beta'_p z_{t-1})SMB_{m,t} + (\beta_p^{HML} + \beta'_p z_{t-1})HML_{m,t} + (\beta_p^{PR1YR} + \beta'_p z_{t-1})PR1YR_{m,t} + \varepsilon_p$

Table 4.7 Fund strategies using Cahart's four-factor model

Table reports the estimation of Cahart's four-factor model using unconditional and conditional measures, in panels A and B, respectively. The unconditional regressions, panel A, are estimated as follows:

$r_{pt} = \alpha_p + \beta_{0p}\, r_{mt} + \beta_{1p}\, SMB_t + \beta_{2p}\, HML_t + \beta_{3p}\, PR1YR_t + \varepsilon_t$

where α_p is abnormal returns of portfolio; SMB_t is the size premium factor, which is the difference between returns on small stock portfolios and large stock portfolios; HML_t is the value premium which is the difference in return between a portfolio of high BE/ME stocks and a portfolio of low BE/ME stocks; PR1YR is the difference in returns between a portfolio of a past year winner and a portfolio of a past year loser. In panel B, regressions are estimated using conditional measure. Each coefficient is a linear combination of the average unconditional beta and a vector of information variables as follows:

$$R_{p,t} = \alpha_p + (\beta_p^{Rm} + \beta'_p z_{t-1})R_{m,t} + (\beta_p^{SMB} + \beta'_p z_{t-1})SMB_{m,t} + (\beta_p^{HML} + \beta'_p z_{t-1})HML_{m,t}$$
$$+ (\beta_p^{PR1YR} + \beta'_p z_{t-1})PR1YR_{m,t} + \varepsilon_p$$

where Z_{t-1} is the vector of information variables including treasury-bill yield, dividend yield, and the dummy variable of the January effect. The regression estimates the funds portfolio for June 2000 to August 2007 using the equally weighted method. T-statistics, adjusted for heteroscedasticity using White's (1980) model, are in parentheses ( ). The R^2 in the last column is the adjusted correlation coefficient. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

	α_p	β_{rm}	β_{SMB}	β_{HML}	β_{PR1YR}	R^2
Panel A: Unconditional measure						
ALL	-0.00201	0.82***	0.032**	-0.030***	0.002	0.95
	(-1.09)	(50.8)	(2.1)	(-3.21)	(0.86)	
EQUITY	-0.00194	0.88***	0.040**	-0.033***	0.001	0.942
	(-0.95)	(48.54)	(2.34)	(-3.31)	(0.72)	
FLEXIBLE	-0.00258	0.65***	0.025	-0.027***	0.002	0.935
	(-1.35)	(40.45)	(1.6)	(-2.97)	(1.13)	
Panel B: Conditional measure						
ALL	-0.00051	3.717**	5.522	3.505	-0.050	0.95
	(-0.18)	(2.31)	(1.45)	(1.21)	(-0.94)	
EQUITY	-0.00034	3.904**	5.180	3.886	-0.055	0.943
	(-0.1)	(2.11)	(1.18)	(1.17)	(-0.91)	
FLEXIBLE	-0.00103	7.304***	6.604**	2.855	-0.054	0.939
	(-0.47)	(5.19)	(1.98)	(1.13)	(-1.17)	

In sum, this section illustrates the strategies used by fund managers in Thailand which are different for different fund investment policies. Fund managers exploit both macroeconomic information variables and other risk factors outside the overall market risk, as stated in the capital asset pricing model. Both equity and flexible fund managers dynamically adjust their portfolio using Treasury bill yield and dividend yield information. However, flexible fund managers are more active, likely to use these dynamic strategies and more reliant on economic variables. In contrast, equity fund managers rely less on macroeconomic information but tend to prefer to take advantage of risk premium factors by inclining toward small and glamour (growth) stocks.

4.4.3 Sub-period analysis

Evaluation over a long horizon as a single period may not give a clear idea of the performance of managers because of the possible existence of structural changes in the market. Several researcher have found evidence in structural breaks in emerging markets (Beakaert and Harvey, 2000; 2002; Chaudhuri and Wu, 2003). Heaney et al. (2007), who investigate time changing in alpha for Australian international equity funds, also reveal the evidence of inconsistent performance through the evaluation period. Furthermore, emerging markets are more volatile than developed markets.

In Table 4.3, the returns from the stock market in Thailand were approximately -10% per annum between 2000 and 2001 and rose to more than 23% per annum during the period 2002-2007. In addition, their policies and regulations also change over time and these have the potential to destabilise the returns in these markets. Therefore, the study splits the sample period into 2 sub-periods, from June 2000 to December 2001 and from January 2002 to August 2007. The two main reasons for splitting the period in this way are the differences in market conditions and the introduction of new policies for mutual fund investment.

Panel A in Table 4.8 gives the overall performance for both sub-periods. The mutual funds performance and its goodness of fit of the first period (June 2000 – December 2001) are given in columns 2-5 and the results from the second period (January 2002 – August 2007) are given in columns 6-9. Although the performances of the two sub-periods are both insignificant, results show that mutual funds perform better in the first sub-period and become poorer in the second sub-period. In the first period, with the Jensen measure, investment in mutual funds produces an abnormal return close to zero (-0.0004% per week or -0.21% p.a.) and it then shrank to -2.06% in the next period. This is consistent with the conditional measure, by which performance decreased from 0.38% to -2.11% per year. Similarly, this is robust across investment policy level for both the equity and flexible funds portfolios. In particular, in the flexible funds portfolio, a performance of 0.68% per year (0.013% per week) was diminished and went down by more than 2% per year and this is even statistically significant at a 10% level when the conditional measure is applied.

Performance at the individual level in panel C also yields similar conclusions to the aggregated portfolio level. While only one fund performs positively significantly in the first period, there are more extreme funds in the second period. There are 24 and 40 funds which perform statistically significantly using unconditional and conditional measures, respectively. Furthermore, the amount of positive funds drops in the second period significantly and this remains robust across mutual fund styles and performance measures. For instance, more than

50% of funds have positive performance in the first period, although the proportion of positive funds declines to below 40% in the second period.

In addition, the Chow (analysis of variance) test is performed in order to test the stability of the parameters for the entire sample. Results show that the test statistics are high in both unconditional and conditional measures. Using the unconditional measure, F-statistics for the Chow stability test are 5.60, 5.36 and 22.78 for the all-funds, equity funds and flexible funds portfolios, respectively, and there is also similarity to the conditional measure. Therefore, it can be concluded that the performance of mutual funds in Thailand is unstable throughout the period studied.

Table 4.8 Performance measure: Sub-period analysis

The table reports the results of estimations of Jensen's unconditional and conditional measures at overall level, investment policy level and individual level in panels A, B and C, respectively. Columns 2-5 report the estimation for June 2000 to December 2001 and columns 6-9 report the estimation for January 2002 to August 2007. T-statistics, adjusted for heteroscedasticity, using White's (1980) model, are in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method. Alpha indicates the abnormal returns of the portfolio. R^2 represents the adjusted correlation coefficient. The conditional measure is estimated using 3 time-varying variables: treasury-bill yield, dividend yield and the dummy variable of the January effect. Panel C presents the number of funds with positive and negative abnormal returns. The number of funds with negative abnormal returns is presented in square parentheses [ ]. Funds with less than 24-week observations are excluded. Sig 5% refers to the number of funds for which abnormal performances are significant at a 5% level.

	June 2000 – December 2001				January 2002 – August 2007			
	Unconditional		Conditional		Unconditional		Conditional	
	Alpha	R^2	Alpha	R^2	Alpha	R^2	Alpha	R^2
Panel A: Overall level								
ALL	-0.00004	0.941	0.00007	0.94	-0.00040	0.955	-0.00041	0.955
	(-0.05)		(0.08)		(-1.24)		(-1.29)	
Panel B: Investment policy level								
EQUITY	-0.00007	0.931	-0.00009	0.94	-0.00041	0.948	-0.00043	0.955
	(-0.07)		(-0.09)		(-1.1)		(-1.16)	
FLEXIBLE	0.00013	0.89	0.00077	0.94	-0.00042	0.961	-0.00046*	0.955
	(0.14)		(0.85)		(-1.75)		(-1.95)	
Panel C: Individual level (Number of positive and negative [ ] funds)								
	All	Sig 5%	All	Sig 5%	All	Sig 5%	All	Sig 5%
All funds	54 [51]	1 [0]	64 [41]	1 [0]	79 [125]	12 [12]	95 [109]	29 [11]
Equity funds	40 [44]	0 [0]	51 [33]	0 [0]	61 [84]	11 [5]	75 [70]	24 [4]
Flexible funds	14 [7]	1 [0]	13 [8]	1 [0]	18 [41]	1 [7]	20 [39]	5 [7]

4.4.4 General and tax-benefit mutual funds

Tax-benefit funds are fund style unique to Thailand. They are different from general funds in term of their restrictions, which require a longer holding period than all others. For the fund managers, the restrictions are beneficial and, therefore, have a positive effect on fund performance. This is due to two main reasons; first, that restrictions tend to reduce the cost of liquidity-motivated trading and, second, that they allow fund managers to put more weight on illiquid assets and to earn illiquidity rents. Hence, this section distinguishes tax-benefit funds from general funds and investigates the performance of the two groups.

To test whether the performances are statistically different between funds, equally weighted portfolios are formed, based on the tax purpose, and the performances of both portfolios are estimated using either unconditional or conditional measures. Nonetheless, since tax-benefit funds began in 2002, for consistency, we estimate the performances of all funds from the beginning of 2002 to August 2007. The results in Table 4.9 suggest that, with the unconditional measure, the returns of the tax-benefit funds portfolio equals 0.04% per week (over 2% pa.) compared to -0.06% per week (-3% pa.) from general funds. The cross-equation test in column 4 tests whether the constant terms (performance) in the two estimations are identical. The test confirms that returns from tax-benefit funds are statistically higher than general funds with regard to any performance measures used.

Table 4.9 Performance differences across fund characteristics

This table reports the abnormal performance of general and tax-benefit funds portfolios using Jensen's unconditional and conditional measures. The measures estimate for June 2002 to August 2007 using Ordinary Least Square (OLS). T-statistics, adjusted for heteroscedasticity using White's (1980) model, are in parentheses ( ). The conditional measure is estimated using 3 time-varying variables; Treasury-bill yield, dividend yield and the dummy variable of the January effect. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

	Tax-benefit funds portfolio (1)	General funds portfolio (2)	(1)-(2)
Unconditional	0.00044	-0.00057*	0.00101***
	(1.32)	(-1.92)	(3.41)
Conditional	0.00028	-0.0006**	0.00088***
	(0.92)	(-1.99)	(3.31)

Furthermore, this study also confirms the robustness of these results by using the cross-section regression method to estimate the relationship between the performance of mutual funds and tax style while controlling for fund characteristics. To begin with, the alphas of each fund are estimated over the period 2002-2007. Subsequently, we perform a cross-section regression of performance on a dummy variable of tax-benefit funds and four controlled variables; including size, fund net cash flows, age and investment policy. Table 4.10 illustrates the results generated from the Ordinarily Least Square estimation. We find that the dummy variables for tax-benefit funds are positively significant to fund performance and this result is robust for both unconditional and conditional performance. Therefore, this can be interpreted to suggest that tax-benefit funds perform statistically differently from other mutual funds, which is consistent with the results in Table 4.9.

This supports the conclusion that tax-benefit funds significantly outperform general funds. The plausible explanation of this is that the restrictions tax-benefit funds could bring a liquidity premium, as pointed out in the literature, for example, Edelen (1999) and Aragon (2007). Nonetheless, the evidence of liquidity premium still calls for further investigation.

Table 4.10 Cross-sectional coefficients of mutual fund characteristics

This table reports the slope coefficients for the cross-sectional regression of mutual fund performance on five mutual fund characteristics. Size refers to total asset values of mutual funds at the end of period. NNCF refers to the normalized net cash flows of mutual funds. Age refers to week-observations of mutual funds. Tax refer to a dummy variables for the tax-benefit fund style, equal to 1 if a tax-benefit fund, otherwise=0. Style refers to a dummy variable for mutual fund investment policy, equal to 1 if an equity fund, otherwise=0. To calculate performance, both unconditional and conditional measures are used. The conditional measure is estimated using 3 time-varying variables: treasury-bill yield, dividend yield and the dummy variable of the January effect. The measures are estimated using Ordinary Least Square (OLS). T-statistics, adjusted for heteroscedasticity using White's (1980) model, are in parentheses ( ). *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

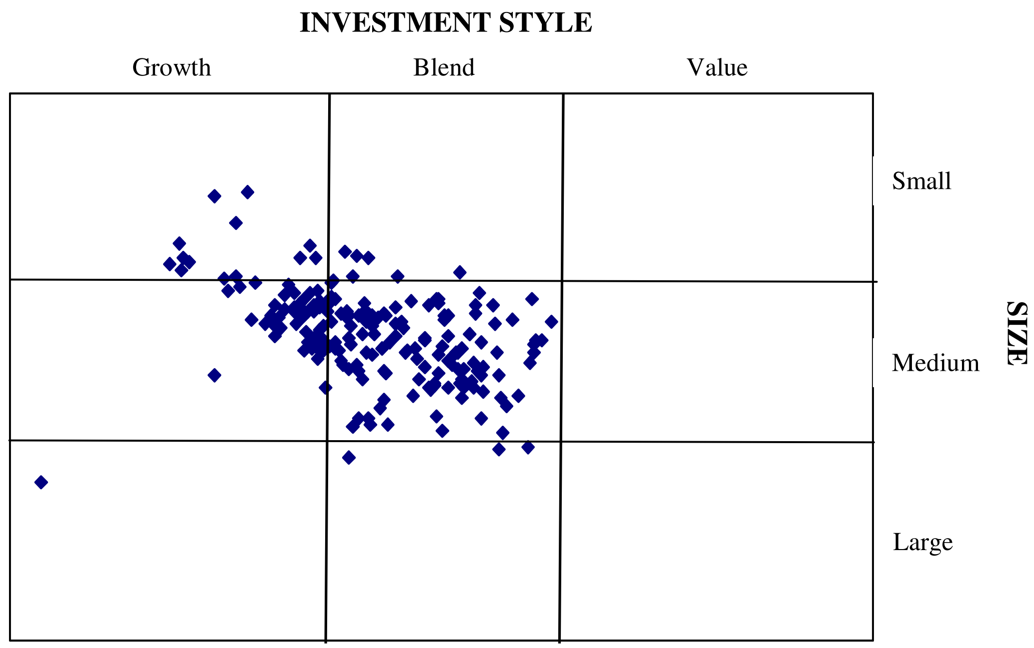
	Tax	Size	NNCF	Age	Style	R^2
Unconditional	0.109**	0.00982	-8.00E-05	7.20E-05	0.00857	0.015
	(2.18)	(0.49)	(-0.72)	(0.39)	(0.32)	
Conditional	0.125***	0.00334	-5.90E-05	-5.40E-06	0.00449	0.032
	(2.74)	(0.14)	(-0.55)	(-0.04)	(0.2)	

4.4.5 Mutual fund styles and performance

Unlike many developed countries, Thailand classifies mutual funds only on the basis of investment policy, as, equity funds, flexible funds and bond funds. Specific information about style policy is not provided. Thus, there is still a puzzle regarding the style which fund managers follow and the differences in performance across fund styles. The present study puts forward a simpler method to analyse mutual fund style, that of using the factor loadings in Fama and French's three factor model (1993) and investigates style in two dimensions, size and value/growth. Our style classification approach is similar to Morningstar's style box in that it contains nine groups based on three investment styles and three fund size categories. Nevertheless, our approach is the returns based classification where the Morningstar's style box is based on the holding assets.

To accomplish our style analysis, the Fama and French's three-factor model estimates for each fund and, subsequently, the t-statistics of SMB and HML coefficients are plotted against each other. Then, sign and significance of size and style betas are used to determine mutual fund style[17]. Figure 4.2 shows the scatter plots for size and book-to market t-statistics and reveals that Thai mutual fund styles are clustered. Thai mutual funds are blend (value and growth) and medium capitalization oriented.

Figure 4.2 Scatter plots for size and book-to-market t-statistics



[17] This study uses t-statistics equal to ±1.96 as break points for investment style and size

This study further investigates whether there is any difference in performance across mutual fund styles. Accordingly, mutual funds are categorised in one of nine styles: large-cap/growth, large-cap/blend, large-cap/value, mid-cap/growth, mid-cap/blend, mid-cap/value, small-cap/growth, small-cap/blend and small-cap/value. These styles are based on the SMB and HML estimates in Fama and French's three-factor model. The sign and significance value of t-statistics are used as the break point. Funds are grouped into style portfolios and performances are estimated using unconditional and conditional measures. The results are shown in Table 4.11. Large-cap fund portfolio gives marginally abnormal returns. The large-cap and glamour fund yields the lowest performance of all the nine styles and significant at 10% level. In contrast, large-cap/blend funds give the highest return and outperform the market at 10% level. While most of funds rely on the mid-cap/blend style, this style provides no abnormal returns and this style is relatively passive. This finding contrasts with the evidence in developed markets, which shows that growth funds perform better than funds of other styles (for example, see Grinblatt and Titmann, 1989 and 1993; Daniel et al. 1997).

Table 4.11 Performance of style portfolios

The table reports the results of estimations of Jensen's unconditional and conditional measures for style equally weighted portfolios. The measure estimates funds for June 2000 to August 2007, using OLS. T-statistics, adjusted for heteroscedasticity, using White's (1980), are in parentheses ( ). The conditional measure is estimated using treasury-bill yield, dividend yield and the dummy variable of the January effect. *, **, *** Significant at the 10%, 5% and 1% levels, respectively.

	N	Unconditional			Conditional					
		Alpha	β_{rm}	R^2	Alpha	R_m	R_m*TB	R_m*DIV	R_m*JAN	R^2
Panel A: All funds										
Large-cap growth	1	-0.0009*	0.563***	0.74	-0.001**	0.568***	-0.289	0.00008	0.0323	0.74
		(-1.71)	(32.95)		(-1.76)	(11.15)	(-0.22)	(0.02)	(-1.05)	
Large-cap blend	3	0.0014*	0.77***	0.77	0.0021***	1.25***	7.83***	-0.305***	-0.023	0.80
		(1.83)	(23.17)		(3.28)	(13.74)	(7.04)	(-9.03)	(-0.38)	
Mid-cap growth	37	-0.00031	0.874***	0.94	-0.00045	0.783***	-1.28	0.0542	0.0101	0.94
		(-0.8)	(49.69)		(-1.24)	(12.22)	(-1.22)	(1.65)	(0.27)	
Mid-cap blend	140	-0.00023	0.822***	0.95	-0.00031	0.822***	-1.28	0.0186	0.0287	0.95
		(-0.67)	(49.14)		(-0.95)	(12.91)	(-1.28)	(0.58)	(0.71)	
Small-cap growth	16	-0.00017	0.774***	0.93	-0.00053	0.571***	-3.76***	0.134***	0.0532	0.94
		(-0.44)	(38.92)		(-1.56)	(10.45)	(-3.85)	(4.81)	(1.14)	
Small-cap blend	8	-0.00041	0.659***	0.83	-0.00066	0.504***	-2.37	0.0948**	0.0316	0.84
		(-0.77)	(30.76)		(-1.13)	(11.12)	(-1.31)	(2.36)	(0.89)	

4.5 Robustness of the results

4.5.1 Multifactor model

Many studies in the developed markets confirm the importance of using a multifactor model for performance evaluation and this is now commonly used. Yet the study of fund performance in emerging markets is still mostly based on standard traditional measures, such as the Sharpe, Treynor and Jensen models. For example, in Thailand, extensive search has produced only one study, that by Nitibhon (2004), which investigates mutual fund performance in Thailand using a multifactor model.

For this reason, this study employs a multifactor model – the four-factor model of Cahart (1997) – to validate its results. This model adds three variables to Jensen's measure to capture size, value and momentum risk premiums. Performance, estimated by means of Cahart's four-factor model in Table 4.12, is consistent with Jensen's model in showing that, as a whole, mutual funds do not have abnormal returns. Neither an equity nor a flexible funds portfolio produces a significant return. However, the performance generated by Cahart's four-factor model provides interesting results. With this model, the overall although funds still yield no statistically abnormal returns, value of inferior return is enlarged to 0.021 percent per week or nearly 10% a year, compared to an inferior performance of 1.19% using Jensen's measure. Therefore, the figures are economically significant because its size is considerable. This implies the heavy use of other risk factors besides market risk. This conclusion is confirmed by column 4 where the P-values of the Wald test are highly significant in both equity and flexible funds portfolios. This indicates the significance of the additional variables in the multifactor model.

The results of the conditional version of Cahart's four-factor model are presented in columns 5-8. For the multifactor model, the conditional measure greatly improves fund performance from -0.2% per week using the unconditional measure to only -0.05% per week. This result contrasts with that using the Jensen measure, which suggests that performance is lower when the conditional measure is used. The results in panel C also confirm the results from panels A and B: a lowering in mutual funds performance using the multifactor model. 65 funds are shown to have a superior return, compared to 83 funds when using the Jensen measure and a number of significantly performing funds are removed.

Therefore, this lets us conclude that mutual fund performance is sensitive to the model used, although estimating fund performance using Cahart's four-factor model is consistent with the Jensen measure and still gives the same conclusion as before: that there are no abnormal returns in the Thai mutual funds. Nevertheless, the multifactor model shows evidence of economic and statistical significance. In addition, extending to the multifactor model relaxes the criticism of the Capital Asset Pricing Model (CAPM) that a market portfolio is unobservable. The use of the multifactor model also allows us to understand the strategies used by fund managers by examining the factor loadings in the model. So far, studies in emerging markets using the multifactor model are still limited. As a result, it is urged that the future study of fund performance in emerging markets should move forward to the multifactor model.

Table 4.12 Cahart's four-factor performance measure

Panels A, B and C, respectively, in this table reports the results of estimations of Cahart's four-factor unconditional and conditional measures at overall level, investment policy level and individual level. The measure estimates funds for June 2000 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's (1980) model, shown in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method. Alpha indicates the abnormal returns of the portfolio. R^2 represents the adjusted correlation coefficient. The conditional measure, in columns 5-7, is estimated using 3 time-varying variables: treasury-bill yield, dividend yield and the dummy variable of the January effect. The Wald test is under the null hypothesis that additional variables are jointly equal to zero. Column 4 presents the p-values of the Wald test for the additional variables in Cahart's four-factor unconditional model. Column 7 presents the p-values of the Wald test for the additional variables in Cahart's conditional model. Column 8 presents the p-values of the Wald test for the additional variables in the conditional measure, compared to the unconditional measure. Panel C presents the number of funds with positive and negative abnormal returns. The number of funds with negative abnormal returns is presented in square parentheses [ ]. Funds with less than 24-week observations are excluded. Sig 5% refers to the number of funds for which abnormal performances are significant at a 5% level.

	Unconditional			Conditional			
	Alpha	R^2	Wald (p-value)	Alpha	R^2	Wald (p-value)	Wald (p-value)
Panel A: Portfolio level							
ALL	-0.00201	0.95	0.0054	-0.00051	0.95	0.0071	0.1881
	(-1.09)			(-0.18)			
Panel B: Investment policy level							
EQUITY	-0.00194	0.94	0.0066	-0.00034	0.943	0.0053	0.0936
	(-0.95)			(-0.1)			
FLEXIBLE	-0.00258	0.94	0.0035	-0.00103	0.939	0.0694	0.0820
	(-1.35)			(-0.47)			
Panel C: Individual level (Number of positive and negative [ ] funds)							
	All	Sig 5%		All	Sig 5%		
All funds	65 [140]	1 [3]		151 [60]	4 [2]		
Equity funds	47 [99]	0 [2]		109 [37]	1 [0]		
Flexible funds	18 [41]	1 [1]		36 [23]	3 [2]		

4.5.2 Value-weighted portfolio method

This fund performance study is mainly based on the equally weighted method, which assumes that the same amount of money is invested in each fund and, thus, that the returns of each mutual fund will affect the returns of the portfolio equally. To identify whether performance is sensitive to the method of portfolio formation, the value-weighted portfolios are computed by weighting returns with their total asset values (TNAs). This means that the returns from large mutual funds have more influence on the returns of the portfolio than those from small funds. The results using the TNAs weighted method, in Table 4.13, are consistent with the equally weighted method, which gives no abnormal return. However, performance estimated by means of the TNA weighted method is better and very close to zero, implying that large mutual funds perform better than small mutual funds and their performances are close to zero. The P-Values of the Wald test, presented in the last column, are significant over different portfolio styles and this is inconsistent with the previous results in Table 4.4. Tables 4.14 and 4.15 highlight the strategies used by fund managers, which are also consistent with the equally weighted method. Nonetheless, the evidence of employing size, book-to-market and momentum strategies as well as predetermined economic variables, is slightly stronger than it is for the equally weighted portfolios. Therefore, it can be concluded that although the method of constructing portfolios is not sensitive to fund performance, it is sensitive to the significance of parameters in performance models, implying that there are differences in engaging strategies between large and small funds.

Table 4.13 Performance of value-weighted portfolios

This table reports the results of estimations of Jensen's unconditional and conditional measures using the value weighted portfolio method. The measure estimates funds for June 2000 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's (1980) model, are in parentheses ( ). Alpha indicates the abnormal returns of the portfolio. R^2 represents the adjusted correlation coefficient. The conditional measure, in columns 4-5, is estimated using 3 time-varying variables: treasury-bill yield, dividend yield and the dummy variable of the January effect. The Wald test, in the last column, is under the null hypothesis that additional variables in the conditional measure are jointly equal to zero.

	Unconditional		Conditional		Wald test
	Alpha	R^2	Alpha	R^2	(p-value)
ALL	-0.00004	0.955	-0.00019	0.956	2.37 (0.07)
	(-0.15)		(-0.67)		
EQUITY	0.00002	0.953	-0.00013	0.954	3.70 (0.01)
	(0.05)		(-0.41)		
FLEXIBLE	-0.00008	0.871	-0.00033	0.876	10.87 (0.00)
	(-0.17)		(-0.7)		

Table 4.14 Fund's factor sensitivities of value weighted portfolios

This table reports the beta coefficients estimated from Jensen's unconditional and conditional measures using value-weighted portfolio method. The beta coefficients of unconditional beta (β_p), estimated from the following regression are presented in the second column:

$r_{pt} = \alpha_p + \beta_p r_{mt} + \varepsilon_t$

where r_{pt} and r_{mt} are, respectively, the excess return on portfolio p and on the benchmark portfolio over the risk-free rate at time t. The last four columns present beta coefficients estimated using a conditional measure from the following regression:

$r_{pt} = \alpha_p + \beta_{0p} r_{mt} + \beta_{1p} (r_{mt} * TB_{t-1}) + \beta_{2p} (r_{mt} * DIV_{t-1}) + \beta_{3p} (r_{mt} * JAN_{t-1}) + \varepsilon_t$

where TB, DIV, JAN are treasury-bill yield, dividend yield, and dummy variable of the January effect, respectively. The regressions are estimated for June 2000 to August 2007 using ordinary least square. T-statistics, adjusted for heteroscedasticity using White's (1980) model, are in parentheses ( ). *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

	Unconditional	Conditional			
	β_p	β_{rm}	$\beta_{t\text{-}bill}$	β_{div}	β_{jan}
ALL	0.809***	0.755***	-2.07***	5.2**	0.024
	(56.4)	(15.59)	(-2.64)	(2.16)	(0.64)
EQUITY	0.854***	0.825***	-2.44***	4.74*	0.027
	(54.04)	(15.03)	(-2.83)	(1.74)	(0.67)
FLEXIBLE	0.707***	0.535***	-2.52***	10.5***	0.00866
	(35.87)	(11.58)	(-2.77)	(5.46)	(0.2)

Table 4.15 Fund strategies of value weighted portfolios

This table reports beta coefficients estimated from Cahart's four factor model using the value-weighted portfolio method. SMB refers to a small-minus-big stock portfolio. HML refers to a high-minus-low book-to-market stock portfolio. PR1YR refers to the difference in return between portfolios of past years, winner and loser. The measure estimates funds for June 2000 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's model (1980), are in parentheses ( ). The Wald test, in the last column, is under the null hypothesis that additional variables are jointly equal to zero. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

	β_{rm}	β_{SMB}	β_{HML}	β_{PR1YR}	R^2
ALL	0.813***	0.0324**	-0.0312***	0.00163	0.956
	(56.12)	(2.11)	(-3.24)	(0.81)	
EQUITY	0.858***	0.0394**	-0.0344***	0.00066	0.954
	(54.03)	(2.44)	(-3.39)	(0.32)	
FLEXIBLE	0.711***	0.036*	-0.034***	0.00411*	0.872
	(35.1)	(1.72)	(-2.91)	(1.7)	

4.5.3 Frequency of data

Whereas most previous studies use monthly data for performance evaluation, our analyses are based on weekly returns. A fund's beta may change with the return interval when the return is measured in continuous time dates, due to the trading frequency. Goetzmann et al. (2000) reveal that mutual fund performance is sensitive to the horizon period of the data. Thus, to verify the sensitivity of fund performance to the time interval used in the study, in Table 4.16, we re-estimate mutual fund performance using monthly returns data for the overall level (panel A), investment policy level (panel B) and individual level (Panel B).

Using monthly data, mutual funds still provide no abnormal returns though its performance is slightly more than the market returns. The results in Panel B show positive insignificant performance for both equity and flexible portfolios, regardless of any performance measure or portfolio formation used. Adjusted R-squares vary from 0.78-0.82, which is slightly lower than they are with a weekly horizon. The individual level, in panel C, also gives a similar conclusion: that there are more positive than negative funds. Moreover, the factor exposures of conditional models contrast with the findings using weekly data. Only the dummy variable of the January effect is positively significant with this estimation. This result can refer to the investment horizon of fund managers, showing that they are likely to rebalance their portfolio dynamically over a week's horizon and, therefore, the use of a monthly interval is unable to capture fund managers' strategies. For this reason, it can be concluded that mutual fund performance is sensitive to the time interval used. This has implications for future research as regards the time horizon used in performance evaluation.

4.5.4 Dummy variable market timing measure

This study employs the dummy variable measure (Henriksson and Merton, 1981) to test robustness in fund managers' timing ability. Henriksson and Merton argue that beta risk changes up and down according to the condition of the market. Subsequently, they incorporate a dummy variable to capture up and down markets[18]. The results in Table 4.16 are those from the dummy variable market timing measure which are consistent with the quadratic market timing measure. Coefficients of the dummy variables are not statistically significant in any portfolio. Moreover, at individual level, shown in Panel C, only a small number of funds have significant timing ability. This confirms that fund managers do not display market timing ability.

[18] See Section 2.2.4 for details

Table 4.16 Performance using monthly return data

The table reports the results of estimations of Jensen's unconditional and conditional measures at overall level, investment policy level and individual level in panels A, B and C, respectively. The measure estimates funds for June 2000 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's (1980)model, shown in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method (EW) and value-weighted method (VW). R^2 represents the adjusted correlation coefficient. The conditional measure, in columns 5-10, is estimated using 3 time-varying variables: treasury-bill yield, dividend yield and the dummy variable of the January effect. Panel C presents the number of funds with positive and negative abnormal returns. The number of funds with negative abnormal returns is presented in square parentheses [ ]. Funds with less than 24-week observations are excluded. Sig 5% refers to the number of funds for which abnormal performances are significant at a 5% level. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

	Unconditional			Conditional					
	Alpha	β_{rm}	R^2	Alpha	R_m	R_m*TB	R_m*DIV	R_m*JAN	R^2
Panel A: Overall level									
EW-ALL	0.00065	0.713***	0.78	0.00092	0.92***	-49.6	-0.061	0.207**	0.80
	(0.21)	(15.44)		(0.29)	(8.42)	(-0.95)	(-1.11)	(2.38)	
VW-ALL	0.00106	0.7***	0.80	0.00099	0.914***	-71.3	-0.0455	0.191**	0.81
	(0.36)	(16.06)		(0.34)	(9.42)	(-1.42)	(-0.9)	(2.33)	
Panel B: Investment policy level									
EW-EQUITY	0.00079	0.76***	0.77	0.00098	0.978***	-57.8	-0.0593	0.211*	0.79
	(0.23)	(15.09)		(0.28)	(8.15)	(-1)	(-0.97)	(2.2)	
VW-EQUITY	0.00154	0.742***	0.79	0.00161	0.987***	-76.4	-0.0515	0.157*	0.81
	(0.48)	(15.98)		(0.5)	(9.05)	(-1.38)	(-0.92)	(1.75)	
EW-FLEXIBLE	0.00052	0.564***	0.79	0.00028	0.696***	-50.7	-0.0319	0.24***	0.82
	(0.22)	(15.92)		(0.12)	(9.67)	(-1.3)	(-0.88)	(3.78)	
VW-FLEXIBLE	0.00043	0.602***	0.79	-0.00045	0.725***	-82.6*	-0.00503	0.269***	0.82
	(0.17	(14.8)		(-0.18)	(10.15)	(-1.96)	(-0.13)	(3.78)	

	Unconditional		Conditional				
	Alpha	β_{rm}	Alpha	R_m	R_m*TB	R_m*DIV	R_m*JAN
Panel C: Individual level (Number of positive and negative [ ] funds)							
All funds	137 [68]	203 [2]	137 [68]	181 [24]	52 [53]	79 [126]	177 [23]
All funds with 5% sig.	10 [0]	196 [0]	16 [3]	114 [1]	3 [6]	4 [10]	129 [5]
Equity funds	105 [41]	146 [0]	104 [42]	128 [18]	35 [111]	56 [90]	124 [18]
Equity funds with 5% sig.	9 [0]	143 [0]	13 [1]	88 [1]	3 [4]	2 [8]	93 [5]
Flexible	32 [27]	57 [2]	33 [26]	56 [6]	17 [42]	23 [36]	53 [5]
Flexible funds with 5% sig.	1 [0]	53 [0]	3 [2]	26 [0]	0 [2]	2 [2]	36 [0]

Table 4.17 The dummy variable market timing performance measure

The table reports the results of estimations of dummy variable timing ability (Henriksson and Merton, 1981) using unconditional and conditional measures at overall level, investment policy level and individual level in panels A, B and C, respectively. The measure estimates funds for June 2000 to August 2007 using ordinary least square. T-statistics, adjusted for heteroscedasticity using White's (1980), are in parentheses ( ). Portfolio levels in panels A and B are calculated using the equally weighted method. Alpha indicates the abnormal returns of the portfolio. Dummy is the coefficient of the dummy variable representing market timing ability. R^2 represents the adjusted correlation coefficient. The conditional measure, in column 5-7, is estimated using 3 time-varying variables; Treasury-bill yield, dividend yield and the dummy variable of the January effect. Panel C presents the number of funds with positive and negative market timing ability. Number of funds with negative market timing ability is presented in parentheses [ ]. Funds with less than 24-week observations are excluded. Sig 5% refers to the number of funds for which market timing ability is significant at a 5% level.

	Unconditional			Conditional		
	Alpha	Dummy	R^2	Alpha	Dummy	R^2
Panel A: Overall level						
ALL	-0.00037	-0.011	0.95	-0.00026	0.067	0.95
	(-0.56)	(-0.20)		(-0.44)	(0.14)	
Panel B: Investment policy level						
EQUITY	-0.00056	-0.026	0.94	-0.00042	-0.0039	0.94
	(-0.79)	(-0.44)		(-0.64)	(-0.07)	
FLEXIBLE	0.00044	0.047	0.94	0.00046	0.625	0.94
	(0.64)	(0.76)		(0.82)	(1.42)	
Panel C: Individual level (Number of positive and negative [ ] market timing)						
All funds		128[81]			118[86]	
All funds with 5% sig.		21[0]			24[0]	
Equity funds		77[69]			73[73]	
Equity funds with 5% sig.		18[0]			19[0]	
Flexible		47[12]			45[13]	
Flexible funds with 5% sig.		3[0]			5[0]	

4.6 Conclusions

It is acknowledged that mutual fund investment in emerging markets has grown substantially in the past few years. Nonetheless, not many studies in fund performance have been conducted in this setting and most of these studies still use conventional measures; survey only short periods and examine a small number of funds. Therefore, this chapter reviews mutual fund performance in Thailand in some depth, using survivorship-bias-free data from 2000-2007, which is the most extensive period to be reviewed in mutual fund performance studies in Thailand. This chapter examines many aspects of fund performance, including performance in selectivity and timing ability, the strategies and styles of fund managers and mutual fund characteristics in relation to performance. In addition, this study also takes into account the style of tax-benefit funds and reviews the differences between these and general funds. Several models of mutual funds are used in this study and analysed at both aggregate, style and individual levels. The findings are, first, that mutual fund managers do not have stock selection ability or timing ability. On average, mutual funds insignificantly underperform the market benchmark. The inferiority is 1.2% using an unconditional measure, reducing to 1.75% with a conditional measure. In addition, the number of negative funds is also greater than of positive funds at the individual level. Second, equity and flexible fund managers employ different strategies to adjust their portfolios. Flexible fund managers tend to adjust their portfolios dynamically by employing macroeconomic variables, namely, treasury-bill and dividend yield. In contrast, equity fund managers select stocks on the basis of stock characteristics and are likely to put more emphasis on small and growth stocks, although there is no evidence of the momentum strategies used. Third, performance is unstable throughout the period studied. Mutual funds performed better in the first part of the period when the market was down but worsened in the subsequent period when the market peaked and significant cash flows were approached. Fourth, the performances of tax-benefit funds and general funds are statistically significant. Tax-benefit funds perform better than these general funds. Fifth, fund managers styles are homogenous. They are rather passive and mid-cap and blend (value and growth) oriented most funds. Finally, although the performance of mutual funds is not sensitive to portfolio formation, it is sensitive to the time interval and the model used. Cahart's four-factor model gives statistical and economic significance in fund performance.

These results provide practical implications for both Thai investors and fund managers. While most of these funds are based on a passive strategy and provide no abnormal return to investors, concentrating on small and value oriented funds is likely to provide a better return. Flexible fund managers align themselves to their main objectives in that they adjust their portfolios more actively on the basis of the economic information and, thus, suit active investors better. Tax-benefit funds not only provide income tax relief, but also earn a higher return than general funds. Therefore, this can be beneficial to the long-term passive investors. Nevertheless, the performance of funds also depends on the market conditions and for this reason performance in the past does not guarantee future performance. Furthermore, the implication for fund managers is that they should be more style-specific. The use of momentum strategy is also worth their consideration.

Our findings show both similarities and contradictions to the literature. The similarity is that both show evidence of no selectivity ability or timing ability among fund managers in Thailand. Moreover, predetermined variables in the conditional model are individually and jointly significant, although it lowers fund performance, contrary to the study of Ferson and Schadt (1996). Another contradiction is that, while evidence in the US reveals that growth funds perform better than others, in Thailand their performance is low compared to funds of other styles. However, the performance of tax-benefits funds is significantly different from that of general funds. This may be due to the lock-up provision period of the tax-benefit funds, which generate the liquidity premium (Edelen, 1999; Aragon, 2007).

Evidently these contradictions call for further studies, in order to find out what exactly causes them. More study of tax-benefit fund style should consider what factors make them perform better than general funds. The inclusion of benchmark and risk-free rate return to the performance measures is also required, as some evidence suggests that these can affect the results (Coles et al., 2006). Finally, the sensitivity of fund performance toward performance measures and data frequency found in this study require further investigation in order to evaluate as precisely as possible the mutual fund performance in emerging markets.

CHAPTER 5

DETERMINANTS OF MUTUAL FUND PERFORMANCE

Abstract

This study examines the relationship between Thai mutual fund performance and the following five characteristics: past return, size, net flows, fund longevity and family size. We base fund performance on risk-adjusted approaches and determine the relationship both statistically and in economic terms. We find evidence of persistence in fund performance only in general funds. The persistence in performance is mainly a result in poorly performing funds. Lagged cash flows shock has a negative impact on the performance of tax-benefit funds. Fund size, family size and fund longevity can explain fund performance in some specific policies but these are not enough to earn abnormal return based on these characteristics. In addition, we reveal the superior performance of tax-benefit funds even when we control for fund characteristics and year effect.

5.1 Introduction

Regardless of data and measure used, the prevailing empirical evidence suggests that fund managers, as a group, are unable to outperform the market, in particular after allowing for fees and expenses (see, Jensen, 1968; Malkiel, 1995; Ferson and Schadt, 1996; Wermers, 2000). Nonetheless, when we consider this at the fund level, there are some funds which outperform others. Kosowski et al. (2006) add that the performance of fund managers is not entirely due to luck. A number of studies examine whether we can identify the finds with superior performance and many fund characteristics are considered to be potential determinants. For example, Hendricks et al. (1993), Brown and Goetzman (1995) and Gruber (1996) suggest reasons for persistence in fund performance over a short horizon. However, Cahart (1997) argues that this is due to the use of momentum strategy on the part of fund managers. Indro et al. (1999) and Chen et al. (2004) suggest that fund size reflects the implicit transaction cost and, therefore, has a negative impact on fund performance. In addition, Warther (1995) and Edelen (1999) suggest the negative relation between return and cash flows. In contrast, Gruber (1996) and Zheng (1999) reveal a positive relation between returns and past flows and suggest a 'smart money effect' in fund performance. Furthermore, some other factors, such as longevity, size of the management company, fees, expenses and turnover have been identified in this regard in the literature. Nonetheless, most of these studies focus on only one particular factor or investigate particular factors only as a small part of their studies of mutual fund performance. More importantly, these studies are conducted within a developed market setting, where the context is different from that of the emerging markets in many ways, for instance, size, growth and competitiveness. This all makes evidence on this issue still scarce and ambiguous.

Thus, this study aims to investigate relation between fund performance and fund characteristics using data on Thai mutual funds. In addition to the fact that it is conducted in an emerging market where little is known about mutual fund performance, this study will also contribute to mutual fund literature in several ways. First, it examines a more extensive list of characteristics and employs a wider dataset than any previous study of emerging markets. We examine 5 characteristics which have been widely discussed in the literature including past performance, net cash flows, fund size, fund family size and fund longevity. We use the more complete dataset and also control for the effect from mutual fund investment policy differences. Thus, this study is the most comprehensive study in mutual fund determinants in an emerging market so far.

Second, in contrast to most previous studies of emerging markets, we focus on mutual fund performance on a risk-adjusted basis. This study employs both unconditional and conditional versions of Jensen's alpha. The conditional model allows for time-varying in the market risk factor.

Third, this is the first study which applies not one but two measures to disentangle the problem; multivariate (panel) regression controlling for time-variation effect and zero-cost trading strategy. This allows us to explore several determinants both separately and simultaneously and also to highlight what is significant both statistically and economically.

In total, this study considers up to 230 mutual funds from 2000-2007, including both equity and flexible funds. It examines a larger dataset and a longer period than previous studies in Thailand. In addition, we control for the impact of the mutual fund investment policy and tax-purpose fund style by further classifying funds into four groups; general equity funds (EQN), tax-benefit equity funds (EQT), general flexible funds (FLN) and tax-benefit flexible funds (FLT). The tax-benefit funds require a longer investment horizon than do the general funds, resulting in clientele differences[19]. Subsequently, this study will not only benefit investors and fund managers, but can also be used to suggest policy implications in order to scrutinize the characteristics of tax-benefit funds.

We find that the determinants of fund performance are subject to the fund investment policies. We find strong persistence in the performance of general funds. However, this is mainly attributable to poorly performing funds which continue to perform badly from one period to the next. Lagged year net cash flows do not explain fund performance as a whole. However, the cash flows shock in tax-benefit funds inversely affects fund performance. Fund size is negatively related to general flexible funds and positively related to tax-benefit flexible funds. General funds which belong to large management companies outperform those of small companies; and finally, young general equity funds tend to perform better than old ones. Nevertheless, selecting funds on the basis of size, family size and longevity does not confer any economic benefit.

The rest of the present chapter is organised as follows. Section 5.2 gives previous empirical evidence and hypotheses. Section 5.3 describes the data and methodology used. Empirical results are provided in section 5.4 and the final section, 5.5, gives a conclusion and suggestions for further research.

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[19] Tax-benefit funds are a special type of funds in Thailand which require long-term investment and investors will receive up to 15% tax relief (or maximum THB 300,000). See Chapter 3 for details.

5.2 Previous evidence and hypotheses

A number of studies have investigated the relationships of various mutual funds characteristics and fund performance in order to identify whether mutual fund performance can be explained by any particular characteristics. This section begins with a review of previous theoretical and empirical studies of each characteristic; include size, past returns, net flows, fund age and family size. Then this section goes on to offer hypotheses which will be tested in the study, concerning mutual fund characteristics. .

5.2.1 Persistence in performance

Persistence in performance occurs when past performance is positively correlated with current performance. Persistence in performance implies that prices reflect information and, therefore, it becomes evidence for rejecting the semi-strong form efficient hypothesis (EMH), since this claims that price does not fully reflect available information. Studies of persistence in mutual fund performance are well documented. In the literature, a number of studies bear evidence of short-term persistence, particularly among poorly performing funds (see, for example Hendricks et al., 1993; Goetzmann and Ibbotson, 1994). However, Brown and Goetzmann (1995) argue that the persistence in performance is due to survivorship bias. Grinblatt and Titman (1992) and Elton (1996) reveal evidence of persistence in a longer horizon. However, Cahart (1997) suggests that persistence in the performance of mutual funds is due to employing momentum strategies, as pointed out by Jagadeesh and Titmann (1993). Cahart shows that, after controlling for this effect, evidence of persistence is removed. Nonetheless, the recent study by Ferreira et al. (2009), who investigate the determinants of mutual funds using cross-country data over the period 1997-2007, reveal that fund performance can be explained by returns in the previous quarter, suggesting short-term persistence in performance. They reveal that this evidence is stronger in the US domestic funds than in non-US domestic funds.

In the UK, Blake and Timmermann (1998) also reveal persistence in UK unit trusts and their findings are using a 24-month previous return. This is comparable to Otten and Bams (2002), who reveal persistence in mutual fund performance in the UK but not in other European countries. Furthermore, Annaert et al. (2003) find evidence of persistence in European funds and Bauer et al. (2006) also reveal persistence in the performance of New Zealand mutual funds. These findings contrast with those in a study of Swedish data by Dahlquist et al. (2000) using Swedish data and Prather et al. (2004), who document the reverse effect of persistence in US funds during 1996-2000.

5.2.2 Fund size

There are extensive studies about the relationship between the size of mutual funds and performance, where the findings are still mixed. Large funds have an advantage over small funds in term of economies of scale because large funds can spread fixed cost and have access to more resources. In addition, managers of large funds will have better investment opportunities than managers of small funds and the brokerage commission is likely to be reduced with the amount of the transaction (Ciccotello, 1996).

However, some studies argue that fund size could have a negative impact on performance. For instance, Indro et al. (1999) suggest that fund size reflects implicit transaction costs and subsequently diminishing marginal returns. Fund size increases the cost of acquiring and trading on information, as the activities of a fund draw market attention. Therefore, larger funds face more difficulty in exploiting information asymmetry.

Furthermore, small funds also present stronger evidence of persistent performance (see Gruber, 1996; Berk and Green, 2004).

Grinblatt and Titmann (1989) investigate US mutual funds during 1975-1984. They find abnormal performance in small funds using returns data. Elton et al. (1996) also reveal that larger funds perform better than smaller funds when the data are controlled by survivorship bias. Similarly, Payne et al. (1999) find that the risk-adjusted performance of the US mutual funds between 1993 and 1995 is positively related to fund size. Indro et al. (1999) claim that mutual fund performance increases with size. However, the marginal return diminishes when it reaches its optimum size. Using European mutual fund data, Otten and Bams (2002) find a positive relationship between size and performance of mutual funds. Annaert et al. (2003) also examine the relationship of European equity mutual funds performance with different characteristics during 1995-1998 and reveal a positive relationship with fund size. Similarly, Bauer et al. (2006) reveal a positive relationship among New Zealand data.

In contrast to the findings above, Droms and Walker (1994) find no relationship in international mutual funds between size and performance. Ciccotello (1996) employs mutual funds with different investment objectives. He finds that fund size cannot explain fund performance with the exception of funds in aggressive/growth objectives where size has an inverse impact on performance. Dahlquist et al. (2000) point out that, in Sweden, small equity funds perform better than large equity funds, although the reverse relation holds for bond mutual funds. Similarly, Chen et al. (2004) examine a large set of US mutual funds from 1962 to 1999 and reveals a negative relationship between size and performance. They suggest that this reverse relationship is related to liquidity constraints. In addition, Edelen et al. (2007) also reveal that the evidence of negative relationship between size and performance is a result of high trading cost. In contrast to Chen et al., Ferreira et al. (2009) argue that the negative relationship exists only in the US market. Outside the US, large funds outperform small funds.

5.2.3 Net cash flows

The net cash flow of a fund represents the net growth in fund assets. Nonetheless, the movement of cash in and out of a fund would inversely affect portfolio beta and, subsequently, performance. This is because, when a fund receives large cash inflows, it is not possible for a manager to allocate the new money immediately. This makes a larger cash position in the portfolio and subsequently lowers the mutual fund's beta. Conversely, large cash outflows require fund managers to liquidate assets, even though they may have private information. Therefore, it prevents a fund manager from trading on information and causes him to show negative market timing ability. The effect of flows to fund performance is regarded as 'liquidity-motivated trading' and it impacts on the risk and return estimation. Warther (1995) suggests that, during 1976-1970, t-statistics for the slope coefficient of changes in beta on the changes in net cash flows were between -2.8 to -3.8. This negative is a highly significantly way of representing the negative relation between the net flows and portfolio beta (cited in Ferson and Schadt, 1996). Also, Edelen (1999) suggests the negative relation between fund abnormal returns and investor flows. He suggests that this, due to liquidity-motivated trading, lowers a fund's abnormal return by 1.5% - 2% per year. Furthermore, Benson and Faff (2006) study the relevance of money flows to equity fund performance, using Australian data. They find evidence supporting Warther's (1995) and Edelen's (1999) view that money flows and fund betas are negatively related and fund flows negatively impact on fund performance.

However, some studies find evidence that money flows into funds which had high returns in the preceding period, or "smart money". This refers to the ability of investors to pick superior find managers. A number of studies show evidence of the smart money effect. For example, Gruber (1996) finds that the returns from funds with high net cash inflows are higher than from those with average net cash inflows. Zheng (1999) also reveals that funds with positive cash flows outperform in the following period funds with negative cash flows. More specifically, she reveals that this finding is more pronounced in small funds. Nevertheless, Sapp and Tiwari (2004) argue that the smart money effect is explained by the stock momentum phenomenon. They show that, after controlling for stock return momentum, the smart money effect disappears.

Outside the US, Dahquist et al. (2000) find little evidence in Sweden of the relation between lagged flows and performance. However, Gharghori et al. (2007) investigate the smart money effect using Australian funds. They find evidence of it which cannot be explained by the stock return momentum. Ferreira et al. (2009) also confirm the above findings. They suggest that the smart money effect is evident in both US and non-US funds.

5.2.4 Fund longevity

The relationship between longevity and fund performance has received little scholarly attention in previous studies. Funds normally experience higher costs at first because they have fewer connections and money has to be spent on advertising. Therefore, we could expect that old funds would outperform young funds. Nevertheless, one could argue that managers of young funds are more active. This is confirmed by Blake and Timmermann (1998), who reveal that funds are likely to perform best during their first year of existence. Similarly, Otten and Bams (2002) find a negative correlation between performance and fund age in some European countries during the period 1991-1998. Nevertheless, Prather et al. (2004) and Ferreira et al. (2009) find no relationship between age and fund performance.

5.2.5 Family size

Mutual funds are operated under a management company, or "fund family", which holds an array of mutual funds. Therefore, a mutual fund is not an independent entity but is operated as part of a family. A fund family could impact on the decision of a fund manager and, therefore, potentially impact on fund performance. A larger family is superior to a small family in terms of increased economies of scale in operation, as it can share the resources of the whole family (Khorana and Servaes, 1999, 2005). A larger fund family also has better research quality. Furthermore, it reduces the search cost for investors due to its ease of recognition (Gaspar et al., 2006). Nevertheless, Chen et al (2002) find that that the size of a fund family does not significantly impact on fund performance. In contrast, Guedj and Papastakaikoudi (2004) reveal evidence of persistence of performance among large fund families. In addition, Chen et al (2004) and Ferreira et al. (2009) reveal the positive and significant relation to fund performance of both US and international funds.

5.2.6 Evidence from emerging markets and hypotheses

The relationship between fund performance and fund characteristics are less researched in emerging markets. This is primarily due to the fact that mutual fund data are much less accessible than those of other financial intermediaries. Among a limited number of studies, Mei-Chen (2006) examines the determinants of mutual fund performance over different investment periods. He estimates performance using the Sharpe ratio and looking at different characteristics in Taiwan. The characteristics include net asset values, current yield, turnover and expenses ratios. He shows that performance is positively related to net asset values but inversely related to the expenses ratio. Similarly, Tng Cheong (2007) finds insignificant evidence of positive relationship in size and performance using mutual fund data from Singapore.

In Thailand, a study of the relationship between performance and mutual fund characteristics is conducted by Prasomsak (2001). He employs fixed-effect regression to investigate the performance of 77 mutual funds over the period 1998-2000. He calculates performance using raw returns and looks at market returns, fund size, turnovers and fund type. He reveals that fund returns are positively correlated with market returns and negatively related to size and turnover. The type of fund does not correlate with fund returns. Watcharanaka (2003) investigates persistence in the performance of 62 Thai open equity funds for the period 1999-2002 using cross-section regression. She reveals a negative persistence in performance; that is, high return funds tend to perform worse in the following period. In addition, she does not find any relationship between returns and mutual fund expenses. Nitibhon (2004) also uses cross-sectional analysis to investigate how performance is generated, focusing on two characteristics, size and the book-to-market value of stock held. He finds that, over the period 2000-2004, performance is positively related to size and growth stocks. In addition, he investigates persistence in performance and flows of funds. By examining the performance of decile portfolios, he reveals that, unlike what is observed in the US, only the top decile portfolio outperformed the market. However, the spread between top and bottom portfolios is not statistically significant. In addition, he shows that the outperforming in the top decile portfolio is not the result of momentum strategy but rather because the fund manager has put more weight on growth stocks. Similarly, he finds that investment in funds with high flows does not provide superior returns. Researchers in Kasikorn research centre (2005) investigate the performance of the 5 largest fund companies in relation to other companies. They find that large fund companies do not perform better than small ones.

Table 5.1 summarises the findings in the previous literature on emerging markets as well as the expected signs according to the theory and evidence in developed countries. It is clear that, in emerging markets, research on this issue has so far received very little attention and the evidence is still scanty. These studies examine only one or two characteristics and tend to look at this issue as a part of a performance measurement study. Some of the characteristics, such as fund age and family size, have never been investigated. Furthermore, some studies do not consider the time-variation over the study period or differences in mutual fund style.

Nevertheless, the issue of determinants in fund performance is important to investors because it can be the first point of guidance in selecting funds and can also help fund managers to manage their portfolio more efficiently. Therefore, this study aims to test the same hypotheses as the previous literature; that is, to look at the relationship between mutual fund performance and its characteristics. However, this study looks at this relationship in the context of a emerging market where previous studies are hardly to be found. We test a more extensive list of mutual fund characteristics and investigate its relationship comprehensively by looking at each characteristic individually and also as part of a group in order to control for the effect of one characteristic on the others. Altogether, we look at five characteristics, namely, size, past returns, net flows, fund longevity and family size. Hence, five hypotheses are tested:

$H_{5.1}$: Fund past performance is related to fund current performance

$H_{5.2}$: Fund size is related to fund performance

$H_{5.3}$: Fund age is related to fund performance

$H_{5.4}$: Fund net flow is related to fund performance

$H_{5.5}$: Fund family size is related to fund performance

Table 5.1 Previous evidence of the relationship between fund performance and fund attributes in emerging markets

The table summarises evidence of a relationship between fund performance and the five fund attributes, namely size, past returns, age, flows and family size. '+' indicates a positive relationship. '-' refers to a negative relationship. '0' indicates no relationship.

	Past returns	Size	Age	Flows	Family size
Prasomsak (2001)		-			
Nitibhon (2004)	0	+		0	
Watcharanaka (2003)	-				
Kasikorn research centre (2005)					0
Mei-Chen (2006)		+			
Tng Cheong (2007)		+			
Author's expected sign	0	+/-	+/-	+/-	+/-

5.3 Data and methodology

5.3.1 Fund sample

Our sample includes equity and flexible mutual funds in Thailand over the period 2000-2007. We exclude international funds, index funds, sector funds, property funds and fund with any specific purpose. This makes 230 funds in our initial sample (made up of 166 equity funds and 64 flexible funds). Details of our sample selection are in Chapter 3. In addition, we impose one extra condition for this study: funds in order to be included must have been in operation at least 12 weeks over the sample period. The reason behind this is to reduce small sample size bias in the estimating mutual performance.

As a result, our final sample is reduced to 215 funds, made up of 155 equity funds (118 general funds and 37 tax-benefit funds) and 60 flexible funds (48 general funds and 12 tax-benefit funds.) The tax-benefit funds offer tax relief while requiring a long-term investment and result in differences in their characteristics. Subsequently, our sample can be classified into four broad groups: general equity funds, general flexible funds, tax-benefit equity funds and tax-benefit flexible funds. Table 5.2 below provides summary statistics of the mutual fund returns in each year. The table shows that the number of funds rose sharply over the years and there is great variation in mutual fund returns over the study period. Funds lost up to 19% per annum during the recession period but earned around 70% during the bull market. Additionally, Panel B reveals that returns are also different across investment policy.

Table 5.2 Summary statistics of mutual fund returns

The table presents the summary statistics of fund returns from 2000-2007. Mean refers to the mean of annualised returns. SD refers to standard deviation of the returns. N refers to the number of funds operated in the year. Panel A gives the summary statistics of the whole fund sample and Panel B gives the summary statistics of the funds classified by investment and tax policies

	2000	2001	2002	2003	2004	2005	2006	2007
Panel A: Whole sample								
- Mean	-0.1944	0.0333	0.1587	0.7670	-0.0957	0.0340	-0.0341	0.1547
- SD	0.07	0.07	0.11	0.50	0.19	0.09	0.08	0.08
- N	103	105	127	138	169	177	190	206
Panel B: Classified by fund investment and tax policies								
General Equity funds								
- Mean	-0.2094	0.0398	0.1966	0.8266	-0.1454	0.0292	-0.0434	0.1752
- SD	0.05	0.06	0.09	0.55	0.23	0.11	0.07	0.07
- N	84	84	86	92	95	99	100	106
General Flexible funds								
- Mean	-0.1282	0.0076	0.1004	0.5748	-0.0579	0.0206	-0.0428	0.1033
- SD	0.10	0.09	0.10	0.34	0.09	0.05	0.10	0.07
- N	19	21	27	31	39	39	46	43
Tax-benefit Equity funds								
- Mean	--	--	0.0314	0.9595	0.0071	0.0640	-0.0004	0.1576
- SD	--	--	0.08	0.19	0.04	0.06	0.06	0.09
- N	--	--	7	7	24	28	32	44
Tax-benefit Flexible funds								
- Mean	--	--	0.0440	0.6582	-0.0253	0.0486	-0.0132	0.1479
- SD	--	--	0.10	0.35	0.05	0.04	0.04	0.07
- N	--	--	7	8	11	11	12	13

5.3.2 Fund performance benchmarks

In this study, we consider two different risk-adjusted performance measures: the traditional Jensen's alpha (α_{trad}) and conditional Jensen's alpha (α_{con}). The traditional Jensen's alpha measure is a single-factor model based on the Capital Asset Pricing model proposed by Jensen (1968). Jensen's measure is expressed as:

$$R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_t \tag{5.1}$$

where R_{pt} is the excess return on portfolio p over risk-free rate; R_{mt} is the excess return on the market benchmark portfolio over the risk-free rate t; ε_{it} is the random error term. The model interception is the traditional Jensen's alpha representing the performance of a fund.

The conditional Jensen's model is estimated on the basis of work by Ferson and Schadt (1996). They argue that the beta estimated by the Jensen model is downwardly biased because the beta is unstable over time. They incorporate time varying variables in addition to the previous model. The conditional Jensen's measure is:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{0p}(R_{mt} - R_{ft}) + \delta'_p\ [(R_{mt} - R_{ft})Z_{t-1}] + \varepsilon_t \tag{5.2}$$

where Z_{t-1} is the predetermined information variables; and δ_p is the vector of parameter. The interception is the conditional Jensen's Alpha representing the performance of the fund.

In this study, the 7-day Bank of Thailand's repurchase rate is used to represent the return of a risk free rate and the return of SET index is used as the market benchmark. These data are both obtained from the Thompson Datastream database. For the conditional Jensen's model, three predetermined information variables are used: 7-day treasury bills yield, dividend yield and a dummy variable of the January effect. This selection is selected on the basis of evidence that it can explain the stock return during our study period. Once again, these data are obtained from the Thompson Datastream database.

5.3.3 Fund characteristics

In this study, we examine 5 fund characteristics, namely, size, persistence (past return), net cash flows, fund longevity and fund family size. Summary statistics for these fund characteristics are reported in Table 5.3. Mutual fund size is measured by the total asset values (TNAs). This study assesses TNAs in two ways: TNAs at the beginning of the year and average TNAs across the year. We focus on the TNAs at the beginning of the year in order to avoid look-ahead bias. We obtain this data from the Association of Investment Management Companies (AIMC) in Thailand. Table 5.3 reveals that the average size of mutual funds is around 490 million Baht, but they are subject to great variation. Average general funds size is slightly larger than tax-benefit funds. This is because tax-benefit funds were established only in early 2002.

Net cash flows are the net amount of cash that a fund has received or paid during a given period. Since the data on cash flows data are not publicly available, we implicitly calculate the net cash flows based on a fund's total net asset values by assuming that the flows occur at the end of period. The net cash flows (NCF) and normalised net cash flows (NNCF) are calculated following Equations 5.3 and 5.4, respectively.

$$NCF_{p,t} = \frac{TNA_{p,t} - TNA_{p,t-1} * (1 + R_{p,t})}{TNA_{p,t-1}} \tag{5.3}$$

$$NNCF_{p,t} = \frac{NCF_{p,t}}{TNA_{p,t-1}} \tag{5.4}$$

where $TNA_{p,t}$ is the total net asset values of fund p at the end of period t and $R_{p,t}$ is the cumulative return of the fund for the period t. The average cash flows of the funds in our sample is 64 million Baht. However, this comes with the massive variation of 490 million Baht. The tax-benefit funds receive much greater cash flows than the general funds. This reveals the popularity of the tax-benefit funds over the study period. Tax-benefit flexible funds received the highest average net cash flows while general equity funds received the smallest net cash flows.

Fund longevity or fund age is measured by the length of time (in months) that the fund has been operating since its registration date (inception date). We obtained a fund's inception date from the Security Exchange Commission Thailand (SEC) and then we match it manually them to our mutual fund sample. The average age of our sample is 90 months, or around 7 years. As expected, tax-benefit funds are much younger than general funds, since the scheme began only in early 2002.

Finally, family size is measured by either the total net asset values (TNAs) of the management company at the beginning of the year or the number of funds which belonged to the company at the beginning of the year. These figures are obtained from the Security Exchange Commission Thailand (SEC). We construct a dummy variable corresponding to family size in order to separate the large management companies from the small management companies. The dummy variable equals one if a fund belongs to the five largest companies in a particular year and zero otherwise.

Table 5.3 Summary statistics of fund attributes

The table presents the summary statistics of mutual fund attributes. The table shows mean and standard deviation (in parentheses). TNA refers to total asset value and NCF refers to net cash flows (in million Baht). Age refers to a fund's longevity since its inception date (in months). DFAM is a dummy variable which equals one if the fund belongs to the five largest fund companies and zero otherwise. Panel A presents the summary statistics of funds in the whole sample. Panel B presents summary statistics for funds according to its investment style.

	N	TNA	NCF	AGE	DFAM
Panel A: Whole sample					
ALL	215	491.0447	63.8253	90.1429	0.3782
		(800.03)	(490.54)	(60.70)	(0.49)
Panel B: Classified by fund investment and tax policies					
General Equity funds	118	443.6516	31.1268	123.5750	0.3552
		(638.82)	(472.66)	(53.317)	(0.48)
Tax-benefit Equity funds	37	383.5389	163.8508	29.6596	0.3910
		(743.19)	(316.97)	(28.01)	(0.49)
General Flexible funds	48	695.9902	73.2570	77.6800	0.4225
		(1145.07)	(598.63)	(51.71)	(0.49)
Tax-benefit Flexible funds	12	436.9128	178.9287	51.1429	0.3750
		(747.38)	(479.42)	(18.19)	(0.49)

5.3.4 Methodology

This study employs two approaches to investigate the relationship between performance and the five characteristics, a multidimensional (panel) analysis (section 5.3.4.1) and trading strategies (section 5.3.4.2).

5.3.4.1 Multidimensional (panel) regression

While previous studies normally use monthly return data, this study employ weekly return data. The benefit of higher frequency in our dataset is that it allows us to investigate this issue using an alternative approach: multidimensional or panel regression. We use the panel regression approach to examine the determinants of fund performance both separately and as a group while controlling for style specifics and year variation.

To estimate panel regression, we first estimate the risk-adjusted performance of each fund every year from 2000-2007, using both traditional and conditional measures as stated in Equations 5.1 and 5.2. We restrict this to funds with a minimum of 12 weekly returns in the estimation; hence, survivorship bias may arise (see Brown et al., 1992). Nonetheless, the evidence in Chapter 3 reveals that the bias in our data is expected to be relatively small. Table 5.4 reports summary statistics for mutual fund returns over the study period. For the period 2000-2007, mutual funds, on average, generated returns of around 8% per annum but they still slightly underperformed for about 1%-2% in relation to the market. Nonetheless, variations in returns are high, which is consistent with what is shown in Table 5.2 and reveals the fluctuation in returns each year.

Table 5.5 reports the correlation between fund returns and the four following characteristics: size, net flows, age and family size. As expected, the returns estimated using unconditional and conditional measures are highly correlated. Therefore, this study will base its results on the unconditional performance measure. However, we also report results from the conditional measure in order to confirm the robustness of the results. The rest of the variables have a relatively low correlation. The highest figure is 0.285, which comes from the correlation between size and net flows. Therefore, our estimation is less likely to suffer from multicollinearity.

Table 5.4 Summary statistics of mutual fund performance

The table shows the summary statistics of mutual fund returns from 2000-2007 using traditional and conditional Jensen's measures (in columns 4 and 5, respectively). Panel A gives the summary statistics for the whole sample. Panel B gives the summary statistics for funds within each investment style. The table shows mean and standard deviation (in parentheses).

	N	Excess return	Alpha	
			α_{trad}	α_{con}
Panel A: Whole sample				
ALL	215	0.080	-0.00033	-0.00031
		(0.322)	(0.00284)	(0.00312)
Panel B: Classified by investment and tax policies				
General Equity funds	118	0.088	-0.00044	-0.00053
		(0.367)	(0.00335)	(0.00354)
Tax-benefit Equity funds	37	0.088	0.00039	0.00052
		(0.218)	(0.00155)	(0.00161)
General Flexible funds	48	0.051	-0.00040	-0.00016
		(0.239)	(0.00156)	(0.00240)
Tax-benefit Flexible funds	12	0.099	0.00010	0.00031
		(0.253)	(0.00117)	(0.00138)

Table 5.5 Correlation matrix

The table presents a correlation matrix of fund performance and the four fund attributes. α_{trad} and α_{trad} refer to traditional and conditional Jensen's performance, respectively. TNA and NCF refer to total asset value and net cash flows (in million Baht). Age refers to a fund's longevity since its inception date (in months). DFAM is a dummy variable which equals one if the fund belongs to the five largest fund companies and zero otherwise.

	α_{trad}	α_{con}	TNA	NCF	AGE	DFAM
α_{trad}	1.000	0.915	-0.042	-0.057	-0.028	0.020
α_{con}	-	1.000	-0.027	-0.100	-0.047	0.024
TNA	-	-	1.000	0.285	-0.105	0.150
NCF	-	-	-	1.000	-0.098	0.065
AGE	-	-	-	-	1.000	0.138
DFAM	-	-	-	-	-	1.000

Next, we estimate the panel regressions controlling for fixed-year effect (year dummies) to account for cross-sectional dependence. The fixed-year effect is chosen over the random effect because we assume there is some unobserved heterogeneity which correlated with time. The model is presented as:

$$PERF_{pt} = \alpha_{0t} + \sum_{i=1}^{8} \alpha_i YEAR_{it} + \alpha_{9t} DTAX_{it} + \alpha_{10} tDSTYLE_{it} + \beta_t' \ CHARAC_p + \varepsilon_t \tag{5.5}$$

where $PERF_{pt}$ represents the risk-adjusted performance of mutual fund p in year t estimated using an unconditional measure. $YEAR_{it}$ captures the fixed-effect model account for year-specific fund performance. $DTAX_{it}$ is a dummy variable of a fund of tax-benefit style, equal to 1 if fund i is a tax-benefit fund and zero otherwise. $DSTYLE_{it}$ is a dummy variable of fund investment style, equal to 1 if fund i is an equity fund and zero otherwise. $CHARAC_p$ is a set of five mutual fund characteristics, namely, total net asset values of the fund; past year's performance; age of mutual fund; annual net cash flows; and a dummy variable corresponding to family size. We estimate this regression for the full sample and also separately for each investment and tax-benefit policy in order to control for heterogeneity in mutual fund style.

5.3.4.2 Trading strategies

The alternative approach to examining the relationship between performance and fund characteristics is to construct zero-cost trading strategy portfolios corresponding to each of five characteristics: past returns, size, net flows, fund age and family size. Even though the long-short strategy is not allowed in practice, this measure gives a meaningful result because it also measures the economic significance of the fund determinants.

Nevertheless, this approach assumes that no transaction cost is involved in the portfolio rebalancing. However, in practice, transaction costs can have a significant impact on performance, in particular with active funds which trade more frequently. The transaction costs are all costs associated with trading, both explicitly and implicitly. The main transaction costs are commissioning and the bid/ask spread. The transaction cost can reduce the profit from mutual funds and this becomes more significant with an active portfolio. Berk and Green (2004) and Edelen et al. (2007) reveal that trading costs bear a significantly negative relation to the fund performance, of large funds, most of all.

To conduct our trading strategies approach, our sorting rule is 30:70:30 and the holding period is for one year. That is, at the beginning of each year, funds are ranked according to their characteristics. Funds which lie above the 30th percentile (HIGH) and below the 70th percentile (LOW) are used in constructing the HIGH and LOW portfolios respectively. The portfolio is on an equally-weighted basis. Subsequently, these portfolios are held for one year and then re-constructed by repeating the process.

We follow the process above to construct a trading strategy portfolio for all characteristics except family size. Since the family size is a dummy variable, its HIGH portfolio based on family size is defined as an equally weighted portfolio of funds which belong to the five largest fund companies (HIGH) and the LOW portfolio is an equally weighted portfolio of the remaining companies (LOW). Again, this is held for one year and the process is repeated.

The trading strategies portfolios are constructed using the whole fund sample as well as funds according to investment style. Therefore, for each characteristic, we have two portfolios (a HIGH and a LOW) constructed within the five fund groups; the whole sample (ALL), general equity funds (EQN), tax-benefit equity funds (EQT), general flexible funds

(FLN) and tax-benefit flexible funds (FLT). We then estimate the risk-adjusted performance of each portfolio using traditional and conditional measures, as pointed out in Equations 5.1 and 5.2, respectively.

5.4 Empirical results

This section reports the empirical results for each fund characteristic. Results for multivariate (panel) regression are presented in Table 5.6. What is estimated is the relationship between performance and fund characteristics, controlled for fixed-year effect. The fund performance is estimated using unconditional and conditional measures. However, because the results read from the two measures are quite similar, we present only the result based on the unconditional measure. Panel A reports the results estimated for the full sample. Models 1-5 (in columns 2-6) regress the performance on each individual fund characteristic and Model 6 (column 7) reports the results of estimating all five characteristics together. Style dummies are also included in Model 6 in order to control for unobserved heterogeneity. Similarly, Panels B – E provide the results of investment policies in order to examine finds from a style-specific standpoint. The results in Panel A show that the dummy variable for investment policy (DSTYLE) is not significant and its t-statistics are very low across all models, suggesting that investment policy does not affect the performance of a fund. In contrast, the dummy variable for tax-benefit funds (DTAX) is highly and statistically significant. This reveals the superior performance of tax-benefit funds even when controlled for fund characteristics.

Results from the trading strategy approach are presented in Tables 5.7 - 5.11. The performances of trading strategy portfolios are estimated using unconditional and conditional measures. Its abnormal returns and t-statistics (in parentheses) are shown in columns 2-3 and 5-6, respectively. Once again, the results are consistent across performance measures and, therefore, we based our analysis on the unconditional measure. Columns 4 and 7 report the differences in performance between the HIGH and the LOW portfolios and test whether it is statistically different from zero.

Subsequently, sections 5.4.1 - 5.4.5 reveal the relationship between performance and the following fund characteristics: past performance, size, net cash flows, age and size of fund family respectively.

Table 5.6 Multidimensional (panel) analysis for determinants of fund performance

The table shows the estimated results of annual fund performance regressed on fund attributes allowing for fixed-year effects. Coefficients and t-statistics (in parentheses) are reported, adjusted for heteroscedasticity using White's (1980) model. Fund performances are calculated using an unconditional single-factor measure. lnTNA is the natural logarithm of average total asset value (TNA) of a fund in the year. $PERF_{t-1}$ is the one-year lagged performance. NNCF refers to normalized net cash flows. lnAge is the natural logarithm of number of months since the fund's inception date. DFamily is a dummy variable for family size, equal to 1 if belongs to the five largest companies, otherwise=0. Dstyle is a dummy for investment style, equal to 1 if an equity fund, otherwise=0. Dtax is a dummy variable for tax-benefit style, equal to 1 if a tax-benefit fund, otherwise=0. * Significant at a 10 % level. ** Significant at a 5% level. *** Significant at a 1% level

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Panel A: All funds						
PERF t-1	0.223***					0.211***
	(3.93)					(3.31)
lnTNA		0.0001				0.00003
		(1.59)				(0.3)
NNCF t-1			0.0002**			0.0001
			(2.19)			(1.18)
lnAge				-0.00021*		-0.00013
				(-1.74)		(-1.2)
DFamily					0.00026**	0.0005***
					(2.04)	(2.58)
DStyle	0.00003	-0.00005	0.00003	-0.00001	-0.00006	0.0001
	(0.17)	(-0.36)	(0.17)	(-0.09)	(-0.41)	(0.49)
Dtax	0.0009***	0.0011***	0.0071***	0.0008***	0.0010***	0.005***
	(5.7)	(7.6)	(4.33)	(4.69)	(7.63)	(2.76)
R^2	0.13	0.11	0.11	0.11	0.11	0.13

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Panel B: General Equity funds						
PERF t-1	0.231***					0.986***
	(3.57)					(2.76)
lnTNA		0.00023**				0.00013
		(2.09)				(1.01)
NNCF t-1			0.0002			0.00003
			(1.17)			(0.17)
lnAge				-0.00032*		-0.00027*
				(-1.7)		(-1.74)
DFamily					0.00026	0.00044*
					(1.46)	(1.9)
R^2	0.13	0.10	0.10	0.10	0.10	0.13
Panel C: Tax-benefit Equity funds						
PERF t-1	0.0541					0.1639
	(0.42)					(0.96)
lnTNA		-0.00012				0.00005
		(-1.12)				(0.46)
NNCF t-1			-0.00007			-0.00019
			(-0.7)			(-1.25)
lnAge				-0.00047		-0.00036
				(-1.43)		(-0.81)
DFamily					0.00021	0.00032
					(0.95)	(1.07)
R^2	0.37	0.4	0.06	0.41	0.39	0.14
Panel D: General Flexible funds						
PERF t-1	0.302***					0.266***
	(3.8)					(3.67)
lnTNA		-0.00007				-0.00021**
		(-0.74)				(-2.21)
NNCF t-1			0.0001			0.00021
			(0.75)			(1.63)
lnAge				0.00003		0.00022
				(0.18)		(1.23)
DFamily					0.00033**	0.0005**
					(1.97)	(2.11)
R^2	0.27	0.22	0.21	0.22	0.23	0.35
Panel E: Tax-benefit flexible funds						
PERF t-1	0.0451					0.1453
	(0.3)					(0.98)
lnTNA		0.00013**				0.00029*
		(2.1)				(2.00)
NNCF t-1			0.00008			-0.00001
			(0.37)			(-0.06)
lnAge				0.00047**		0.00012
				(2.68)		(0.5)
DFamily					0.00019	-0.0005
					(0.84)	(-1.28)
R^2	0.55	0.53	0.40	0.50	0.50	0.53

5.4.1 Persistence in performance

Table 5.6, Model 1, estimates whether fund performance is correlated with its performance in the past year. The fund performance is estimated using a risk-adjusted unconditional approach. The result shows that current performance increases with past performance and this is highly and statistically significant. In addition, this is shown in Model 6 when other characteristics are also included. Thus, we can conclude that there is evidence of performance persistence in our fund sample. Nevertheless, since our sample is dominated by general equity funds, we control for investment and tax policies and investigate the relationship separately for each individual fund style.

Panels B to E show the results estimated at policy level. We find that the performance of general equity and flexible funds can also be explained by the past year's performance (Panels B and D). In contrast, we do not find this evidence in any tax-benefit funds and its t-statistical values are very low. Therefore, we suggest that there is persistence in the performance of general mutual funds.

We also examine whether this evidence is robust and of any economic importance. Table 5.7 presents evidence from the trading strategy approach. The table shows the abnormal performance of trading strategy portfolios constructed on the basis of the past year's performance. We view past performance in two ways: risk adjusted returns (Panel A) and raw returns (Panel B). In Panel A, the high past year's returns portfolio insignificantly outperforms the market. In contrast, the low past year's returns portfolio underperforms the market and is statistically significant at the 5% level. This makes the difference between the two high and low past returns portfolios equal 0.13% per week or around 6% per annum. This difference is highly and statistically significant. Consistent with the results in Table 5.7, we find that persistence in performance is attributed to the evidence for general funds only, but not to the tax-benefit funds. In contrast, results suggest that in tax-benefit funds the differences in the high and the low past year's returns portfolios are relatively small.

The results from Panel B, which estimates the performance of portfolios based on the past year's raw returns are comparable to the results in Panel A. For general funds, high past year's return portfolios do not earn abnormal returns, while low past year's returns portfolios generate significantly inferior performance. The differences between the two portfolios are positively and highly significant but we do not find this evidence for the tax-benefit funds portfolio.

Consequently, we can conclude that there is persistence in performance in Thai mutual funds over our estimation period. This evidence is statistically and economically important. However, it holds good only for general funds. In addition, our results suggest that this result of persistence in performance applies only to poorly performing funds which continue to perform badly. Past outperforming funds do not generate an abnormal return in a subsequent period. Our results are consistent with several previous studies in developed markets (for example, Grinblatt and Titmann, 1992; Hendricks et al., 1993; Goetzmann and Ibbotson, 1994; Blake and Timmermann, 1998; Annaert et al., 2003; and Bauer, 2006). However, this is in contrast to the evidence in Thailand suggested by Nitibhon (2004). He shows that the first decile portfolio of funds has superior abnormal return but the long-short strategy does not generate abnormal return. He also reveals that the superior performance in the top decile portfolio is not due to the use of momentum strategy by fund managers. Nevertheless, in our study, we do not observe whether the evidence of persistence is due to the use of momentum strategy, as pointed out by Cahart (1997), and therefore this issue calls for further investigation.

Table 5.7 Performance of trading strategy portfolios based on past performance

The table presents performance estimated from trading strategy portfolios based on a past year's returns using an unconditional Jensen's measure (1968) and Ferson and Schadt's conditional measure (1996). High refers to the equally weighted portfolio of the 30% highest past return portfolios and Low refers to the equally weighted portfolio of the 30% lowest past return portfolios. Panel A estimates using the past year's raw returns and Panel B estimates using the past year's risk-adjust single factor returns. T-statistics, adjusted for heteroscedasticity, using White's (1980) model are in parentheses ( ). High-Low is the performance difference between the high and low portfolios and its t-statistics in parentheses ( ) test whether the performance is significant from zero. All refers to all funds, EQN to general equity funds, EQT to tax-benefit equity fund, FLN to general flexible funds and FLT to tax-benefit flexible funds. * significant at 10% ** significant at 5% *** significant at 1%

	Unconditional			Conditional		
	High	Low	High-Low	High	Low	High-Low
Panel A: Single-factor measure						
ALL	0.00023	-0.0011**	0.0013***	0.00008	-0.0011***	0.0012***
	(0.6)	(-2.54)	(3.48)	(0.21)	(-2.85)	(3.25)
EQN	0.00022	-0.00126**	0.0015***	0.00007	-0.0014***	0.0015***
	(0.51)	(-2.44)	(3.29)	(0.17)	(-3.05)	(3.29)
EQT	-0.0006	-0.0002	-0.00046	-0.00048	0.00021	-0.0004
	(-1.23)	(-0.51)	(-0.99)	(-0.99)	(0.53)	(-0.86)
FLN	0.00002	-0.0011***	0.0011**	-0.00017	-0.001***	0.0009**
	(0.07)	(-2.77)	(2.5)	(-0.61)	(-2.96)	(2.15)
FLT	-0.00038	0.00013	-0.00007	-0.00054	0.00009	-0.00015
	(-0.85)	(0.38)	(-0.2)	(-1.53)	(0.27)	(-0.49)
Panel B: Raw returns						
ALL	0.0002	-0.00072*	0.00091**	0.00003	-0.00042	0.00071*
	(0.43)	(-1.63)	(2.14)	(0.06)	(-1.06)	(1.77)
EQN	0.00021	-0.00087*	0.0011***	0.00005	-0.001**	0.0011***
	(0.44)	(-1.8)	(2.94)	(0.13)	(-2.45)	(3.01)
EQT	0.0007*	0.0012***	-0.00048	0.00071*	0.0011***	-0.00038
	(1.66)	(2.97)	(-1.28)	(1.69)	(2.75)	(-1.03)
FLN	0.00012	-0.00058	0.000706	-0.00018	-0.00025	0.00008
	(0.2)	(-1.33)	(1.04)	(-0.34)	(-0.64)	(0.12)
FLT	-0.00149**	0.00072	-0.0022***	-0.0013**	0.00042	-0.0018**
	(-2.49)	(1.63)	(-2.83)	(-2.3)	(1.06)	(-2.36)

5.4.2 Mutual fund size

Models 1 and 6 in Table 5.6 estimate the relationship between performance and mutual fund size as measured by the natural logarithm of total net asset values at the beginning of the year. We do not find this relationship in the whole sample estimation. However, the results in Panels B- E reveal that size can explain fund performance to some extent but there are some important differences across fund policies. We find that fund size is positively related to performance in general equity funds and tax-benefit flexible funds. However, the evidence in general funds is removed when other characteristics are included in the model. This is probably due to the correlation between fund size and net cash flows. Conversely, we find a negative relationship in flexible funds.

Table 5.8 reports the abnormal returns estimated from trading strategy portfolios based on fund size. Panel A provides the results based on TNAs at the beginning of the year. Results based on the average TNAs are also used to confirm the validity and are presented in Panel B. Results from both panels are consistent and suggest that strategy portfolios based on size do not yield abnormal performance. Therefore, even when there is evidence suggesting a relationship between some mutual fund styles, this is not strong enough to be able to earn abnormal returns on the basis of mutual fund size.

Our results are comparable to those of Nitibhon (2004), who applies cross-section regression and reveals the positive relation in size and performance in Thai equity funds. In addition, our results are also comparable to findings in other emerging markets which show that performance increases with fund size ((Mei-Chen, 2006; Tng Cheong, 2007).

Nonetheless, it contrasts with most of the evidence in the US, which suggests a negative relationship between size and fund performance (for instance, Indro et al. 1999; Chen et al., 2004; Ferreira et al., 2009). Indro et al. (1999) pointed out that if a fund is larger than marginal in size, there will be a negative impact on performance due to the diseconomies of scales and liquidity constraints. Therefore, we conclude that the mutual funds in our sample may not be large enough to reach marginal size.

Table 5.8 Performance of trading strategy portfolios based on fund size

The table presents performance estimated from trading strategy portfolios based on fund size using an unconditional Jensen's measure (1968) and Ferson and Schadt's conditional measure (1996). Fund size is calculated using average total net asset values (Panel A) and total net asset values at the beginning of the year (Panel B). High refers to the equally weighted portfolio of the 30% largestportfolio and Low to the equally weighted portfolio of the 30% smallestportfolio. T-statistics, adjusted for heteroscedasticity, using White's (1980) model are in parentheses ( ). High-Low represents the performance difference between the high and low portfolios and their t-statistics in parentheses ( ) test whether the performance is significant from zero. All refers to all funds, EQN to general equity funds, EQT to tax-benefit equity funds, FLN to general flexible funds and FLT to tax-benefit flexible funds. * significant at 10%, ** significant at 5% , *** significant at 1%

	Single-factor			Conditional		
	High	Low	High-Low	High	Low	High-Low
Panel A: Average total net asset values						
ALL	-0.00009	-0.00038	0.00029	-0.00015	-0.00045	0.00030
	(-0.3)	(-0.93)	(1.04)	(-0.52)	(-1.19)	(1.04)
EQN	-0.00013	-0.00058	0.000446	-0.0002	-0.00074	0.00055
	(-0.41)	(-1.16)	(1.31)	(-0.62)	(-1.61)	(1.59)
EQT	0.0010***	0.0005	0.000439	0.0010***	0.00061	0.00031
	(2.63)	(1.12)	(1.04)	(2.68)	(1.38)	(0.74)
FLN	-0.00015	0.00007	-0.00022	-0.00039	-0.0003	-0.00009
	(-0.43)	(0.2)	(-0.53)	(-1.23)	(-1)	(-0.22)
FLT	0.00041	-0.00015	0.000474	0.00035	-0.00022	0.00057
	(1.59)	(-0.29)	(1.05)	(1.45)	(-0.43)	(1.3)
Panel B: Total net asset values at beginning of the period						
ALL	-0.00032	-0.00014	-0.00018	-0.00043	-0.00022	-0.00021
	(-1)	(-0.35)	(-0.71)	(-1.36)	(-0.58)	(-0.84)
EQN	-0.00021	-0.00033	0.00011	-0.0003	-0.00051	0.00021
	(-0.62)	(-0.68)	(0.34)	(-0.87)	(-1.14)	(0.65)
EQT	0.00093**	0.00079**	0.000133	0.00098**	0.0008**	0.00019
	(2.12)	(2.03)	(0.31)	(2.26)	(2.03)	(0.45)
FLN	-0.0003	-0.0003	0.00000	-0.00051*	-0.00039	-0.00011
	(-0.93)	(-0.78)	(0.01)	(-1.81)	(-1.18)	(-0.3)
FLT	-0.00021	0.00014	-0.00006	-0.00015	0.00029	-0.00004
	(-0.78)	(0.31)	(-0.13)	(-0.62)	(0.67)	(-0.09)

5.4.3 Net cash flows

This section presents evidence of the relationship between net cash flows and fund performance. The net cash flows of funds are measured by the normalised net cash flows ($NNCF_{t-1}$) based on a one-year lagged period. On the basis of panel regression estimation (Table 5.6), we find that, for a full sample (panel A), the coefficient of lagged net cash flows equals 0.0002 and this is significant at the 5% level. However, this evidence is removed when all characteristics are combined, in Model 6. This is possibly due to its correlation with fund size. This relationship is also considered within the policy specifics in Panels B-E and we do not find any statistically significant evidence in any fund group. Although it is insignificant, the results suggest that performance is positively related with the past year's net cash flows in general funds but negatively related in tax-benefit funds.

Additionally, results from the trading strategy portfolios based on lagged cash flows in Table 5.9 (Panel A) also reveal similar findings that, for the whole sample, high and low past year cash flows portfolios do not perform significantly differently. However, when investment policy is taken into account, the difference in general flexible funds is positively and highly significant, implying the 'smart money effect' – that is, flexible fund investors have the ability to identify superior funds in the subsequent period (Zheng, 1999).

However, this is in contrast to the evidence from tax-benefit funds. The results suggest that tax-benefit funds with high net cash flows perform lower than funds with low net cash flows. The figures are highly and statistically significant and account for up to 0.16% and 0.14% per week on tax-benefit equity and flexible funds, respectively.

In addition, we also consider the effect of current cash flows on fund performance. The results are presented in Table 5.9, Panel B. We do not find any difference in performance between the high and the low current cash flow portfolios. This is consistent with Nitibhon

(2004), who examines the smart money effect in Thai equity funds. He reveals that the top decile portfolio of funds which are constructed on the basis of current cash flows does not outperform the bottom decile portfolio. Subsequently, our results suggest that lagged period cash flows are more important to performance than current cash flows.

Considering the fact that the trading strategy approach accounts only for funds at extreme values – the 30% highest and lowest cash flows – and the cash flows into tax-benefit funds are sizeable and highly varied, we can conclude that the lower performance in the funds with high past cash flows funds can be attributed to the negative cash flows shock. The reason for this is that when a large amount of cash flows into the funds, the managers are unable to allocate this cash immediately and, thus, an excessive amount of cash is left in the portfolio, which can reduce the portfolio's systematic risks.

Consequently, unlike previous studies, which reveal evidence of the smart money effect (for example, Gruber, 1996; Zheng, 1999; Gharghori, 2007), we do not find this evidence in Thailand, except in the case of general flexible funds. In contrast, we reveal that flows can lower fund performance when it comes to substantial amounts. Our evidence supports the findings of Warther (1995), who suggests a negative relationship between flows and portfolio beta; and of Edelen (1999) who suggests that flows reduce fund returns by 1.5%-2% per year.

Table 5.9 Performance of trading strategy portfolios based on net cash flows

The table presents performance estimated from trading strategy portfolios based on past year net cash flows funds, using an unconditional Jensen's measure (1968) and Ferson and Schadt's conditional measure (1996). Net cash flows are calculated assuming that flows occur at the beginning of the period. Results from the current net cash flows are presented in Panel A and results from the lagged year net cash flows are presented in Panel B. High refers to the equally weighted portfolio of the funds with 30% highest net cash flows and Low refers to the equally weighted portfolio of funds with the 30% lowest net cash flows. T-statistics, adjusted for heteroscedasticity, using White's (1980) model are in parentheses ( ). High-Low is the performance difference between the high and low portfolios and its t-statistics in parentheses ( ) test whether the performance is significant from zero. All refers to all funds, EQN to general equity funds. EQT to tax-benefit equity funds, FLN to general flexible funds and FLT to tax-benefit flexible funds. * significant at 10%, ** significant at 5%, *** significant at 1%

	Single-factor			Conditional		
	High	Low	High-Low	High	Low	High-Low
Panel A: lagged year net cash flows						
ALL	-0.0002	0.00021	-0.00046	-0.00019	-0.00015	-0.0005
	(-0.45)	(0.78)	(-1.22)	(-0.44)	(-0.62)	(-1.34)
EQN	-0.00021	-0.00024	0.00002	-0.00034	-0.00028	-0.00006
	(-0.55)	(-0.53)	(0.12)	(-0.95)	(-0.66)	(-0.35)
EQT	-0.00022	0.00075**	-0.0016***	-0.00038	0.00077**	-0.002***
	(-0.38)	(1.99)	(-3.2)	(-0.72)	(2.05)	(-3.5)
FLN	0.00043	-0.00032	0.0015***	0.00039	-0.00052	0.0015***
	(1.16)	(-0.64)	(4.34)	(1.07)	(-1.25)	(4.35)
FLT	-0.00093**	0.00028	-0.0014***	-0.0010**	0.00029	-0.0014***
	(-2.36)	(0.59)	(-2.63)	(-2.58)	(0.68)	(-2.92)
Panel B: Current net cash flows						
ALL	-0.00045	0.00001	-0.00046	-0.00052	-0.00009	-0.00043
	(-1.12)	(0.01)	(-1.28)	(-1.31)	(-0.29)	(-1.2)
EQN	-0.00074	-0.00004	-0.0007	-0.00094*	-0.00011	-0.0008*
	(-1.41)	(-0.11)	(-1.56)	(-1.78)	(-0.31)	(-1.81)
EQT	0.00051	0.00016	0.000328	0.00054	0.00018	0.000324
	(1.55)	(0.39)	(0.91)	(1.59)	(0.47)	(0.93)
FLN	-0.00075	0.00017	-0.00092	-0.00086	-0.00006	-0.0008
	(-0.99)	(0.55)	(-1.16)	(-1.2)	(-0.21)	(-1.01)
FLT	0.00047*	-0.0003	0.000684	0.00041*	-0.00047	0.0009**
	(1.76)	(-0.59)	(1.6)	(1.69)	(-0.97)	(2.15)

5.4.4 Fund longevity

We measure the longevity of funds by the operation period of mutual funds since its registration date. The results from the panel regression, Table 5.6 (Model 4), present weak evidence that young funds perform better than old funds. This evidence even disappears when all the characteristics are combined in Model 6. In addition, the results from Panels B-E suggest that the negative relationship in young funds is only applicable to general equity funds. There is no evidence of it in any other fund category.

Subsequently, we examine whether fund age can be used as a criterion in determining outperforming funds. The results in Table 5.10 show that the differences between old and young funds are small and not enough to be significant for any fund policies. Thus, we conclude that fund longevity does not explain mutual fund performance. This differs from the conclusions of Blake and Timmermann (1988), who find that UK unit trusts perform better in the early stage of their operation; and from Otten and Bams (2002), who reveal a negative correlation in some European funds. However, our results are comparable to those of recent studies such as Prather et al. (2004), who find no relationship between age and performance in US funds; and Ferreira et al. (2009), who suggest that, after controlling for size, age does not provide explanatory power in the case of domestic funds.

Table 5.10 Performance of trading strategy portfolios based on fund longevity
The table presents performance estimated from a trading strategy portfolio based on the age of funds (in months) since inception date. Results are estimated using an unconditional Jensen's measure (1968) and Ferson and Schadt's conditional measure (1996). High refers to the equally weighted portfolio of the 30% oldest fundsand Low is the equally weighted portfolio of the 30% youngest funds. T-statistics, adjusted for heteroscedasticity, using White's (1980) model are in parentheses ( ). High-Low is the performance difference between the high and low portfolios and its t-statistics in parentheses ( ) test whether the performance is significant from zero. All refers to all funds, EQN to general equity funds, EQT to tax-benefit equity funds, FLN to general flexible funds and FLT to tax-benefit flexible funds. * significant at 10%, ** significant at 5%, *** significant at 1%

	Single-factor			Conditional		
	High	Low	High-Low	High	Low	High-Low
ALL	-0.00042	0.00001	-0.00044	-0.0006*	-0.00015	-0.00045
	(-1.11)	(0.04)	(-1.48)	(-1.7)	(-0.53)	(-1.49)
EQN	-0.00025	0.00002	-0.00027	-0.0004	-0.00007	-0.00033
	(-0.68)	(0.04)	(-0.96)	(-1.14)	(-0.17)	(-1.19)
EQT	0.00069	0.00051	0.000114	0.00043	0.00064	0.00005
	(1.51)	(0.87)	(0.24)	(1.13)	(1.31)	(0.12)
FLN	-0.00023	-0.0002	-0.00002	-0.00024	-0.00045	0.00021
	(-0.69)	(-0.36)	(-0.04)	(-0.76)	(-0.87)	(0.32)
FLT	0.00044	-0.00086*	0.000265	0.00058	-0.00091*	0.00005
	(0.95)	(-1.79)	(0.35)	(1.19)	(-1.85)	(0.06)

5.4.5 Family size

We examine the relationship between the size of the fund family and fund performance by classifying the fund families into either large or small. The five biggest fund companies are classified as large fund families and the rest are classified as small fund families. Size is measured in two ways: total net asset values (TNAs) of the company at the beginning of the year; or the number of funds operated under its management.

The results from panel regression in Table 5.6 reveal the positive correlation between family size, as measured by total asset values, and performance. Model 5 shows that the funds in the large companies outperform funds in the small companies by 0.026% per week and this is statistically significant at a 5% level. The results in Model 6 also confirm the findings that funds under large management companies perform significantly better than others. However, the results at the policy level suggest that this evidence is typical of general funds. General equity and flexible funds which belong to large management companies perform significantly better. However, we do not find significant evidence from tax-benefit funds.

We investigate the economic importance of family size to fund performance and show the results in Table 5.11. The table compares the differences between large and small family fund portfolios. In Panel A, family size is classified by the TNAs of a fund company and in Panel B, family size is classified by number of funds owned by a company. We do not find significant evidence from funds of any fund policy.

Thus, we can conclude that there is a positive relationship between family size and performance in general funds, which agrees with the findings of previous studies such as Indro et al. (1999) and Ferreira et al. (2009). However the performance differences between large and small fund companies are not economically significant, which endorses the evidence in Thailand of large fund companies not outperforming small companies (Kasikorn Research, 2005)

Table 5.11 Performance of trading strategy portfolios based on size of fund family

The table presents performance of portfolio based on size of fund family. Size is measured by total net asset values of company (Panel A) number of funds in the family (Panel B). Results are estimated using an unconditional Jensen's measure (1968) and Ferson and Schadt's conditional measure (1996). High refers to the equally weighted portfolio of funds belong the five largest management companies and Low to the equally weighted portfolio of remaining funds. T-statistics, adjusted for heteroscedasticity, using White's (1980) model are in parentheses ( ). High-Low is the performance difference between the high and low portfolios and its t-statistics in parentheses ( ) test whether the performance is significant from zero. All refers to all funds, EQN to general equity funds, EQT to tax-benefit equity funds, FLN to general flexible funds and FLT to tax-benefit flexible funds. * significant at 10%, ** significant at 5%, *** significant at 1%

	Single-factor			Conditional		
	High	Low	High-Low	High	Low	High-Low
Panel A: Total net asset values						
ALL	-0.00007	-0.00029	0.000224	-0.00011	-0.00044	0.000329
	(-0.22)	(-0.7)	(0.65)	(-0.36)	(-1.16)	(0.95)
EQN	-0.00013	-0.00038	0.000253	-0.00017	-0.0006	0.000426
	(-0.36)	(-0.79)	(0.61)	(-0.48)	(-1.37)	(1.03)
EQT	0.00121**	0.00079*	0.000134	0.00083*	0.0006	-0.00004
	(2.53)	(1.66)	(0.34)	(1.9)	(1.42)	(-0.11)
FLN	-0.00013	-0.0003	0.000173	-0.00022	-0.00053	0.000315
	(-0.42)	(-0.67)	(0.35)	(-0.74)	(-1.38)	(0.7)
FLT	0.00025	-0.00006	0.00015	0.00016	-0.00004	0.00007
	(0.98)	(-0.17)	(0.44)	(0.65)	(-0.11)	(0.2)
Panel B: Number of funds						
ALL	-0.00041	-0.00008	-0.00033	-0.00054	-0.0002	-0.00034
	(-1.05)	(-0.27)	(-1.18)	(-1.48)	(-0.73)	(-1.18)
EQN	-0.00059	-0.00008	-0.00051	-0.00076*	-0.00026	-0.0005
	(-1.29)	(-0.23)	(-1.42)	(-1.78)	(-0.77)	(-1.4)
EQT	0.00074	0.00063*	0.00006	0.00051	0.00061*	0.000018
	(1.59)	(1.75)	(0.19)	(1.27)	(1.74)	(0.06)
FLN	-0.00022	-0.00022	0.00000	-0.00035	-0.00043	0.00008
	(-0.8)	(-0.42)	(0)	(-1.32)	(-0.96)	(0.16)
FLT	0.00031	-0.00036	0.000454	0.00021	-0.00031	0.000328
	(1.17)	(-1.08)	(1.65)	(0.81)	(-0.92)	(1.22)

5.5 Robustness of the results

In order to test the robustness of the results, these estimates use a cross-section time-series average regression approach following Fama and Macbeth (1973), who suggest that the error terms are likely to be correlated over time and that using pooled regression could violate the OLS assumptions. Therefore, they suggest an alternative approach in estimating cross-section regression in panel data which treats each fund-year observation non-independently. The Fama-Macbeth approach is in two steps. The first step is to perform a cross-section regression of fund performance in fund characteristics for each period. The model is expressed as:

$$PERF_{pt} = \alpha_{pt} + \beta_t' \ CHARAC_p + \varepsilon_t; \qquad p = 1,2,...N \quad for\ each \quad t. \tag{5.5}$$

where $PERF_{pt}$ represents the performance of mutual fund p in period t estimated with the use of either a traditional or conditional measure; $CHARAC_p$ is a set of five mutual fund characteristics, namely: total net asset values of the fund; past year's performance; age of mutual fund; annual net cash flows; and a dummy variable corresponding to family size. We also include two other controlled variables; mutual fund style and tax benefit purpose.

The second step is to estimate the coefficients by obtaining the average coefficients of the first step. Moreover, the standard deviations of coefficients estimated in the first step are used to generate sampling errors. The mathematical expressions for estimated coefficients and sampling errors are:

$$\hat{\beta} = \frac{1}{T}\sum_{t=1}^{T}\hat{\beta}_t \tag{5.6}$$

$$\sigma^2(\hat{\beta}) = \frac{1}{T^2}\sum_{t=1}^{T}(\hat{\beta}_t - \hat{\beta})^2 \tag{5.7}$$

Nevertheless, if the independent variables are not correlated over time, the Fama-Macbeth procedure will be numerically equivalent to a pooled regression with the correction of standard errors.

The results are presented in Table 5.12 and are estimated using the whole sample (Panel A) and a sub sample for each fund style (Panel B). For the whole sample, another two controlled variables are included capturing the effects of difference in fund styles.

Past performance ($PERF_{t-1}$) is positively related to current performance. The slope coefficients equal 0.19 and 0.26 using unconditional and conditional measures, respectively. Nonetheless, evidence of persistence in performance is observed in general funds. The results in panel B show that the slope coefficients of past returns are positively significant in both general equity and flexible funds, but not in tax-benefit funds. The slope coefficient of normalised net cash flows (NNCFt-1) is negatively significant, suggesting a negative relationship of flows and performance. However, the results in panel B suggest that this is generated from general equity funds. Furthermore, the slope coefficients of the normalised net cash flows are negative in general funds but positive in tax-benefit funds. The effect of fund age (lnAGE) is shown only in the general flexible funds which show a positive relationship with fund performance. We do not find evidence that mutual fund size (lnSIZE) and fund family (FAMILY) can explain fund performance. Thus, results based on Fama-Macbeth approach show some support and some conflict with the findings in Section 5.4. We find persistence in fund performance; but fund performance is not explained by fund size or fund family size and these findings are comparable to our empirical findings in Section 5.4. Nevertheless, results on net flows and fund age are not robust across the measure. Hence, we conclude that the relationship between performance and fund characteristics estimated by a cross-section approach can be sensitive to the measure used and this calls for further investigation.

Table 5.12 Multivariate regression (Cross-section time-series average)

The table shows the Fama-Macbeth (1973) estimates of annual fund performance regressed on fund attributes. Fund performances are calculated using traditional and conditional Jensen measures. lnSIZE is the natural logarithm of average total asset values (TNAs) of a fund in a year. PERFt-1 refers to the one-year lagged performance, NNCF to normalized net cash flows. lnAge is the natural logarithm of the number of months since the fund's inception date. DFamily is a dummy variable for family size, equal to 1 if it belongs to the five largest companies, otherwise=0. DSTYLE is a dummy for investment style, equal to 1 if the fund is an equity fund, otherwise=0. DTAX is a dummy variable for tax-benefit style, equal to 1 if a tax-benefit fund, otherwise=0. The sample extends from June 2000 to August 2007. T-statistics are in parentheses ( ). * Significant at a 10 % level. ** Significant at a 5% level. *** Significant at a 1% level

	Constant	lnSIZE	PERFt-1	NNCFt-1	lnAge	DFamily	DSTYLE	DTAX	R^2
Panel A: Whole sample									
Traditional	0.0000	0.0000	0.1860**	-0.0006**	-0.0002	0.0004	0.0003	0.0015	0.20
	(0)	(0.37)	(2.55)	(-3.11)	(-0.84)	(1.42)	(1.29)	(1.77)	
Conditional	0.0005	0.0000	0.2600**	-0.0004	-0.0002	0.0004	0.0003	0.0014	0.25
	(0.36)	(0.1)	(3.01)	(-1.46)	(-0.74)	(1.38)	(1.23)	(1.61)	

Table 5.12 Multivariate regression (Cross-section time-series average) Cont'd

	Constant	lnSIZE	PERFt-1	NNCFt-1	lnAge	DFamily	R^2
Panel B: Classified by fund style							
General Equity funds							
- Traditional	0.0015	0.0002	0.3580**	-0.0016*	-0.0007	0.0003	0.28
	(0.91)	(0.91)	(3.46)	(-2.14)	(-1.38)	(0.93)	
- Conditional	0.0008	0.0002	0.2670**	-0.0016**	-0.0006	0.0002	0.20
	(0.58)	(1.09)	(3.05)	(-2.78)	(-1.41)	(0.85)	
Tax-benefit Equity funds							
- Traditional	-0.0145	-0.0020	0.3780*	0.0020	0.0066	0.0003	0.75
	(-1.1)	(-1.98)	(2.37)	(1.43)	(1.36)	(0.33)	
- Conditional	-0.0189	-0.0020	0.4000	0.0024	0.0078	0.0004	0.71
	(-1.32)	(-1.7)	(1.74)	(1.34)	(1.42)	(0.41)	
General Flexible funds							
- Traditional	-0.0021	-0.0001	0.3540**	0.0008	0.0006**	0.0001	0.40
	(-1.62)	(-0.48)	(2.96)	(1.18)	(3.14)	(0.3)	
- Conditional	-0.0025*	-0.0001	0.1690	-0.0001	0.0007**	-0.0001	0.44
	(-2.02)	(-0.97)	(0.98)	(-0.27)	(2.82)	(-0.37)	
Tax-benefit Flexible funds							
- Traditional	-0.0117	-0.0009	0.1270	0.0014	0.0040	0.0006	0.80
	(-0.87)	(-1.11)	(0.43)	(1.78)	(1.01)	(0.43)	
- Conditional	-0.0176	-0.0007	0.1090	0.0008	0.0055	-0.0001	0.78
	(-0.95)	(-1.35)	(0.3)	(1.2)	(1.01)	(-0.09)	

5.6 Conclusions

In addition to the abundant literature on mutual fund performance, the growth and popularity of mutual fund investment have led to another question to the mutual fund study. This is how one can distinguish a superior performing fund from others. The present study explored this question and examined the relationship of fund performance to an extensive set of mutual fund characteristics. We examined five fund characteristics, making this the most comprehensive study of them in emerging markets so far. The five characteristics consisted of size, past performance, net cash flows, fund longevity and family size. Additionally, we focused on fund performance on a risk-adjusted basis and disentangled the problem using both multidimensional (panel) regression and the trading strategies portfolios. The former approach allowed us to investigate the fund characteristics as a group, allowing the association with characteristics to be controlled. In contrast, the latter approach, using the trading strategies portfolios, allowed us to examine whether selecting funds based on these characteristics is economically important. Therefore, the results of combining these two approaches would provide us with more meaningful results than previous studies have done.

We find evidence of specific determinants of mutual fund performance for individual investment policies. There is persistence in performance in general funds but not in tax-benefit funds. This persistence is both statistically and economically significant. However, persistence is evident only from poorly performing funds, which continue to perform poorly in the next period; this is consistent with the empirical evidence in the US literature (Hendricks et al., 1993; Goetzmann and Ibbotson, 1994; Bauer et al., 2006; Ferreira et al., 2009).

The relationship between size and fund performance is also subject to policy specifics and the evidence is stronger in flexible funds than in equity funds. Small general flexible funds tend to perform better and, in contrast, small tax-benefit flexible funds tend to perform worse than others. Nonetheless, the effect of fund size is not strong enough for investors to earn abnormal returns on this basis. This is inconsistent with the contention in the US of diseconomies of scale (Indro, 1999; Chen et al., 2004; Ferreira et al., 2009).

Net cash flows have very little impact on fund performance as a whole, which contradicts the evidence of the smart money effect (Gruber, 1996; Zheng, 1999 Gharghori et al., 2007; Keswani and Stolin, 2008). In addition, we find that tax-benefit funds with relatively high cash flows perform significantly lower than funds with low cash flows. This finding confirms the view of Warther (1995) and Edelen (1999), who suggest that cash flows shock can lead to inferior performance in the next period because it is lower the portfolio's beta risk.

Young funds perform better than old funds among general equity funds and general funds which belong to large fund companies also tend to perform better. However, these two attributes are not economically significant and, therefore, investors are unable to earn abnormal returns on the basis of these characteristics. In addition, we find that our results could be sensitive to the regression method used in the analysis.

Thus, from our results we conclude that it is difficult on the basis of their characteristics to select funds which earn abnormal returns, even though their performance can be explained by some particular characteristics. Nevertheless, our results suggest three important findings and some practical implications. The main three findings are: first, we find strong evidence of persistence in performance in the Thai general mutual funds, which is a primary reason to reject the efficient market hypothesis. Nevertheless, we do not consider the use of momentum strategy in fund managers in this study (Jegadeesh and Titmann, 1993; Cahart, 1996). This issue calls further investigation in a subsequent study.

Second, we find that tax-benefit funds with high cash flows perform significantly lower than those with low cash flows. Thus, we argue that the cash flows shock is negatively affected in fund performance. While cash flows into the funds in developed markets are quite stable over time, emerging market mutual funds experience high and vulnerable cash flows. In Thailand, tax-benefit funds received exceptionally high cash flows due to the government campaign featuring long-term and retirement savings (Table 5.3). Thus, fund managers need to be more responsive to this impact. In addition, the subject requires detailed exploration of the effect of cash flows on performance in emerging markets.

Third, evidence on the panel regression confirms the highly significant outperforming of tax-benefit mutual funds even when it is controlled for fund characteristics. Therefore, we may conclude that superior performance can be a result of their own unique characteristics which are restricted the long-term investment; or it can even be attributed to better skills on the part of the fund managers and, subsequently, this requires a further examination to see what causes them.

The practical implications from this study are that it is difficult to make a fund selection on the basis of fund characteristics, such as size, family size and fund longevity because these characteristics do not impact on fund returns. Nevertheless, short-term past performance can be a good criterion in selecting funds. Investors should look at short-term risk-adjusted performance and try to avoid funds which have performed poorly in the previous year. Fund managers, in particular managers of tax-benefit funds, need to be more responsive to cash flows. Cash flow prediction and a controlling policy for cash flows may be required in order to avoid negative performance due to the cash flow shock.

CHAPTER SIX

THE LIQUIDITY PREMIUM, SHARE RESTRICTION AND MUTUAL FUND PERFORMANCE

6

Abstract

This study looks at the relationship between liquidity and mutual fund performance in Thailand, using a return-based stale price measure to quantify the liquidity of the assets contained in the portfolio (Getmansky et al., 2004). We find evidence of an illiquidity premium in Thai mutual funds. Thailand's tax-benefit funds contain slightly – but not statistically significantly – more illiquid assets than do general funds. Subsequently, the study proposes a liquidity-augmented performance measure to capture the premium in liquid assets as it is measured by the share turnover ratio. We find that our liquidity factor has explanatory power for mutual fund returns and its magnitude increases with the degree of illiquidity. With the liquidity-augmented measure, mutual fund returns are reduced and evidence of abnormal returns in low liquid portfolios is removed but the evidence of a liquidity premium is still present. This suggests the importance of the liquidity factor in the fund performance even though share turnover ratio is not a good proxy for the liquidity premium. Finally, the results are robust as regards the method used in quantifying illiquidity assets and are not affected by seasonality.

6.1 Introduction

The role of liquidity in asset pricing and stock returns has attracted growing interest over the past decade. Nonsynchronous trading is an example of illiquidity which impacts on the estimation of stock returns. Previous studies find nonsynchronous trading results in the bias beta estimation in the capital asset pricing model (see, for example, Scholes and Williams, 1977; Dimson, 1979; Lo and Mackinlay, 1988, 1990). Furthermore, less liquid assets are likely to generate a return premium due to the clientele effect. Many studies have investigated the relationship between liquidity and asset returns and confirmed the liquidity premium, admitting also that liquidity can explain cross-sectional returns (see, for example, Amihud and Mendelson, 1986; Brennan et al., 1998; Datar et al. 1998; Rouwenhorst, 1999; Amihud, 2002; Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Liu, 2006). However, these studies still focus on the security context and we still know very little about the way in which liquidity influences other financial assets. More recently, few studies document the fact that liquidity also impacts on hedge fund returns. In the seminal article of Getmansky et al. (2004), the writers suggest that hedge fund returns are serially correlated not only because of nonsynchronous trading but also because of the illiquidity of the stocks contained in their portfolios. Aragon (2007) also shows that hedge funds with lockup restrictions perform better than nonlockup funds and that those lockup hedge funds generate an illiquidity premium of 4%-7% per year.

Nonetheless, the impact on liquidity has never so far been extended to the mutual fund literature, although its underlying assets are dominated by stocks. More importantly, since empirical evidence suggests that liquidity leads to inconsistency in estimating risk and return, it could equally influence the measurement of mutual fund performance, since most prevailing performance measures are based on the standard capital asset pricing model.

In addition, liquidity is one of the major concerns in emerging markets. Several researchers reveal that emerging markets often feature low liquidity and infrequent trading (Harvey, 1995; Bekaert and Harvey, 2003). Therefore, emerging markets would seem to be an ideal setting for investigating the evidence of a liquidity premium. Subsequently, the aim of this chapter is to investigate the role of liquidity in mutual fund performance and performance measures in an emerging market.

This study will, it is hoped, make several contributions. First, it extends the knowledge of the role of liquidity in asset returns in the context of mutual funds. This, to the best of our knowledge, is the first empirical study of this area in the mutual fund literature. Second, we adopt an alternative approach in measuring mutual fund liquidity. The return-based stale price measure allows us to quantify liquidity in funds' underlying assets, implicitly using fund return data (Getmansky et al., 2004). This measure has been proposed and used in the hedge fund literature but hitherto it has never been applied to other financial assets. Thus, this also allows us to investigate how to verify a model outside the hedge fund literature. Third, we propose an auxiliary mutual fund performance measure which includes one additional liquidity factor and we investigate whether liquidity is an important factor in this performance measure. Our proposed performance measure can be viewed as a factor model which would allow investors to understand how fund managers allocate their portfolios and how to identify the source of the return premium which they receive. Fourth, we employ data from one of the emerging economies. Since emerging markets are less liquid and suffer from chronically infrequent trading, this would allow a powerful test and provide useful evidence about the liquidity premium. Finally, we outline the policy implications related to the long-term investment policy of the tax-benefit funds scheme in Thailand.

We consider Thai mutual fund data from 2002 to 2007 consisting of 211 mutual funds, made up of 152 equity funds and 59 flexible funds, and observe the liquidity premium in the funds using a return-based stale price measure, as proposed by Getmansky et al. (2004), which suggests that the true observed return is a function of unobserved economic returns. Subsequently, to capture liquidity premium in the funds, we propose a liquidity-augmented performance measure which includes a liquidity factor as measured by share turnover.

We find that the liquidity of assets contained in the mutual fund portfolio plays an important part in mutual fund returns. The highest liquidity mutual fund portfolio significantly underperforms the market in contrast to the lowest liquidity mutual fund portfolio, which significantly outperforms the market. Our proposed liquidity-augmented model makes performance slightly lower, particularly that of illiquid portfolios. We find that our liquidity factor has explanatory power in all but two of the most liquid portfolios. This suggests that low liquidity mutual funds allocate their portfolios on the basis of illiquidity assets in order to obtain the liquidity premium. Nevertheless, evidence of liquidity premium still persists when our liquidity factor is incorporated. Thus, turnover seems not to be the best factor by which to explain the liquidity premium in Thai mutual funds. Finally, we look at policy implications by considering the differences in liquidity between general and tax-benefit funds. We hypothesize that, due to restrictions imposed on the tax benefit funds, these mutual funds would invest in illiquid assets more than general funds would and, subsequently, would earn a liquidity premium. We find that the tax-benefit funds contain more illiquidity assets, but not enough to be statistically significant. Therefore, the evidence of outperforming in tax-benefit funds does not result from the illiquidity premium alone.

The rest of this chapter is organised as follows. Section 6.2 gives a literature survey and hypotheses for the study. Section 6.3 describes the data and methodology used. Section 6.4 presents the empirical results. Section 6.5 provides the results of a robustness test and, finally, Section 6.6 draws some conclusions and makes suggestions for future research.

6.2 Literature and hypotheses

The effect of infrequent or nonsynchronous trading has long been discussed in the finance literature. This effect is observed when stock prices trade at different time intervals but are recorded at intervals of the same interval length (i.e. daily closing prices). Subsequently, this creates bias in the movement and co-movement of stock returns, resulting in serial correlation and cross serial correlation. Dimson (1979) shows that betas estimated from UK stock returns over the period 1955-1974 increase with trading frequency, suggesting the bias in beta estimation. Therefore, stock with infrequent trading will have a beta estimated downward bias while stock with frequently traded stocks will have a beta estimated upward bias. Subsequently, to capture this effect, he proposed the 'aggregated coefficient method', which includes leads and lags variables in order, and found that the bias in estimated betas is eliminated once this method is used.

Investment portfolios also have an impact from nonsynchronous trading through the computation of the net asset values (NAVs). Bhargava et al. (1998), Goetzmann et al. (2001) and Boudoukh et al. (2002) suggest that the net asset values of mutual funds reflect stale prices due to the nonsynchronous trading effects on the prices of their underlying assets. However, they suggest that this effect transfers wealth from buy-and-hold investors to those who engage with a timing forecast.

Getmansky et al. (2004) argue that nonsynchronous trading is part of the cause of serial correlation in hedge funds. Hedge funds can also have high serial correlation even when their underlying stocks are synchronous, if these stocks are not actively traded. They observe plausible sources of serial correlation in hedge fund returns and show that time-varying expected returns, time-varying leverage and incentive fees with high water marks are insufficient to explain the serial correlation in hedge fund returns. Thus, evidence of serial correlation is most likely to be explained by illiquidity and smoothed returns. They propose an econometric model followed a moving average process in quantifying illiquidity and smoothing returns and empirically investigate a large hedge fund dataset during the period 1977-2001. Their results confirm that illiquidity exposure and smoothing returns are sources of serial correlation in hedge fund returns.

Illiquidity also has an impact on asset returns, referring to implicit transaction cost (i.e. the maximum expected return that an investor is willing to exchange for a zero transaction cost). Amihud and Mendelson (1986) proposed a model by which, in equilibrium, expected returns increase with illiquidity, as measured by the bid-ask spread. They also showed that there is a ‘clientele effect’ in which longer horizon investors have a positive relation to expected returns because they hold more in illiquid assets. They also find a positive and concave relationship between expected return and transaction cost. In addition, they test their hypothesis using data for the period 1961-1980 and find that their results are consistent with their model.

In contrast, Eleswarapu and Reinganum (1993) re-investigate the relationship between return and bid-ask spread, using the same methodology as in Amihud and Mendelson (1986). They find, in contrast to Amihud and Mendelson, a positive relationship only during the month of January. Therefore, they argue that the liquidity premium is merely a seasonal phenomenon.

Instead of using the bid-ask spread as a measure of liquidity premium, Brennan and Subrahmanyam (1996) employ intraday transaction data to measure liquidity. They find, consistent with Amihud and Mendelson (1986), a positive and significant relationship between return and illiquidity in assets, after adjusting for Fama and French's three-factor model.

Nonetheless, liquidity normally refers to the ability to trade large quantities quickly at low cost without moving the price. Thus, liquidity can be viewed in several dimensions, such as the quantity, speed and cost of trading. The literature mentioned above investigates liquidity only in the trading cost dimension. However, there are also some studies which investigate the effect of liquidity by looking at other dimensions. For example, Brennan et al. (1998), Datar et al. (1998) and Rowenhorst (1999) look at liquidity in the trading quantity dimension. Brennan et al. measure liquidity using trading volume. They suggest a negative relationship between stock returns and trading volume. Similarly, Datar et al. employ a share turnover ratio, which is the number of shares traded divided by the number of shares outstanding. They argue that the share turnover ratio is an ideal proxy for liquidity because it has strong theoretical support and the data are easy to obtain. Their results reveal that, over the period 1963-1991, stock returns were negatively related to the turnover ratio even after controlling for size and book-to-market risk premium and there is no evidence of seasonal effect.

In the Asia-Pacific region, where there are few studies on liquidity, Rowenhorst (1999) examines the factors which drive a cross-sectional return in 1,705 firms across 20 emerging markets over the period 1982-1997. Having constructed 30% top and bottom turnover-sorted portfolios, they conclude that there is no evidence of a relationship between expected return and share turnover. However share turnover is positively correlated with other risk factors. In contrast, a more recent study by Bekaert et al. (2007) suggests that local market liquidity is an important driver of expected returns in emerging markets.

With this evidence of a liquidity premium, a few more recent studies have tried to incorporate a liquidity risk factor into an asset pricing model. One of the main papers to do this is by Pastor and Stambaugh (2003), who propose liquidity beta in measuring liquidity risk. This views liquidity as the price reaction to trading volume. In their study, liquidity beta is the stock sensitivity to innovation in aggregate liquidity. They look at liquidity at the aggregated market level and find a 7.5% per annum return spread in the expected return between low and high liquidity stocks. Hence, they incorporate their liquidity factor into Fama and French's 3-factor model and conclude that, over the period 1966-1999, the risk factor explains half the profit in a momentum strategy.

Liu (2006), in contrast, investigates liquidity using a proposed measure which he argues is able to capture liquidity in several dimensions rather than one particular specific dimension, as in previous studies. His liquidity factor is measured by the standardized turnover-adjusted number of zero daily trading volumes over the previous 12 months. Then he proposes a liquidity-augmented capital asset pricing model, which incorporates his proposed liquidity risk factor. He finds that, over the period 1960-2003, his liquidity risk measure positively correlates with other liquidity measures and the low liquid stock deciles portfolio outperforms by 0.7% per month. The liquidity premium in January is 2% higher than in other months. In particular, he finds that liquidity risk is an important factor in asset pricing models and it can well explain cross-section return, unlike Fama and French's 3-factor model.

Outside the US market, Chan and Faff (2005) investigate the importance of the liquidity premium in the asset pricing model, using Australian data from 1990 to 1998. They quantify stock liquidity using the share turnover ratio and then construct a 4-factor model in a similar way to Fama and French (1993), but with one additional factor, the liquidity factor, which is measured by share turnover. They find evidence to support their model.

More recently, there have been some studies on the role of liquidity in the investment fund literature. However, these studies are conducted using hedge fund data. This is because certain hedge funds impose restrictions which can apply to the more illiquid underlying assets in their portfolios[20]. Studies which relate to liquidity and performance in hedge funds are, for example, by Aragon (2007), who investigates the relationship between share lock-up restrictions and the illiquidity assets of hedge funds between 1994 and 2001. He finds that hedge funds with lock-up restrictions outperform non-lockup funds by 4%-7% per year. He also reveals a positive relationship between share restriction and illiquid underlying assets. He suggests that the outperforming in lock-up hedge funds is to be attributed to the share illiquidity premium. Similarly, Liang and Park (2008) investigate the illiquidity premium in hedge funds but, for their part, focus on the differences between onshore and offshore funds. They argue that show onshore hedge funds impose a higher degree of share restriction, due to the difference in legal structure. Nevertheless, offshore hedge funds collect a higher illiquidity premium, 4.4% per year compared to 2.7% per year for onshore funds.

Thus, on the basis of previous studies, we can conclude that the evidence on the liquidity premium shows it to be an important factor in asset pricing. Asset illiquidity could also lead to biased estimation by underestimating risk and overestimating returns. Nevertheless, empirical evidence on the role of liquidity is mostly conducted using stock returns data. It is less clear whether the relationship of liquidity to asset returns also holds good for mutual funds and how important it is to performance measurement. As with the evidence on stock returns, we expect that mutual funds which contain high illiquid stocks as their underlying assets could associate with the illiquidity returns premium. And thus,

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[20] General restrictions on hedge funds include lockup provision, redemption notice period, redemption frequency and minimum investment.

incorporating the liquidity factor into the performance model would give less bias in the estimations of performance. Therefore, the two following hypotheses are tested:

$H_{6.1}$: A liquidity premium is associated with mutual fund performance

$H_{6.2}$: The liquidity factor is an important factor in mutual fund performance measures

The last hypothesis is drawn from the institutional characteristics of Thai mutual funds. In addition to conventional mutual funds, Thailand has two further unique types of mutual fund, namely, Retirement mutual funds (RMF funds) and Long-term equity funds (LTF funds). These two unique types (hereafter, tax-benefit funds) are different from general mutual funds in term of their restrictions. In principle, tax-benefit mutual funds require a longer holding period to fulfill the conditions for tax relief. For instance, investors are required to hold LTF funds for at least 5 years and RMF funds until the age of 55[21]. These restrictions on tax-benefit funds create a longer investment horizon and therefore could create a higher expected return, due to holding more illiquid assets, as pointed out in Amihud and Mendelson (1986). Furthermore, although the restrictions in Thai tax-benefit funds are unique, we find that they are similar to the restrictions imposed on hedge funds. The studies on the impact of restrictions in the hedge funds literature are well documented. Liang (1999) studies the performance of hedge funds during the 1990s. He finds that hedge fund performance is positively related to the lockup period. Similarly, Bali et al. (2007) reveal the higher expected return on hedge funds with lockup provision than on non-lockup funds. Liang and Park (2007, 2008) and Aragon (2007) argue that the higher returns in lockup hedge funds can be explained by the illiquidity premium because the restrictions allow fund

[21] See chapter 3 for details

managers to manage illiquid assets more efficiently. Similarly, Agarwal et al. (2008) suggest that share restrictions are important drivers of hedge fund returns. However, in contrast to the findings above, Joenväärä and Tolonen (2008) investigate the impact of share restrictions on risk taking and on hedge fund performance in the period from 1995 to 2006. They reveal that hedge funds with lockup generate 3.8%-5.4% lower Sharpe ratios than non-lockup funds do.

The theoretical and empirical evidence above supports a positive relationship between restrictions and fund performance because the restriction is not only a lower nondiscretionary trading cost, but it also allows fund managers to put more weight on illiquid assets and to manage these assets more efficiently. Therefore, one could expect that the restrictions imposed on tax-benefit funds in Thailand would yield a similar result. More importantly, the results in Chapter 4 reveal that tax-benefit funds outperform general funds. Therefore, we test whether the evidence of outperforming in tax-benefit funds noted in Chapter 4 is a result of fund managers' skills in identifying mispricing in securities or of a liquidity premium as compensation for the long-term investment restriction. Thus, we test the third hypothesis:

$H_{6.3}$: Tax-benefit funds hold more illiquid assets than general mutual funds do.

6.3 Data and Methodology

6.3.1 The sample

This study was initially based on 230 Thai mutual funds, comprising equity and flexible funds over the period 2000-2007. Details of our sample selection are outlined in Chapter 3. Nevertheless, we impose an additional restriction in this study in that funds have to have at least a 12-week period included in the sample order to mitigate the history bias. We also narrow down the estimation period to one from January 2002-August 2007. This is done for two main reasons: first, mutual funds exhibit different characteristics in the period before 2002 and, second, tax-benefit funds were launched in 2002 and we want to make all the sampled funds consistent with one another. Our final sample in this study consisted of 211 mutual funds, made up of 152 general funds and 59 tax-benefit funds. Descriptive statistics are presented in Table 6.1. The table shows that our data are dominated by equity funds, to which more than two-thirds of the total asset values belong. However, the average asset values across our sample period indicate that the average size of equity funds is slightly lower than that of flexible funds (equity funds have average asset values equal to 558 million Baht compared to 647 million Baht in flexible funds). The average life of equity funds is approximately 4 years, which is about the same as for flexible funds.

Table 6.1 Descriptive statistics of the mutual fund sample

This table reports the characteristics of the mutual fund sample from January 2002 to August 2007. TNA refers to the total net asset values (in million Baht).

	Mean	Median	Std. Dev.	Min.	Max.
Panel A: ALL funds (N=211)					
TNAs (all)	110,096.56				
TNAs (average/fund)	583.14	276.21	873.65	2.00	6312.70
Age (in weeks)	207.89	252	93.61	12	292
Panel B: Equity funds (N=152)					
TNAs (all)	82,020.98				
TNAs (average/fund)	558.09	276.39	854.97	2.00	6312.70
Age (in weeks)	208.28	269	95.21	12	292
Panel C: Flexible funds (N=59)					
TNAs (all)	28,075.58				
TNAs (average/fund)	647.66	271.43	924.46	20.89	4970.82
Age (in weeks)	206.86	250	90.13	33	292

6.3.2 Measuring mutual funds' asset illiquidity

The mutual funds' asset illiquidity can ideally be measured by looking at the individual fund assets directly. Nevertheless, since portfolio holding data are not available in Thailand, we alter the method and follow an econometrics model proposed by Getmansky et al. (2004). In this study, the writers argue that the high serial correlation in hedge fund returns is explained by illiquidity exposure and smoothed returns. Subsequently, they quantify illiquidity by distinguishing between fund reported returns (R_t^o) and true returns (R_t). They argue that the true (economic) returns (R_t) are the flows of information which determine the asset price in a frictionless market. However the effect of nonsynchronous trading causes the flows in information to take longer until they are fully impounded in the price. This means that the true (economic) return (R_t) is unobserved in the current period but it is partially incorporated in the reported returns (R_t^o). Since the true returns could take up to k periods until the information is impounded, the reported return in period t satisfies the following equation:

$$\begin{aligned} &R_t^o = \theta_0 R_t + \theta_1 R_{t-1} + \theta_2 R_{t-2} + ... + \theta_k R_{t-k} \\ &\theta_j \in [0\,,1], \quad j = 0,1,...,k \quad and \\ &1 = \theta_0 + \theta_1 + \theta_2 + ...\theta_k \end{aligned} \tag{6.1}$$

where R_t^o is the fund's reported returns and R_t is the fund's economic return in period t. The condition of coefficients sum to one implies that the information in period t is reflected to the returns, but it could take up to k+1 periods. Thus, the parameter θ_0 can be viewed as indicating the speed at which information reflects the reported returns and it can be a proxy for asset liquidity. The larger θ_0 can be interpreted as a high liquid portfolio. In contrast, the smaller θ_0 signifies that the fund is illiquid and exhibits return smoothing. We impose a 12-week filter in order to obtain a reliable estimation[22]. Subsequently, we estimate the MA (2) model using estimated by maximum likelihood, assuming that demeaned economic returns are mean-zero with normal random variables. Our estimated MA(2) model is expressed:

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[22] The 12-week filter is chosen to ensure consistency with the literature. However, the results could be sensitive to filter choice; this is an issue which could be investigated in future research.

$$
\begin{aligned}
R_t^o &= \theta_0 R_t + \theta_1 R_{t-1} + \theta_2 R_{t-2} \\
1 &= \theta_0 + \theta_1 + \theta_2
\end{aligned} \tag{6.2}
$$

6.3.3 Liquidity-augmented performance measure

We construct our liquidity-augmented performance measure based on Cahart's 4-factor model (1996), plus an additional factor capturing liquidity premium. Thus, our liquidity-augmented measure contains five risk factors, namely, market risk, size and book-to-market factors as proposed by Fama and French (1992, 1993); momentum variable to capture the one-year momentum anomaly (Jegadeesh and Titman, 1993); and one liquidity factor to capture the liquidity premium. The expected return of portfolio p from the liquidity-augmented model is:

$$
\begin{aligned}
E(R_p) - R_f = \beta_{1p}(E(R_m) - R_f) + \beta_{2p}E(SMB) + \beta_{3p}E(HML) \\
+ \beta_{4p}E(PR1YR) + \beta_{5p}E(LIQ)
\end{aligned} \tag{6.3}
$$

where $E(R_p)$ is the expected return of portfolio p, R_f is the risk-free rate of return, R_m is the return of the market and SMB, HML and PR1YR are the returns of mimicking portfolios for size, book-to-market and one year momentum in the stock returns factors. The last factor, LIQ, is a mimicking portfolio capturing the liquidity premium in our augmented liquidity model. Consequently, we estimate mutual fund performance using the capital asset pricing model (CAPM) and our proposed liquidity-augmented factor model:

$$
R_{pt} - R_{ft} = \alpha_{pt} + \beta_{1p}(R_{mt} - R_{ft}) + \varepsilon_{pt} \tag{6.4}
$$

$$
\begin{aligned}
R_{pt} - R_{ft} = \alpha_{pt} + \beta_{1p}(R_{mt} - R_{ft}) + \beta_{2p}SMB_t + \beta_{3p}HML_t + \beta_{4p}PR1YR_t \\
+ \beta_{5p}LIQ_t + \varepsilon_{pt}
\end{aligned} \tag{6.5}
$$

We use the returns of the stock exchange of Thailand index (SET index) as a return of the market (R_m). This is the value-weighted index for all Thai securities traded in the Stock Exchange of Thailand. We use the government of Thailand's 7-day repurchase rate as a return of the risk-free rate. All the data for securities returns and their relevant characteristics, such as market value, book-to-market ratio and number of shares, are collected from the Datastream database.

Size and book-to-market mimicking portfolios are constructed following Fama and French (1993), using data from the Thai stock market. At the beginning of the year, stocks are equally divided into small (S) and big (B) groups, based on market value. We also rank stocks by their book-to-market ratios, divided on a 30:40:30 split and assigned into one of three groups, high (H), medium (M) and low (L).

For the liquidity factor, we measure liquidity using a share turnover ratio which can be viewed as the trading quantity dimension of liquidity. The share turnover ratio used as a liquidity factor occurs in previous studies, for example, Datar et al. (1998) and Chan and Faff (2005). They argue that share turnover ratio is an appropriate liquidity factor because it has strong theoretical support and they confirm that the share turnover ratio can explain stock returns. Our share turnover ratio is calculated by the volume of shares traded in a month divided by the quantity of shares outstanding in the month. Then, we calculate the average monthly share turnover ratio over the year. For each year, we rank stock based on the average turnover ratio on the year and break it down into very liquid (V), moderately liquid (O) and illiquid (I), based on the 30:40:30 split.

Subsequently, we construct 18 value-weighted portfolios corresponding in size, book-to-market and liquid characteristics (S/H/V, S/H/O, S/H/I, S/M/V, /M/O, S/M/I, S/L/V, S/L/O, S/L/I, B/H/V, B/H/O, B/H/I, B/M/V, B/M/O, B/M/I, B/L/V, B/L/O and B/L/I). Mimicking the portfolio for size (SMB) is the difference between the simple average of 9 small portfolios and the average 9 big portfolios. Mimicking the portfolio for book-to-market (HML) is the difference between the simple average of 6 high book-to-market portfolios and

6 low book-to-market portfolios. Similarly, mimicking the portfolio for liquidity (LIQ) is the difference between the average of 6 illiquid portfolios and very liquid portfolios. This process is repeated at the beginning of each year from 2002-2007. Thus, this construction approach ensures that all three factors are orthogonalized with each other and the effect of the two other factors on the mimicking portfolios is minimized.

For the momentum portfolio, using Thai stock returns, we construct our momentum portfolio (PR1YR) following Cahart (1996), who suggests that persistence in mutual fund returns is explained by the use of momentum strategy. The PR1YR portfolio is the equally weighted portfolio returns of stocks with the top 30 percent highest past year returns minus the equally weighted portfolio returns of stocks with the 30% lowest past year returns.

6.4 Empirical results

6.4.1 Liquidity premium

We quantify illiquidity exposure using the econometric model suggested by Getmansky et al. (2004). In their model, true returns are a finite moving average of economic (unobserved) returns. Subsequently, we employ the maximum likelihood procedure to estimate an MA(2) model with the constraint that coefficients are summed to one as expressed in Equation 6.2. We estimate each mutual fund over the period January 2002 to August 2007. There is only one general equity fund (EQN099) which yielded parameter estimates: $\hat{\theta}_0$ = 43.76, $\hat{\theta}_1$ = -14.06 and $\hat{\theta}_2$ = -28.79, suggesting that the estimation for this fund is severely misspecified. Therefore, we remove this fund from any remaining analysis which relates to the MA(2) estimation. Table 6.2 summarises the values estimated from the model.

In panel A, the mean value of $\hat{\theta}_0$, 0.9232, implies that, on average, 92.32% of the true current weekly returns were reported and the remaining 7.68% were distributed over the following two weeks $(\hat{\theta}_1 + \hat{\theta}_2)$, which suggests illiquidity. Equity funds present a smaller average value of $\hat{\theta}_0$ than flexible funds (0.9016 compared to 0.9784), indicating that equity funds contain more illiquid asset than flexible funds. Nevertheless, illiquidity exposures deviate more in flexible funds than they do in equity funds. These results are consistent with the results of Getmansky et al. (2004) and Ding et al. (2008), who suggest that the average $\hat{\theta}_0$ in hedge funds equals 0.92 and 0.90. For a robustness check, we also quantify asset illiquidity using the first-order serial correlation ($\hat{\rho}_1$) in replacing the model of Getmansky et al. The $\hat{\rho}_1$ coefficient signifies the degree of asset illiquidity and, therefore, the high value implies the high illiquid assets contained in the fund. Summary statistics of the first-order serial correlation are presented in Table 6.2, Panel B, below.

Table 6.2 Descriptive statistics for illiquid assets

The table reports the descriptive statistics for estimated illiquid assets contained in the mutual fund sample. N refers to the number of funds. Panel A shows the descriptive statistics for illiquid assets as proxy by $\hat{\theta}_0$ based on the return-based stale price model (Getmansky et al., 2004). Panel B shows the descriptive statistics for illiquid assets as proxy estimated by the first-order serial correlation ($\hat{\rho}_1$)

	N	Mean	Median	Std. Dev.	Min	Max
Panel A: Return-based stale price model ($\hat{\theta}_0$)						
All funds	210	0.9232	0.9189	0.2871	-0.6238	3.5427
Equity funds	151	0.9016	0.9190	0.1859	-0.2597	2.1334
Flexible funds	59	0.9784	0.9189	0.4510	-0.6238	3.5427
Panel B: First-order serial correlation ($\hat{\rho}_1$)						
All funds	211	-0.0259	-0.0198	0.1027	-0.4799	0.5382
Equity funds	152	-0.0253	-0.0199	0.0757	-0.3893	0.2126
Flexible funds	59	-0.0275	-0.0176	0.1522	-0.4799	0.5382

In order to investigate the role of liquidity on mutual fund returns, we rank mutual funds from the highest liquidity (highest $\hat{\theta}_0$) to the lowest liquidity (lowest $\hat{\theta}_0$) and then form a deciles portfolio using both equally weighted and value-weighted methods. The summary statistics of returns for equally weighted deciles portfolios and value-weighted deciles portfolios are reported in Table 6.3 panels A and B, respectively.

During 2002 and 2007, the top two highest liquidity portfolios generated relatively low mean returns compared to other portfolios, using both equal weight and value weight methods. Using the equal weight method, the highest liquidity portfolio (1^{st} deciles portfolio) has an average return of well below 9% per annum compared to the annual return of more than 18% in the lowest liquidity portfolio (10^{th} deciles portfolio), even though the lowest liquidity portfolio does not present the highest return. Panel B presents the mean returns estimated from the value-weighted deciles portfolios. The results are somewhat similar, but are slightly lower than for the equally weighted method in Panel A. Therefore, the evidence from this deciles portfolio shows the preliminary evidence that the liquidity of assets contained in mutual funds has an impact on the mutual fund returns.

Table 6.3 Descriptive statistics for the returns of liquidity portfolios

The table reports the descriptive statistics of the returns of liquidity portfolios between January 2002 and August 2007. In Panel A, liquidity portfolios are calculated using the equally weighted method. In Panel B, liquidity portfolios are calculated using the value-weighted method.

Portfolios	Mean	Median	Std. Dev.	Min	Max
Panel A: Equally weighted portfolios					
1-High liquidity	0.00170	0.00242	0.02213	-0.1133	0.06735
2	0.00242	0.00286	0.02850	-0.0847	0.08022
3	0.00279	0.00378	0.02676	-0.0885	0.08374
4	0.00377	0.00556	0.02913	-0.0860	0.09533
5	0.00352	0.00323	0.02859	-0.0867	0.09519
6	0.00364	0.00499	0.02731	-0.0834	0.09298
7	0.00367	0.00484	0.02551	-0.0762	0.08218
8	0.00340	0.00461	0.02684	-0.0793	0.07611
9	0.00359	0.00535	0.02395	-0.0653	0.07382
10-Low liquidity	0.00353	0.00142	0.01777	-0.0611	0.06843
Panel B: Value-weighted portfolios					
1-High liquidity	0.00167	0.00199	0.01986	-0.0822	0.06413
2	0.00184	0.00148	0.02502	-0.0760	0.06761
3	0.00319	0.00484	0.02380	-0.0767	0.08020
4	0.00389	0.00585	0.02927	-0.0856	0.09552
5	0.00374	0.00541	0.02897	-0.0873	0.09731
6	0.00392	0.0065	0.02798	-0.0868	0.09789
7	0.00366	0.00513	0.02711	-0.0807	0.08820
8	0.00342	0.00436	0.02583	-0.0742	0.07889
9	0.00290	0.00475	0.02711	-0.0835	0.08901
10-Low liquidity	0.00332	0.00122	0.01733	-0.0611	0.06843

Nevertheless, the mean returns in Table 6.3 do not take risk into account. Subsequently, we employ the capital asset pricing model in adjusting for market risk (Jensen, 1968)[23]. The capital asset pricing model is a single factor model in which the returns of mutual fund portfolio are regressed on the return of the market portfolio. Interception or the alpha estimate represents risk-adjusted performance. The Ordinary Least Square (OLS) adjusted for heteroscedasticity using White's (1980) method is used in the estimation. Table

[23] We also consider the conditional performance model, which allows time varying in betas (Fama and Schadt, 1996) whose results (not reported) are similar.

6.4 shows the results for each deciles portfolio. Equally weighted and value-weighted deciles portfolios are estimated in Columns 2-4 and 5-7, correspondingly and these results are quite similar.

The results show that, using the equally weighed method to construct the portfolio, the 1st deciles portfolio, the most liquid, has the lowest negative alpha figure -0.13% per week or around 6.5% per annum which is statistically significant at the 5% level. Similarly, the 2nd deciles portfolios also underperform at around 6% per annum, which is also statistically significant at the 10% level. There is no evidence of abnormal returns in the 3rd to the 9th portfolios. However, the lowest liquidity deciles portfolio, the 10th, statistically outperforms the market with more than 7% per annum. The D10-1 portfolio is the return premium generated from buying low liquidity by selling high liquidity funds. The performance estimated from this portfolio is positive and significant at the 5% level.

Thus, this reveals that the performance of mutual funds portfolios increases with the illiquidity assets in mutual funds. Performance runs from negatively significant in the high liquid portfolios to positively significant in the low liquid portfolios. This signifies the liquidity premium in mutual funds. This evidence is consistent with the theoretical and previous empirical studies, which suggest a liquidity premium in stock returns (see, for example, Amihud and Mendelson, 1986; Datar et al., 1998; Pastor and Stambaugh, 2003). This is also consistent with the hedge fund literature, which suggests that funds with restrictions hold more illiquid assets and perform better than funds without restrictions, due to the illiquidity premium (see, for example, Aragon, 2007; Liang and Park, 2007). Furthermore, the fact that the GLM measure is able to capture the return premium in mutual funds means that the $\hat{\theta}_0$ in GLM measure is a good proxy for mutual fund liquidity.

Considering the market risk factor estimates which are presented in Columns 3 and 6, the values are all highly significant, ranging from 0.43 to 0.92 across the portfolios. Similarly, the adjusted R-squares are high and vary from 53% to 96%. The lowest beta coefficient and adjusted R-square are exhibited in the lowest and highest liquidity portfolios. Therefore, we suggest that there is a bias in beta estimation but do not confirm whether it is downwardly biased, as Dimson (1979) and Asness et al. (2001) claim; they conclude that betas estimated from infrequently traded stocks are downwardly biased.

Table 6.4 Performance using traditional single-factor measure

The table reports the results of estimations of the traditional single-factor measure. The measure estimates the liquidity portfolios for January 2002 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's method (1980) are in parentheses ( ).Columns 2-4 and 5-7 give results for portfolios calculated using equally weighted and value-weighted methods, respectively. Alpha indicates abnormal returns in a portfolio. R_m is the excess return on the market benchmark. R^2 represents the adjusted R-squares. * Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level

	Equally weighted			Value-weighted		
Portfolios	alpha	Rm	R^2	alpha	Rm	R^2
1-High liquidity	-0.00125**	0.691***	0.89	-0.00103*	0.618***	0.89
	(-2.73)	(30.32)		(-2.52)	(35.44)	
2	-0.00122*	0.886***	0.88	-0.00149***	0.796***	0.92
	(-2.11)	(48.39)		(-3.55)	(53.07)	
3	-0.0007	0.843***	0.91	-0.000021	0.762***	0.94
	(-1.44)	(47.61)		(-0.06)	(48.95)	
4	-0.000088	0.945***	0.96	0.000010	0.949***	0.96
	(-0.26)	(76.16)		(0.03)	(75.8)	
5	-0.00025	0.921***	0.95	-0.000066	0.93***	0.94
	(-0.66)	(61.47)		(-0.16)	(51.01)	
6	0.000004	0.883***	0.95	0.00021	0.903***	0.95
	(0.01)	(65.14)		(0.57)	(55.01)	
7	0.00023	0.828***	0.96	0.000057	0.874***	0.95
	(0.77)	(73.44)		(0.16)	(61.64)	
8	-0.00018	0.868***	0.95	0.000007	0.821***	0.92
	(-0.55)	(71.58)		(0.02)	(39.66)	
9	0.00035	0.772***	0.95	-0.0007	0.872***	0.94
	(1.09)	(65.09)		(-1.85)	(55.21)	
10-Low liquidity	0.00151*	0.429***	0.53	0.00142	0.397***	0.48
	(2.17)	(12.1)		(1.94)	(10.98)	
D10-1	0.00228**	-0.262***	0.24	0.00196*	-0.221***	0.17
	(2.82)	(-6.11)		(2.35)	(-5.11)	

6.4.2 Liquidity-augmented performance measure

Evidence from the previous section suggests a bias in beta estimation and also a liquidity premium in mutual fund performance. Thus, we propose a liquidity-augmented model to estimate mutual fund performance and examine whether our alternative model can explain the illiquidity premium in mutual fund performance. Our model, as shown in Equation 6.5, incorporates one extra variable to capture the liquidity premium in addition to Cahart's 4-factor model. The liquidity factor in our model is measured by the share turnover ratio, which is calculated by the number of shares traded over the period in relation to total amount of shares outstanding. Thus, our liquidity factor will capture liquidity from the viewpoint of the quantity of trading. Nonetheless, the share turnover ratio is confirmed for its ability to explain stock returns (Datar et al., 1998; Chan and Faff, 2005).

All risk factor variables are self-constructed, as explained in section 6.3, using Thai stock data. Below, Table 6.5 provides descriptive statistics and a correlation matrix for the five risk factors included in the model: market excess return (R_m-R_f), mimicking portfolios for size (SMB), book-to-market (HML), 1-year-momentum (PR1YR) and liquidity risk premium (LIQ), our proposed additional factor.

According to panel A of Table 6.5, over the period 2002-2007, the average excess return of the market (R_m-R_f) is 0.36% per week, which equals around 19% per annum. The return for size premium (SMB) is small, well below 1% per annum. The return for the book-to-market premium (HML) is negative and below 20%. Therefore, this suggests that in the Thai stock market, during our study period, size does not generate much return premium. Growth stocks generate higher returns than value stocks. These findings contrast with evidence from the developed markets, which generally shows that value and small stocks earn higher returns (for example, Fama and French, 1993; Cahart, 1997; Daniel et al., 1997). Additionally, the one-year momentum strategy (PR1YR) gives a high returns premium of almost 60% per annum. This is consistent with the findings of Jegadeesh (1992), who shows the momentum anomaly in the stock returns. Finally, our liquidity premium gives a positive returns premium of well over 9% per annum. We also test whether the mean returns of the five risk factors are statistically significantly different from zero. Results show that the returns of market, book-to-market and momentum return premium are statistically different from zero but not in the size and liquidity premiums.

Panel B presents the correlation matrix of our variables. The table reports only a high positive correlation between the excess market returns and the liquidity factor. Other than this, the correlations are relatively small. Our results are consistent with those of Fama and French (1993), who report that the correlation between SMB and HML equals -0.08 and of Chan and Faff (2005), who also report low correlation between their risk factors.

Table 6.5 Descriptive statistics and correlation matrix of risk factors

The table reports the descriptive statistics (Panel A) and correlation matrix (Panel B) for risk factors. Rm is the excess returns of SET index. SMB, HML, PR1YR and LIQ are the returns of the portfolios mimicking size, value, momentum and liquidity premium, respectively.
* Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

	R_m	SMB	HML	PR1YR	LIQ
Panel A: Descriptive statistics					
Mean	0.0036	0.0002	-0.0045	0.0114	0.0018
Median	0.0041	-0.0010	-0.0041	0.0118	0.0041
Std. Dev.	0.0302	0.0142	0.0163	0.0221	0.0328
Min	-0.0887	-0.0314	-0.0844	-0.0646	-0.1159
Max	0.0867	0.0780	0.0987	0.0847	0.1346
Skewness	-0.2410	1.2052	0.6465	0.0072	-0.1370
Kurtosis	3.4081	7.2487	10.7945	3.9335	3.8516
t-statistics (Ho: mean=0)	2.02**	0.23	-4.73***	8.82***	0.93
Panel B: Correlation matrix					
R_m	1	-	-	-	-
SMB	-0.3827	1	-	-	-
HML	-0.1872	-0.0563	1	-	-
PR1YR	0.0638	0.0028	-0.1051	1	-
LIQ	0.7022	0.0432	-0.048	0.0328	1

Subsequently, we estimate the performance of each deciles portfolio, using our proposed liquidity-augmented performance measure in order to investigate whether it can capture the liquidity premium in mutual fund performance. Results from the estimation are shown in Table 6.6. Column 2 presents the alpha, which is the risk-adjusted performance estimated from the model. It reveals that, using the liquidity-augmented measure, the performances of the top three highest liquidity portfolios are -0.16%, -0.13% and -0.11% per week, respectively, and these are still negatively significant. The most liquid portfolio still has the lowest performance and is statistically significant at the 5% level, while the second and the third deciles portfolios are also statistically significant at the 10% level. We do not find evidence of significant abnormal performance in any other portfolios. The positive returns are presented only in the two lowest liquid portfolios; the 9th deciles portfolio has a risk-adjusted performance equal to 0.027% and the 10th deciles portfolio has a risk-adjusted performance equal to 0.11%, but these are not statistically significant. The performance of the long-short portfolio (D10-1) is positively significant at the 5% level.

In Column 3, market coefficients (Rm) are highly significant in all the deciles portfolios and vary across portfolios. The slopes of the market risk factor are slightly lower in the extreme portfolios. Column 4 presents a coefficient for size premium (SMB) and the results show that it is not statistically significant in any portfolio. The t-statistics for SMB coefficients are relatively low, ranging from -0.69 to 0.82. The value stock premium factor, HML, in Column 5 is negative and statistically significant at a 5% level in 7 out of 10 portfolios. This indicates that some fund managers adjust their portfolios based on their book-to-market value and put more weight on value stocks than on growth stocks. Moreover, there is no evidence of the use of momentum strategy by fund managers. The momentum factor, PR1YR, is not statistically significant in any portfolio. Lastly, our liquidity variables (LIQ) in Column 7 are all positive with the t-statistics ranging from 1.07 (in the 2nd decile) to 4.19 (in the 8th decile). The two portfolios which yield insignificant liquidity factors are the two highest liquidity portfolios. Furthermore, we find that the liquidity coefficients increase from the high to the low liquidity portfolios. The coefficients run from 0.035 in the highest liquidity portfolio to 0.08 in the lowest. This evidence suggests that some fund managers allocate more of their assets to illiquid stocks in order to earn the illiquidity premium.

The results are then compared with those in Table 6.4 in order to examine the change for alphas in the liquidity-augmented model in relation to the single-factor model. When the liquidity augmented measure was used, the performance of the highest liquidity portfolio (1st deciles) went down from -6.5% to -8.5% per annum. Likewise, the performance of the lowest liquidity portfolio (10th deciles) went down from 7.8% to 5.7% per annum. In addition, the adjusted R-squares rose to some extent.

Panel B shows the results estimated from the value-weighted portfolios. The results are quite similar to the equally weighted portfolios in panel A, which suggests that the performances are negatively and statistically significant in the high liquidity portfolios and that the low liquidity portfolios give no abnormal return although its performance is marginally better than the market. The liquidity factor is positive and significant across all deciles portfolios, except the two most liquid portfolios in which the coefficients are also positive but insignificant.

Our results reveal that the liquidity factor can explain the liquidity premium in mutual fund performance. In particular, the liquidity factor in our proposed model is statistically significant and more important in the less liquid portfolios. This signifies that the less liquid portfolios invest more in illiquid assets and earn illiquidity rents. Our results are consistent with the conclusions of Datar (1998), Amihud (2002), Chan and Faff (2005) and Liu (2006), who suggest that liquidity can explain the returns of stocks and also with those of Bakaert et al. (2007), who suggest that liquidity in the local market is an important driver of returns in emerging markets. In addition, our results show that the model of Getmansky et al. can also apply in the mutual fund context in measuring the illiquid assets contained in fund portfolios.

The results show that performance estimated by the liquidity-augmented model goes down by approximately 2% per annum. This figure can be attributed to the growth and liquidity return premium. Nonetheless, we find that evidence of a liquidity premium is still to be observed in the liquidity-augmented model. This indicates that our liquidity factor is unable to fully capture the liquidity premium in mutual funds. This may be the case that our factor explains only one dimension of liquidity, as pointed out by Liu (2006).

Table 6.6 Performance using liquidity-augmented measure

The table reports the results of estimations of the liquidity-augmented measure. The measure estimates liquidity portfolios for January 2002 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's method (1980) are in parentheses ( ).Panels A and B give results for portfolios calculated using equally weighted and value-weighted methods, respectively. Alpha indicates the abnormal returns of the portfolio. R_m is the excess return on the market benchmark. SMB is the size premium factor. HML is the value premium factor. PR1YR is the difference in returns between a portfolio of a past year's winner and a past year's loser. LIQ is the liquidity premium factor. R^2 represents adjusted R-squares. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level

Portfolios	Alpha	R_m	SMB	HML	PR1YR	LIQ	R^2
Panel A: Equally weighted							
1-High liquidity	-0.00164**	0.66***	0.00639	-0.0532*	0.0174	0.035	0.893
	(-2.57)	(27.01)	(0.16)	(-1.93)	(0.49)	(1.45)	
2	-0.00131*	0.858***	-0.00907	-0.0377	-0.00341	0.0292	0.88
	(-1.94)	(21.27)	(-0.17)	(-1.43)	(-0.18)	(1.07)	
3	-0.00108*	0.812***	0.0317	-0.0249	0.0253	0.0435**	0.907
	(-1.92)	(28.90)	(0.82)	(-0.89)	(1.25)	(2.09)	
4	-0.00046	0.891***	-0.0156	-0.0605***	0.0164	0.0582***	0.962
	(-1.11)	(42.53)	(-0.51)	(-2.68)	(0.94)	(3.23)	
5	-0.00036	0.877***	-0.00528	-0.0742***	-0.0136	0.0477**	0.95
	(-0.79)	(33.36)	(-0.15)	(-2.91)	(-0.75)	(2.42)	
6	-0.0002	0.839***	-0.0161	-0.0611**	0.00094	0.0453**	0.956
	(-0.49)	(37.00)	(-0.49)	(-2.4)	(0.05)	(2.53)	
7	-8.50E-06	0.778***	-0.0196	-0.0589***	0.00492	0.0523***	0.963
	(-0.02)	(39.27)	(-0.68)	(-2.7)	(0.33)	(3.39)	
8	-0.00044	0.799***	-0.0238	-0.0756***	0.0031	0.0736***	0.958
	(-1.25)	(34.22)	(-0.69)	(-3.26)	(0.2)	(4.19)	
9	0.00027	0.719***	0.0017	-0.0539**	-0.00763	0.0636***	0.952
	(0.76)	(31.28)	(0.05)	(-2.16)	(-0.5)	(3.32)	
10-Low liquidity	0.0011	0.369***	0.02	0.00675	0.0452	0.0813*	0.538
	(1.32)	(5.86)	(0.26)	(0.09)	(1.16)	(1.69)	
D10-1	0.00229**	-0.29***	0.0132	0.0597	0.0245	0.0459	0.237
	(2.24)	(-4.13)	(0.15)	(0.71)	(0.47)	(0.83)	

Portfolios	Alpha	Rm-Rf	SMB	HML	PR1YR	LIQ	R^2
Panel B: Value-weighted							
1-High liquidity	-0.00124**	0.611***	0.00713	-0.0569**	-0.00215	0.00389	0.886
	(-2.5)	(25.73)	(0.2)	(-2.19)	(-0.08)	(0.19)	
2	-0.00154***	0.772***	0.00848	-0.0448*	-0.0103	0.0284	0.924
	(-3.09)	(25.68)	(0.22)	(-1.91)	(-0.61)	(1.24)	
3	-0.00063	0.731***	0.00342	-0.0402*	0.0422**	0.0334*	0.937
	(-1.43)	(29.21)	(0.11)	(-1.76)	(2.17)	(1.79)	
4	-0.00035	0.888***	-0.022	-0.0625***	0.0161	0.0668***	0.963
	(-0.87)	(42.89)	(-0.72)	(-2.79)	(0.94)	(3.84)	
5	-0.00028	0.865***	-0.0265	-0.0865***	-0.00524	0.0672***	0.944
	(-0.6)	(29.4)	(-0.7)	(-3.06)	(-0.27)	(3.23)	
6	-0.00021	0.846***	-0.0325	-0.078***	0.0152	0.0551***	0.952
	(-0.47)	(33.07)	(-0.91)	(-2.85)	(0.8)	(2.97)	
7	-0.00027	0.797***	-0.0452	-0.0924***	0.00475	0.0773***	0.953
	(-0.65)	(34.29)	(-1.32)	(-3.35)	(0.27)	(4.32)	
8	-0.00008	0.738***	-0.042	-0.0593**	-0.00343	0.0908***	0.925
	(-0.19)	(22.97)	(-0.96)	(-2.23)	(-0.18)	(4.81)	
9	-0.00103**	0.807***	-0.066*	-0.0903***	0.00621	0.057***	0.946
	(-2.27)	(31.63)	(-1.83)	(-3.41)	(0.3)	(2.67)	
10-Low liquidity	0.00118	0.339***	0.027	-0.00612	0.0241	0.0806*	0.484
	(1.33)	(5.24)	(0.35)	(-0.08)	(0.57)	(1.66)	
D10-D1	0.00197	-0.271***	0.0194	0.0505	0.023	0.0763	0.18
	(1.91)	(-3.74)	(0.21)	(0.58)	(0.45)	(1.4)	

6.4.3 Liquidity premium in tax-benefit funds

Since tax benefit funds are a special type of mutual fund in Thailand which differs from the conventional funds in term of its investment horizon, tax-benefit funds require a longer investment period (for example, a minimum of 5 years in LTF funds). Subsequently, we hypothesize that there is a clientele effect in the tax-benefit funds and that tax-benefit fund investors require a return premium to compensate for their longer investment. Moreover, due to their restrictions, tax-benefit fund managers have more opportunity to invest more in illiquid assets, resulting in an illiquidity premium. The evidence in Chapter 4 suggests that tax-benefit funds outperform general funds by around 5% per year (Table 4.9). Hence, we test whether there is any difference in the degree of asset liquidity contained in the funds between general and tax-benefit funds. We employ a straightforward method by using $\hat{\theta}_0$ estimated for all funds and test the mean difference between two types, the results being shown in Table 6.7. Columns 2-6 compare the number of funds and risk-adjusted performance estimated by Jensen's alpha. The number of general funds is roughly three times that of the tax-benefit funds. However, the tax-benefit funds, on average, outperform the market, whereas the general funds underperform the market. The t-statistics, in Column 6, compare the mean differences in fund performance between the two groups and reveal that tax-benefit funds statistically highly outperform general funds. Nevertheless, at style level, this is due only to the results from equity funds and there is no statistical evidence from the flexible funds group.

Columns 7-9 give the average $\hat{\theta}_0$ for each mutual fund style as well as comparing the mean differences between general and tax-benefit fund styles. The results suggest that the average $\hat{\theta}_0$ of tax-benefit funds equals 0.88, which is somewhat lower than 0.94 in general funds, implying that tax-benefit funds have more illiquidity assets than general funds. The t-statistics in Column 4 equal 1.91, which is also significant at the 10% level. However, at style level, the average $\hat{\theta}_0$ of general equity funds equals 0.91 compared to 0.86 in tax-benefit funds. This gives a t-statistic value of 2.16, which is statistically significant at a 5% level. In contrast, the t-statistics value comparing flexible funds is only 0.53. Thus, the evidence that tax-benefit funds managers invest more in illiquid assets than general funds can be conclusive only for equity funds. We find no evidence of it in the flexible funds.

Table 6.7 Illiquid assets in general vs. tax-benefit funds

The table reports the number of funds (N), performance (Alpha) and $\hat{\theta}_0$ of the fund sample. Performance is estimated using the traditional single-factor model. $\hat{\theta}_0$ is estimated using the model suggested by Getmansky et al. (2004). Mean and standard deviation (in parentheses) are reported. General refers to general funds. Tax refers to tax-benefit funds. T-stat refers to the t-statistics for the mean differences between the two samples. * Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

	N		Risk-adjusted returns			$\hat{\theta}_0$		
	General	Tax	General	Tax	t-stat	General	Tax	t-stat
All	161	49	-0.00072	0.0003	-3.4***	0.9362	0.8801	1.91*
			(0.0021)	(0.0012)		(0.3220)	(0.1041)	
Equity	114	37	-0.00074	0.0005	-3.0***	0.9145	0.8616	2.16**
			(0.0024)	(0.0013)		(0.2061)	(0.0917)	
Flexible	47	12	-0.00069	-0.0002	-1.65	0.9889	0.9374	0.63
			(0.001)	(0.0006)		(0.5023)	(0.1226)	

Nonetheless, the difference in illiquidity may derive from other fund characteristics. Thus, to confirm the robustness of the above results, we perform the probit regression and control for fund characteristics, namely, the size, age and style of funds. The results are presented in Table 6.8. We estimate the probit analysis of the tax-benefit funds in which the value equals one if it is a tax-benefit fund and zero otherwise. Subsequently, the result is not statistically significant. The results from models 1-3 reveal the probability that tax-benefit funds increase by 0.54% per each decrease in one standard deviation in the estimated $\hat{\theta}_0$.

However, Mutual fund age is negatively highly significant in our probit analysis. However, this is not a surprising result because tax-benefit funds began only in early 2002.

Models 4-6, in Table 6.8, replace $\hat{\theta}_0$ to the first-order serial correlation ($\hat{\rho}_1$). The results are consistent with the model using $\hat{\theta}_0$ confirming that, after controlling for fund characteristics, the degree of illiquidity asset contained in the tax-benefit funds is no different from that contained in the general funds.

Since tax-benefit funds contain only marginally more illiquid assets than general funds, we conclude that the superior performance in tax-benefit funds is only a result of the liquidity premium, but can also be attributed to other reasons, such as the lower nondiscretionary trading cost and the superior ability of tax-benefit fund manager to identify mispriced stocks.

Table 6.8 Probit regression

The table reports the estimation from a probit analysis of tax-benefit funds. The value equalling one of the funds is tax-benefit and zero otherwise. θ_0 and ρ_1 refer to the estimates of the fund's liquidity level, as measured by Getmansky et al. (2004) and first-order serial correlation, respectively. STYLE is a dummy variable for the mutual fund style, which equals one if flexible funds are in question and zero otherwise. lnAge refers to the natural logarithm of the fund's age since its inception date (in weeks). lnTNA refers to the natural logarithm of a fund's average net asset value (in million Baht). Heteroscedasticity consistent t-statistics are in parentheses ( ). * Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

Model	θ_0	ρ_1	STYLE	LnAGE	lnTNA
1	-0.535				
	(-1.47)				
2	-0.522		0.112		
	(-1.45)		(0.51)		
3	0.00892		0.0984	-0.47***	0.0258
	(0.03)		(0.43)	(-3.41)	(0.32)
4		0.445			
		(0.49)			
5		0.442	0.138		
		(0.48)	(0.63)		
6		-0.251	0.0962	-0.475***	0.0247
		(-0.26)	(0.43)	(-3.55)	(0.31)

6.5 Robustness of the results

6.5.1 Autoregressive model as a proxy of liquidity

We measure asset illiquidity using first-order serial correlation ($\hat{\rho}_1$) in replacing the $\hat{\theta}_0$ in the measure of Getmansky et al. The first-order serial correlation ($\hat{\rho}_1$) signifies the asset illiquidity in funds. The greater value of the $\hat{\rho}_1$ estimation indicates the higher illiquidity asset contained in the fund. We estimate the $\hat{\rho}_1$ of each fund in our sample using an AR(1) model. Subsequently, we rank mutual funds from high $\hat{\rho}_1$ to low $\hat{\rho}_1$ and construct deciles portfolios. The first deciles portfolio contains mutual funds with the highest $\hat{\rho}_1$, which implies the high liquidity portfolios, whereas the last deciles portfolio contains funds with the lowest $\hat{\rho}_1$ which implies the low liquidity portfolio. The results are provided in Table 6.9. Column 6.4 displays the coefficients estimated from the single-factor model. Panel A presents the results estimated from the equally weighted portfolios. Consistent with Getmansky et al.'s model, the most liquid portfolio, 1st deciles, underperforms the market and yields the lowest performance whereas the most illiquid portfolio, 10th deciles, yields the highest performance and is the only portfolio to outperform the market (alpha equals 0.045% per week). Nonetheless, none of these portfolios has a statistically abnormal performance. Our liquidity-augmented performance measure is estimated and the results are presented in Columns 5-11. The alphas estimated from the liquidity-augmented model, in Column 5, are somewhat similar to the single factor measure. The lowest liquidity portfolio is the only portfolio with positive alpha performance. The liquidity factor is positive and highly significant in 5 out of 10 portfolios and, in particular, those portfolios are the 5 most illiquid portfolios. The coefficients for market risk are low in the extreme portfolios, compared to the others. Moreover, the adjusted R-square values slightly increase when the factors model is incorporated.

Panel B of Table 6.9 estimates mutual fund performance for the value-weighted portfolios. In contrast to the previous estimations, there is no evidence of a liquidity premium. The portfolios of funds do not provide abnormal returns, with the exception of the 6^{th} deciles portfolio, which statistically underperforms the market. Both highest and lowest liquid portfolios perform worse than the market but this is not statistically significant. Nevertheless, the liquidity factors in the illiquid portfolios, Column 10, are highly and statistically significant, confirming the importance of this factor to the performance measure.

In addition, using $\hat{\rho}_1$ as a proxy of illiquidity indicates the biased estimation in return and risk premium in mutual funds and suggests the illiquidity premium in funds with low liquidity assets. Although the liquidity-augmented measure slightly changes mutual performance, it gives statistical importance to the mutual fund measure. Results estimated from the first-order serial correlation support the findings in Getmansky et al.'s estimation, though not so strongly. As a result, we can conclude that our results in quantifying asset illiquidity are not sensitive to the method.

Table 6.9 First-order serial correlation

Using first-order serial correlation in quantifying illiquid asset in funds, the table reports the results of estimations of traditional single-factor (Column 2-4) and liquidity-augmented measures (Columns 5-11). The measure estimates the liquidity portfolios for January 2002 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's method (1980) are in parentheses ( ).Panels A and B give results for portfolios calculated using equally weighted and value-weighted methods, respectively. Alpha indicates the abnormal returns of the portfolio. R_m is the excess return on the market benchmark. SMB is the size premium factor. HML is the value premium factor. PR1YR is the difference in returns between a portfolio of a past year's winner and a past year's loser. LIQ is the liquidity premium factor. R^2 represents adjusted R-squares. * Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level.

	Single-factor			Liquidity-augmented measure						
	Alpha	R_m	R^2	Alpha	R_m	SMB	HML	PR1YR	LIQ	R^2
Panel A: Equally weighted										
1-High liquidity	-0.0013	0.658***	0.54	-0.00151	0.673***	0.0971	-0.0521	-0.00723	-0.00335	0.54
	(-1.19)	(32.79)		(-0.83)	(13.91)	(0.85)	(-1.48)	(-0.1)	(-0.11)	
2	-0.00043	0.93***	0.88	-0.00075	0.891***	0.0165	-0.0708**	0.00476	0.0463	0.88
	(-0.69)	(38.9)		(-0.97)	(16.64)	(0.28)	(-2.02)	(0.21)	(1.22)	
3	-0.00082	0.911***	0.89	-0.00117	0.874***	-0.0174	-0.0467	0.0186	0.0371	0.89
	(-1.39)	(40.7)		(-1.57)	(18.11)	(-0.32)	(-1.55)	(0.81)	(1.08)	
4	-0.00042	0.834***	0.94	-0.00064	0.809***	0.0139	-0.0467**	0.00318	0.0286	0.94
	(-1.11)	(59.02)		(-1.46)	(29.75)	(0.4)	(-2.15)	(0.2)	(1.54)	
5	-0.00045	0.873***	0.95	-0.00066*	0.82***	-0.0215	-0.0797***	-0.00459	0.0535***	0.95
	(-1.32)	(63.8)		(-1.69)	(35.36)	(-0.65)	(-2.87)	(-0.26)	(3)	
6	-0.00019	0.854***	0.95	-0.00045	0.819***	-0.0272	-0.0445*	0.011	0.0341**	0.95
	(-0.57)	(64.77)		(-1.08)	(38.31)	(-0.86)	(-1.89)	(0.66)	(2.05)	
7	-0.00033	0.936***	0.96	-0.00062	0.883***	-0.0145	-0.0597**	0.00965	0.0578***	0.96
	(-0.92)	(59.28)		(-1.29)	(42.5)	(-0.45)	(-2.36)	(0.42)	(2.95)	
8	-0.0004	0.85***	0.89	-0.001*	0.767***	0.0103	-0.0598*	0.0389*	0.101***	0.90
	(-0.76)	(45.28)		(-1.75)	(28.8)	(0.24)	(-1.8)	(1.86)	(4.95)	
9	-0.0004	0.845***	0.95	-0.0006	0.804***	0.0244	-0.0516**	0.00115	0.0534***	0.95
	(-1.18)	(82.69)		(-1.57)	(41.4)	(0.78)	(-2.38)	(0.08)	(3.35)	
10-Low liquidity	0.00045	0.409***	0.73	0.00047	0.348***	0.0187	0.0054	0.00662	0.0838***	0.75
	(1.07)	(19.53)		(0.98)	(11.09)	(0.43)	(0.15)	(0.34)	(3.75)	
D10-1	0.00127	-0.249***	0.13	0.00153	-0.324***	-0.0788	0.0572	0.0106	0.0868**	0.13
	(1.12)	(-8.49)		(0.82)	(-5.92)	(-0.66)	(1.09)	(0.15)	(2.53)	

	Single-factor			Liquidity-augmented measure						
	Alpha	R_m	R^2	Alpha	R_m	SMB	HML	PR1YR	LIQ	R^2
Panel B: Value-weighted										
1-High liquidity	-0.00027	0.536***	0.78	0.00073	0.558***	0.00834	-0.0489	-0.11***	-0.0267	0.79
	(-0.5)	(20.01)		(1.31)	(12.91)	(0.16)	(-1.31)	(-4.65)	(-0.98)	
2	-0.00034	0.926***	0.89	-0.00088	0.88***	0.0151	-0.101***	0.0141	0.0503	0.89
	(-0.58)	(37.04)		(-1.27)	(17.6)	(0.27)	(-2.82)	(0.59)	(1.4)	
3	-0.00045	0.869***	0.89	-0.00119	0.821***	-0.017	-0.0547*	0.0514**	0.0488	0.89
	(-0.8)	(37.93)		(-1.62)	(17.05)	(-0.32)	(-1.87)	(2.06)	(1.42)	
4	-0.00021	0.826***	0.94	-0.00024	0.785***	0.0139	-0.0579***	-0.0155	0.05***	0.95
	(-0.59)	(61.76)		(-0.61)	(30.80)	(0.45)	(-2.76)	(-0.96)	(2.68)	
5	-0.00072**	0.885***	0.95	-0.00088**	0.825***	-0.0285	-0.0788***	-0.00757	0.0613***	0.95
	(-1.98)	(59.69)		(-2.13)	(30.93)	(-0.77)	(-2.67)	(-0.43)	(3)	
6	0.00016	0.9***	0.96	3.90E-05	0.854***	-0.0338	-0.0511**	-0.0018	0.0456***	0.96
	(0.53)	(71.6)		(0.11)	(42.64)	(-1.1)	(-2.06)	(-0.12)	(2.91)	
7	-0.00023	0.933***	0.95	-0.00055	0.872***	-0.0381	-0.0769***	0.00827	0.0608***	0.96
	(-0.64)	(63.97)		(-1.29)	(39.29)	(-1.11)	(-2.97)	(0.46)	(3.48)	
8	2.30E-05	0.83***	0.91	-0.00082*	0.721***	-0.0526	-0.0794***	0.0591***	0.116***	0.92
	(0.05)	(37.31)		(-1.94)	(23.03)	(-1.19)	(-2.62)	(2.81)	(6.14)	
9	-0.00068	0.83***	0.91	-0.00027	0.79***	-0.0371	-0.0666**	-0.0545**	0.0384	0.91
	(-1.38)	(35.41)		(-0.49)	(20.85)	(-0.81)	(-2.15)	(-2.55)	(1.63)	
10-Low liquidity	-0.0007	0.32***	0.41	-0.00092	0.267***	0.0142	0.0395	0.04	0.0752**	0.41
	(-0.99)	(11.96)		(-1.04)	(6.36)	(0.18)	(0.87)	(1.17)	(2.39)	
D10-1	-0.00091	-0.215***	0.17	-0.0021**	-0.289***	0.0054	0.0881	0.146***	0.102**	0.23
	(-1.08)	(-5.96)		(-2.09)	(-5.35)	(0.06)	(1.35)	(3.93)	(2.53)	

6.5.2 January effect

Elesnarapu and Reinganum (1993) argue that the evidence of a liquidity premium is due to the seasonal effect. Therefore, in order to ensure that our results are not driven by this effect, we re-estimate our model with a variable capturing the January effect. We use a dummy which equals one if the data are collected from the month of January and zero otherwise. In Table 6.10, Panels A and B accordingly present the results estimated from equally weighted and value-weighted portfolios. Columns 2-4 give the coefficients estimated from the single factor model. The t-statistics estimated from the dummy variable for the January effect in Column 4 are relatively low, ranging from -0.91 to 1.18, suggesting that our results are not influenced by the seasonal effect. Similarly, Column 11 shows the coefficients of the January effect dummy, estimated from our liquidity-augmented model and none of the portfolios has a significant coefficient. Furthermore, we still find evidence of an illiquidity premium. The high liquid fund portfolios yield statistically negative performance compared to the statistically positive performance in the low liquidity portfolio and the liquidity factor is positive and significant in the portfolio with illiquid assets. The results are consistent for both equally weighted portfolios (Panel A) and the value-weighted portfolio (Panel B). Hence, we conclude that our results are not sensitive to the January effect.

Table 6.10 The January effect

The table reports the results of estimations of traditional single-factor (Columns 2-4) and liquidity-augmented measures (Columns 5-11). The measure estimates liquidity portfolios for January 2002 to August 2007, using ordinary least square. T-statistics, adjusted for heteroscedasticity, using White's method (1980) are in parentheses ( ).Panels A and B give results for portfolios calculated using equally weighted and value-weighted methods, respectively. Alpha indicates the abnormal returns of the portfolio. R_m is the excess return on the market benchmark. SMB is the size premium factor. HML is the value premium factor. PR1YR is the difference in returns between a portfolio of a past year's winner and a past year's loser. LIQ is the liquidity premium factor. JAN is the dummy variable for the January effect which equals one if the data are obtained from the month of January and zero otherwise. * Significant at a 10% level. ** Significant at a 5% level. *** Significant at a 1% level

	Jensen			Liquidity-augmented						
Portfolios	Alpha	Rm	Jan	Alpha	Rm	SMB	HML	PR1YR	LIQ	Jan
Panel A: Equally weighted										
1-High	-0.00105***	0.693***	-0.00242	-0.00142***	0.661***	0.00484	-0.0527*	0.0139	0.0347	-0.0021
	(-2.62)	(29.97)	(-0.91)	(-2.79)	(26.86)	(0.12)	(-1.89)	(0.43)	(1.46)	(-0.88)
2	-0.00121*	0.886***	-0.00019	-0.00129*	0.858***	-0.00915	-0.0377	-0.00361	0.0292	-0.00012
	(-1.93)	(48.23)	(-0.16)	(-1.76)	(21.24)	(-0.17)	(-1.42)	(-0.19)	(1.07)	(-0.1)
3	-0.0008	0.842***	0.0011	-0.00124**	0.811***	0.0329	-0.0253	0.028	0.0438**	0.00161
	(-1.52)	(47.64)	(0.96)	(-2.07)	(28.62)	(0.84)	(-0.9)	(1.37)	(2.1)	(1.26)
4	-7.20E-05	0.945***	-0.00019	-0.00047	0.891***	-0.0155	-0.0606***	0.0167	0.0583***	0.00018
	(-0.2)	(76.19)	(-0.16)	(-1.1)	(42.44)	(-0.5)	(-2.67)	(0.95)	(3.23)	(0.14)
5	-0.00032	0.921***	0.00077	-0.00045	0.877***	-0.00464	-0.0744***	-0.0122	0.0478**	0.00086
	(-0.78)	(61.43)	(0.73)	(-0.93)	(33.3)	(-0.13)	(-2.92)	(-0.67)	(2.42)	(0.81)
6	-0.0001	0.882***	0.00126	-0.00036	0.839***	-0.015	-0.0614**	0.00341	0.0455**	0.00147
	(-0.28)	(65.65)	(1.18)	(-0.82)	(36.9)	(-0.45)	(-2.42)	(0.2)	(2.54)	(1.36)
7	0.00029	0.828***	-0.00077	5.00E-05	0.778***	-0.02	-0.0587***	0.00398	0.0522***	-0.00056
	(0.94)	(73.04)	(-0.91)	(0.14)	(39.36)	(-0.69)	(-2.68)	(0.26)	(3.38)	(-0.6)
8	-0.0002	0.867***	0.00025	-0.0005	0.799***	-0.0234	-0.0757***	0.00399	0.0737***	0.00053
	(-0.58)	(71.95)	(0.2)	(-1.34)	(34.09)	(-0.68)	(-3.26)	(0.26)	(4.18)	(0.43)
9	0.00035	0.772***	-8.10E-05	0.00026	0.719***	0.00176	-0.0539**	-0.00751	0.0637***	7.60E-05
	(1.08)	(65.84)	(-0.06)	(0.73)	(31.39)	(0.05)	(-2.15)	(-0.5)	(3.31)	(0.05)
10-Low	0.0017**	0.43***	-0.00216	0.00125	0.37***	0.0189	0.00711	0.0427	0.0811*	-0.0015
	(2.3)	(12.22)	(-0.84)	(1.41)	(5.91)	(0.24)	(0.1)	(1.09)	(1.69)	(-0.61)
D1-D10	0.00226***	-0.262***	0.00027	0.00223**	-0.29***	0.0136	0.0595	0.0254	0.046	0.00057
	(2.7)	(-6.07)	(0.08)	(2.22)	(-4.12)	(0.16)	(0.71)	(0.5)	(0.83)	(0.18)

Portfolios	Jensen			Liquidity-augmented						
	Alpha	Rm-Rf	Jan	Alpha	Rm-Rf	SMB	HML	PR1YR	LIQ	Jan
Panel B: Value-weighted										
1-High	-0.00093**	0.619***	-0.00119	-0.00112**	0.612***	0.00631	-0.0566**	-0.00402	0.0037	-0.00111
	(-2.35)	(35.13)	(-0.61)	(-2.47)	(25.67)	(0.18)	(-2.16)	(-0.16)	(0.18)	(-0.59)
2	-0.0013***	0.797***	-0.00231	-0.0013**	0.773***	0.00678	-0.0443*	-0.0142	0.028	-0.00231
	(-3)	(53.35)	(-1.46)	(-2.52)	(25.97)	(0.18)	(-1.89)	(-0.83)	(1.22)	(-1.46)
3	-0.00002	0.762***	-0.00007	-0.00069	0.731***	0.00381	-0.0403*	0.0431**	0.0335*	0.00053
	(-0.04)	(48.98)	(-0.05)	(-1.49)	(29.06)	(0.12)	(-1.76)	(2.18)	(1.79)	(0.34)
4	-0.00001	0.949***	0.00022	-0.00041	0.887***	-0.0216	-0.0627***	0.0172	0.0669***	0.00061
	(-0.02)	(75.85)	(0.19)	(-0.97)	(42.58)	(-0.7)	(-2.79)	(0.98)	(3.83)	(0.47)
5	-0.00006	0.93***	-0.00003	-0.0003	0.865***	-0.0264	-0.0866***	-0.00499	0.0672***	0.00015
	(-0.15)	(50.94)	(-0.02)	(-0.6)	(29.41)	(-0.7)	(-3.05)	(-0.25)	(3.23)	(0.11)
6	0.00007	0.902***	0.00172	-0.00043	0.845***	-0.0309	-0.0786***	0.0188	0.0554***	0.0021*
	(0.17)	(55.57)	(1.41)	(-0.93)	(33.34)	(-0.86)	(-2.86)	(1)	(2.99)	(1.74)
7	0.00009	0.874***	-0.00039	-0.00026	0.797***	-0.0453	-0.0924***	0.00456	0.0773***	-0.00011
	(0.24)	(61.16)	(-0.37)	(-0.6)	(34.22)	(-1.32)	(-3.34)	(0.26)	(4.32)	(-0.1)
8	-0.00004	0.82***	0.00056	-0.00016	0.738***	-0.0414	-0.0594**	-0.00217	0.091***	0.00075
	(-0.09)	(39.85)	(0.32)	(-0.36)	(22.98)	(-0.95)	(-2.22)	(-0.12)	(4.79)	(0.44)
9	-0.00071*	0.871***	0.00016	-0.00107**	0.807***	-0.0658*	-0.0903***	0.00682	0.0571***	0.00036
	(-1.82)	(55.35)	(0.1)	(-2.25)	(31.52)	(-1.82)	(-3.4)	(0.33)	(2.66)	(0.23)
10-Low	0.00165**	0.398***	-0.00279	0.00142	0.34***	0.0252	-0.00556	0.0202	0.0802*	-0.00234
	(2.12)	(11.07)	(-1.31)	(1.5)	(5.3)	(0.32)	(-0.07)	(0.48)	(1.66)	(-1.15)
D1-D10	0.00209**	-0.22***	-0.0016	0.0021*	-0.271***	0.0185	0.0508	0.0209	0.0761	-0.00126
	(2.38)	(-5.07)	(-0.56)	(1.96)	(-3.73)	(0.2)	(0.58)	(0.41)	(1.39)	(-0.44)

6.6 Conclusions

Previous studies suggest that liquidity plays an important role in asset pricing because it could result in a bias in beta risk and return estimation. Also, illiquid assets are likely to generate a return premium through the clientele effect. A number of previous studies has documented the relationship between liquidity and stock returns. This study extends the investigation into the role of liquidity to an alternative setting, an emerging market mutual fund. This is necessary because most of its underlying mutual assets are stocks. In addition, liquidity is a main concern in emerging markets and, therefore, investigating this issue in this region would provide a powerful test and bring up useful evidence. To achieve this, this study estimates the illiquid assets contained in mutual funds using the return-based stale price model which was proposed by Getmansky et al. (2004). The model implicitly measures illiquidity based on the observed returns and has been used only in the hedge fund literature. We explore whether funds with high illiquid assets are able to earn illiquidity rents. Our results suggest superior performance in illiquid fund portfolios, while liquid funds yield inferior performance. The performance increases with the degree of illiquid assets which is contained in the portfolio. We also find that the beta coefficients estimated from liquidity portfolios are varied and relatively low in the extreme portfolios. Thus, we suggest that there is evidence of a liquidity premium in mutual fund returns which is consistent with the evidence in stock markets (Datar, 1998; Amihud, 2002; Chan and Faff, 2005; and Liu, 2006). The variable in beta estimation across liquidity portfolio also implies the possibility of bias in the beta estimation (Dimson, 1979).

As a result, we propose a liquidity-augmented performance measure. This liquidity-augmented measure is a five-factor model which includes a liquidity variable capturing the liquidity premium in stock returns, in addition to the variables of market, size, value/growth and momentum. The liquidity measured by the share turnover ratio can explain the quantity dimension in the liquidity. Next, all variables are self-constructed using Thai stock data. We find that the liquidity-augmented model brings mutual fund performance down by roughly 2% per year. This is attributed to the growth and liquidity premiums. The coefficients of the liquidity premium variable increase through the degree of illiquid assets contained in the portfolios and are statistically significant in all funds except for two high liquid portfolios. Thus, we confirm the evidence of liquidity rents in mutual funds and the explanatory power in our liquidity factor. Nevertheless, we find that, using our proposed liquidity-augmented measure, the low liquidity funds portfolios still outperform the high liquidity funds portfolios and suggest that there is still evidence of a liquidity premium. This suggests that the share turnover is not a good proxy for liquidity, which contradicts the findings in Datar (1998) and Chan and Faff (2005). Nonetheless, the factor is of statistical importance in measuring mutual fund performance and it helps to identify the sources of the return premium and also to understand how fund managers allocate their portfolios.

In addition, we investigate the policy implications of tax-benefit funds which are a unique mutual fund style in Thailand and require a longer investment horizon. The long-term restriction gives fund managers an opportunity to put more weight on illiquid stocks in order to exploit the illiquidity premium. Therefore, we specifically investigate the differences in liquidity level between general and tax-benefit funds. We find that tax-benefit funds have more illiquid assets than general funds but, after controlling for fund characteristics, this result is not statistically significant. Therefore, the evidence of superior performance in tax-benefit funds is not a result from illiquidity rents alone. The higher return in tax-benefit funds may be attributed to other reasons, such as managerial skills and the lowering in trading cost as the long-term restrictions can make the funds more passive than general funds are. Nevertheless, this calls for further investigation at a later date.

We check for robustness in the results and find that our results are not sensitive to the measure used in estimating asset illiquidity in funds and also are not influenced by seasonal effect. Thus, we can confirm the evidence of a liquidity premium in Thai mutual funds as well as the importance of including a liquidity factor in the performance measure.

Findings from this study make practical implications to both Thai fund investors and fund managers. For investors, selecting funds which are illiquid stocks oriented could provide them superior returns. In addition, the multi-factor model should be considered in performance measurement since it can help investors to select funds which meet their preferences. For fund managers, even the tax-benefit fund managers already perform relatively well compared to their peers, they could perform even better by making use of their long-term restrictions to invest more on illiquid stocks and to earn more illiquidity premium.

However, this study employs a share turnover ratio which can capture a quantity dimension only in liquidity and is tested in only one of the emerging economies.

Thus, further research is called for the more study on the effect of liquidity on investment portfolio; and to investigate the liquidity in other dimensions, such as the speed and cost of trading. Further research is also called for to seek a more appropriate proxy in explaining the liquidity premium in emerging market returns.

CHAPTER SEVEN

CONCLUSIONS

7.1 Introduction

The growth of mutual fund investment and its importance to various economies has become more significant in the past few decades. The distinctive characteristics of emerging markets make it vital to seek more understanding of mutual fund performance in this area; the present thesis has this aim, using the Thai market as a case study. We have surveyed the literature relating to performance measures which have been proposed in the past few decades as well as empirical evidence from both developed and emerging markets. Subsequently, we carried out three empirical studies connected to mutual funds in Thailand. The first relates to the comprehensive evaluation of Thai mutual fund performance based on existing models in the literature. We used a longer and more comprehensive dataset than previous studies did and disentangled several issues which are still unclear or have not even been discussed in the Thai literature, including the performance, style, and strategy used in Thai fund managers. The second empirical study relates to whether any of the fund characteristics can help to explain fund performance. The present study considered five important characteristics and used both time-series and cross-section techniques to tackle this issue. The third relates to the role of liquidity in mutual fund performance, since liquidity is one of the main concerns in emerging markets. We examined the effect of liquidity in assets contained in the portfolio in relation to fund performance and then we proposed an auxiliary performance measure to capture the liquidity premium. Additionally, in each empirical study, we specifically examined the tax-benefit mutual funds. This is an explicit fund type in Thailand, which has received immense cash flows in the past few years. This mutual fund type gives favourable tax treatment and, at the same time, it entails long-term investment restriction. Thus, we look at these funds as a discrete group and reveal their policy implications.

Accordingly, this chapter presents the conclusions and key findings of the study as well as providing some research suggestions. The chapter is organised as follows. Section 7.2 summarises the key findings in the study based on our empirical analysis. In Section 7.3, we bring results from our analysis together and discuss policy implications. Finally, Section, 7.4, discusses the limitations of the study and suggests areas which might benefit from further research.

7.2 Key findings

7.2.1 Literature survey on mutual fund performance

We reviewed existing performance measures and empirical results as well as other relevant issues in mutual fund performance which have been widely discussed over a decade. The mutual fund performance measures are largely influenced by the modern portfolio theory. The criticisms of the validity of the Capital Asset Pricing model and the evidence suggesting that other variables outside the market risk can also explain stock returns have amplified more recent models to become richer and more informative. These models not only help to evaluate performance more efficiently but also allow us to examine further the style and strategy which a fund manager follows. Empirical evidence suggests that fund managers adjust portfolios dynamically on the basis of economic information; invest heavily in small and value stocks; and make use of momentum strategy. Nevertheless, in most cases, they are unable to outperform the market, at least, once fees and expenses have been deducted. This indicates that fund managers do not give value added to investors and this is partly due to the high fees and expenses charged. The other two crucial concerns which are widely discussed in the mutual fund literature are persistence in performance and the effect of fund flows on fund performance. Nevertheless, the results in these studies are still mixed.

With regard to the extensive literature on mutual fund performance, we find that these studies are concentrated in the US and other developed countries and research within the emerging regions is still scant, even though they are in many respects unlike the developed markets. For example, emerging markets suffer from infrequent trading, inefficiency and high volatility and high trading cost. More importantly, the mutual fund industries in emerging markets are distinctive from those in the developed markets in terms of growth, competitiveness, and organisational structure and information availability. Moreover, it is still questionable whether the findings in the developed markets carry over to the emerging markets.

The gap between the studies in developed and emerging countries is also owing to the sample size and the models used in the studies. Most studies of the mutual funds in emerging markets employ a short sample period, although these markets provide evidence of structural breaks. Furthermore, these studies are still based on the prevailing approaches, such as the Sharpe ratio, Treynor ratio and Jensen's alpha, which involve many criricisms: for instance, evidence from both the developed and the emerging markets suggests that there are other factors which can explain stock returns and the risk factor is not constant over time.

In addition, the literature on mutual funds in emerging markets reveals that the main concern in this region lies in performance evaluation. Very little has been written on other issues related to mutual fund performance, such as style and performance determination. Hence, these prevent a fuller understanding of the mutual find business.

Thus, this study chooses to examine mutual funds in emerging markets, using Thailand as a case study, and comes up with three promising research ideas. First, we apply performance measures in the existing literature to the mutual funds in Thailand and investigate its performance comprehensively. Second, we examine the factors related to mutual fund performance. Third, we examine the effect of liquidity, as one of the main concerns in emerging markets in regard to mutual fund performance, and elaborate an auxiliary performance measure.

7.2.2 Empirical study of Thai mutual fund performance

In Chapter Four, we examine the performance of Thai mutual funds using some of the measures proposed in the literature. We investigate both the selectivity and timing abilities of Thai fund managers and also investigate some of their styles and strategies. Finally, we compare and contrast the results with those of existing studies. Our results reveal that Thai fund managers as a whole do not have selectivity or timing ability. Therefore, over the sample period, they do not give value added to investors. Additionally, we applied performance measures which are seldom found in the emerging market literature and reveal that these richer performance models are also statistically important in performance evaluation, but not large enough to lead to abnormal returns. Nevertheless, the use of these models makes it easier to scrutinize the behaviour of fund managers.

Results from style analysis reveal that a large proportion of Thai fund managers invest heavily in small and growth stocks, although this style provides the worst performance of all four fund styles. This is in contrast to the previous studies in developed markets, which indicate that growth funds perform better than other fund styles.

We also employ conditional performance measures to investigate whether fund managers are active and adjust their portfolio dynamically, using macroeconomic information. In contrast to the findings in the literature which suggest that fund managers actively adjust their portfolios in response to changes in economic conditions and that conditional measures shift mutual fund performance toward zero, we find that, in Thailand, only flexible fund managers adjust their portfolio dynamically using Treasury bills and dividend yield. We also find that performances are unstable over the estimation period and that the results are sensitive to the frequency of data and measures used in the evaluation.

Subsequently, our results are comparable to those of previous writers on both the emerging and the developed markets in that no abnormal performance is shown. Our results also extend the mutual fund literature in emerging markets and show that Thai fund managers are more passive than their counterparts and that strategies are not very different in developed and developing markets. Fund managers' strategies are also different across fund types and it is found that the richer models used in developed markets also well explain the mutual fund returns behaviours in emerging markets.

7.2.3 Empirical study of the determinants of mutual fund performance

The findings in Chapter Four reveal that fund managers as a whole do not make abnormal returns. However, some fund managers perform better than others. Thus, the next question is whether we can learn to identify them. In Chapter Five, we shed light on whether abnormal performing funds can be differentiated from others, using their particular characteristics. This study looks at five main characteristics, namely, past performance, size, fund flows, fund longevity and family size.

In addition to the prevailing studies, this chapter investigates fund characteristics individually and as a group; and examines its importance from both statistical and economic standpoints. We find that fund performance in Thailand based on risk-adjusted measures can be explained by some of these characteristics, even though these are investment and tax policy specific.

General funds reveal persistence in performance. There is a positive relationship between the past year's and current performances and its degrees are of both statistical and economic importance. Nonetheless, this relationship applies to poorly performing funds, which continue to perform badly from one period to the next. This is in contrast to the previous evidence in emerging markets, which finds no evidence of performance persistence. However, it is comparable to the several studies in developed markets which show evidence of persistence in performance, especially among poorly performing funds.

Fund size is negatively related to general flexible fund performance and negatively related to tax-benefit flexible fund performance. In contrast, fund family size is positively related to the performance of both general equity and flexible funds. In addition, the performance of general equity funds performance also decreases with the funds' age. Even though the fund performance can be statistically explained by these characteristics, selecting funds on the basis of these strategies is unable to yield abnormal returns.

Another key finding in this study relates to the impact of fund flows on mutual fund performance, about which little is known in emerging markets. In the panel regression, we do not find a relationship in lagged year net cash flows and fund performance. However, in the trading strategy portfolio, we find that tax-benefit funds with high net cash flows significantly underperform. This is evidence of the negative net cash flows shock in tax-fund managers. Since there is a large amount of cash inflow, fund managers are unable to allocate large amounts of cash immediately, causing a lowering of the portfolio's systematic risk and, therefore, a poorer performance. Thus, we show evidence against the view of the smart money effect in mutual fund performance and argue that, in emerging markets, cash flows have little impact on fund performance but cash flows shock can result in inferior performance in a subsequent period.

7.2.4 Empirical study of the effect of liquidity on mutual fund performance

In Chapter Six we examine the role of liquidity on mutual fund performance. Liquidity is one of the main concerns in emerging markets and a number of studies reveal the effect of liquidity on stock returns. However, the impact of liquidity has rarely been discussed in the mutual fund literature. We apply a return-based stale price measure in the hedge fund literature to quantify the degree of illiquid assets contained in the portfolio (Getmansky et al., 2004). Inconsistently with the evidence in the literature, we find that portfolios of funds which contain more illiquid assets perform significantly higher and suggest that there is a liquidity premium in mutual fund performance. Subsequently, we propose an auxiliary performance measure, which includes an additional variable to capture the liquidity premium, in addition to the size, value and momentum premium. In our auxiliary model, liquidity is measured by the share turnover ratio, which can capture liquidity in the trading quantity dimension. We construct a liquidity variable, using three-way sorting on size, book-to-market and share turnover ratio. The liquidity factor is the average returns of illiquid portfolios minus the average returns of very liquid portfolios. The results of using the auxiliary model suggest that the liquidity variable has explanatory power regarding mutual fund returns and is statistically significant in portfolios of funds with a high degree of illiquid assets. This suggests the importance of the liquidity factor to mutual fund performance, even though there is some liquidity premium left unexplained, which may have resulted from the premium from other dimensions of liquidity. Nonetheless, we find that our results are robust across the measures used in estimating illiquid assets in the portfolios and are not influenced by any seasonal effect.

7.3 Policy Implications

In 2002, the Thai government adopted a tax-benefit fund scheme called Retirement Mutual Funds (RMF) and later, in 2004, it introduced another tax-benefit fund scheme called Long-term Equity Funds (LTF). These two fund styles have a similar purpose: to promote long-term and retirement savings. These funds impose a restriction on long-term investment while giving favourable tax treatment. Consequently, these fund styles have become popular and have received substantial cash flows. Since the tax-benefit funds focus on long-term investors and impose restrictions in terms of the investment period, these may influence the funds' performance as well as the behaviour and investment strategy of fund managers. The long-term investment period is likely to make fund managers rely more on passive strategy. In addition, the restrictions imposed on the funds are likely to have a positive impact on performance because they reduce liquidity-motivated trading and also allow fund managers to put more weight on illiquid assets, so as to earn an illiquidity premium.

Thus, we discuss the policy implications of these fund styles by examining these funds in a discrete category, called tax-benefit funds, and comparing them with general funds. Results are reported in each empirical chapter. In the first and second empirical chapters, we find that tax-benefit funds, as a whole, perform significantly better than general funds, even when controlled for size, net cash flows, age and style differences. We also find that tax-benefit funds display different characteristics from general funds in explaining mutual fund performance. In contrast to general funds, we do not find evidence of persistence in tax-fund performance. Although tax-benefit funds perform better than general funds, we find that the impact of high unexpected cash flows can result in inferior mutual fund performance in a subsequent period because fund managers cannot adjust their portfolios immediately.

Furthermore, we investigate whether the superior performance in the tax-benefit funds is a result of the liquidity premium. We examine the degree of illiquid assets contained in the tax-benefit portfolio in relation to general funds. The results reveal that tax-benefit funds hold slightly more illiquid assets than general funds do. Thus, we conclude that the superior performance in tax-benefit funds is only partly attributable to the liquidity premium. The superior performance in tax-benefit funds can also be a consequence of their long-term lockup restriction, which allows fund managers to manage their portfolios more efficiently and to reduce the cost of nondiscretionary trading. Also, it can be explained by the superior skills of the tax-benefit fund manager themselves. Nonetheless, the intense growth in the tax-benefit funds nowadays is something which Thai fund managers should be aware of and prepare for, because they cause large cash flows into the funds which could inversely affect fund performance.

7.4 Limitations of the study and suggestions for further research

The main limitations of this study are three-fold. First, it considers only one emerging market, which cannot represent the emerging market as a whole. Even though these markets share many of their main characteristics, some of them have their own unique characteristics and regulations. Therefore, the findings may not fully cover all emerging markets. Second, with regard to data availability, the data can be traced back only for the past seven years, possibly not long enough to capture the market cycle. Third, some relevant information is not available, such as fees and expenses, trading information and cash inflows and outflows. Hence, some analyses cannot be applied.

Accordingly, we highlight some further research ideas on the basis of findings from this study as well as the previous literature. First, research into mutual funds should be conducted within other emerging countries as well as at the aggregated level. This would provide more understanding of this part of the mutual fund industry.

Second, this study shows that liquidity, which is one of the main concerns in emerging markets, influences the mutual fund performance measure. However, we focus only on liquidity in the trading quantity dimension and, therefore, the effect of liquidity in other dimensions is left unexplained. Furthermore, some further study of mutual funds in emerging markets needs to put more emphasis on other characteristics of emerging markets, such as their inefficiency, non-normality, volatility and structure breaks; and to examine how this affects the performance and performance measures. There is also a need to develop a performance model specifically for this region.

Third, further research can engage in examining the behaviour of mutual fund investors in emerging markets. This study shows that much information about mutual funds is not publicly available. For instance, there is no information on fund styles nor comprehensive league tables to allow the comparison of mutual funds in the market. Subsequent investors are likely to be uninformed. Thus, it is still not clear how these investors make their decisions and whether these decisions are smart in the sense of providing superior returns in subsequent periods.

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Appendix A.1 Mutual fund growth classified by investment policy, 2000-2007

The table present mutual fund asset values in million baht (column 2-6) and number of funds (column 7-11) classified by investment policy from 2000-2007. Growth of asset values and number of funds are presented in panel B.

Year	Total asset values					Number of funds				
	Equity	Fixed income	Mixed	Others	Total	Equity	Fixed income	Mixed	Others	Total
Panel A: Total net asset values and number of funds										
2000	25,529	87,179	16,066	744	129,518	102	87	35	1	226
2001	24,192	92,967	24,067	757	141,983	93	79	51	1	224
2002	27,222	93,368	75,077	2,022	197,690	99	96	80	4	279
2003	83,384	94,168	258,186	4,468	440,205	99	93	120	7	319
2004	79,928	116,798	283,832	4,421	484,979	132	122	156	6	416
2005	82,565	391,315	275,672	23,500	775,392	151	271	149	13	584
2006	89,752	639,880	264,807	46,259	1,040,697	164	406	133	13	716
2007	156,240	946,697	266,744	56,720	1,426,401	221	469	115	16	821
Panel B: Annual growth										
2001	-5.24%	6.64%	49.80%	1.75%	9.62%	-8.82%	-9.20%	45.71%	0.00%	-0.88%
2002-04	71.56%	8.44%	155.26%	95.67%	57.36%	13.26%	16.53%	45.62%	120.24%	23.10%
2005-07	28.69%	115.50%	-2.03%	183.67%	43.72%	19.25%	62.49%	-9.59%	46.58%	25.88%
2001-07	42.22%	54.07%	72.78%	119.97%	44.69%	12.67%	32.55%	21.97%	71.49%	20.87%

Appendix A.2 Summary statistics of individual funds in the sample, June 2000-August 2007

CODE	Name	COMPANY	Obs	Mean	SD	Min	Max
EQN001	1 A.M. Global Emerging Market Equity Fund	ONEAM	88	0.0019	0.0241	-0.0971	0.0557
EQN002	1 A.M. Set 50	ONEAM	192	0.0028	0.0285	-0.0855	0.0792
EQN003	1 A.M. Valued Stock Fund-Dividend Fund	ONEAM	114	0.0015	0.0226	-0.0756	0.0718
EQN004	Aberdeen Growth Fund	ABERDEEN	373	0.0041	0.0296	-0.1757	0.0925
EQN005	Aberdeen Siam Leaders Fund	ABERDEEN	179	0.0030	0.0204	-0.0583	0.0505
EQN006	Aberdeen Small Cap Fund	ABERDEEN	114	0.0038	0.0146	-0.0424	0.0353
EQN007	Aberddén Thai Equity Dividend Fund	ABERDEEN	17	-0.0022	0.0309	-0.1053	0.0320
EQN008	Adkinson Growth Open-Ended Fund	MFC	373	0.0019	0.0348	-0.1532	0.0988
EQN009	Asia Panpol Fund	UOBAM	373	0.0004	0.0545	-0.8643	0.0834
EQN010	AYF Star Capital Fund	AYF	373	0.0009	0.0368	-0.2068	0.1077
EQN011	AYF Star Capital Fund 70/30	AYF	21	0.0035	0.0174	-0.0292	0.0452
EQN012	AYF Dividend Stock Fund	AYF	20	0.0045	0.0166	-0.0279	0.0362
EQN013	AYF Dividend Stock Fund 70/30	AYF	21	0.0032	0.0123	-0.0266	0.0284
EQN014	AYF Star Equity Fund	AYF	185	0.0010	0.0257	-0.0720	0.0616
EQN015	Bualuang Capital Open-End Fund	BBLAM	373	0.0017	0.0314	-0.1099	0.1020
EQN016	Bualuang Infrastructure Open-End Fund	BBLAM	373	0.0041	0.0264	-0.1041	0.0992
EQN017	Buakaew Open-End Fund	BBLAM	373	0.0036	0.0295	-0.1077	0.1021
EQN018	Buakaew 2 Open-End Fund	BBLAM	373	0.0036	0.0296	-0.1099	0.1007
EQN019	Buakaew Income Fund	BBLAM	373	0.0023	0.0312	-0.1574	0.0999
EQN020	Bangkok Metropolitan Open-Ended Fund	MFC	373	0.0017	0.0394	-0.4008	0.1012
EQN021	Sub Bualuang Open-End Fund	BBLAM	373	0.0035	0.0294	-0.1092	0.0996
EQN022	Bualuang Thanakom Open-End Fund	BBLAM	373	0.0024	0.0360	-0.1879	0.1712
EQN023	Bualuang Top-Ten Fund	BBLAM	373	0.0038	0.0288	-0.0984	0.1070
EQN024	Dynamic Eastern One Open-Ended Fund	MFC	373	0.0023	0.0335	-0.1336	0.1088
EQN025	AYF Star Dynamic Fund	AYF	194	0.0005	0.0261	-0.0753	0.0755
EQN026	AYF Star Dynamic Fund	AYF	181	0.0002	0.0237	-0.0720	0.0637

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
EQN027	Finansa SET 50 Dividend Plus Fund	FAM	93	0.0016	0.0272	-0.0877	0.0618
EQN028	Finansa Enhanced Equity Fund	FAM	13	0.0092	0.0414	-0.0794	0.0762
EQN029	Global Balanced Fund Of Funds	ONEAM	270	0.0008	0.0103	-0.0418	0.0435
EQN030	IB Premier Fund	PRIMAVEST	199	0.0025	0.0293	-0.0998	0.1102
EQN031	ING Thai Equity Fund(Corporate 14)	ING FUNDS	20	0.0086	0.0260	-0.0347	0.0672
EQN032	ING Thai Balance Fund	ING FUNDS	373	0.0034	0.0625	-0.5508	0.5599
EQN033	IFCT Ruam Thoon Fund	MFC	373	0.0028	0.0316	-0.1158	0.1126
EQN034	K Equity Fund	KASSET	373	0.0022	0.0331	-0.1633	0.1087
EQN035	Kiatnakin Fund	UOBAM	373	0.0006	0.0525	-0.8138	0.0835
EQN036	Krungsri-Primavest Equity Fund	PRIMAVEST	174	0.0001	0.0278	-0.1070	0.0723
EQN037	Kamrai Permpoon Open-Ended Fund	UOBAM	373	0.0022	0.0328	-0.1606	0.0837
EQN038	Kamrai Permpoon Open-Ended Fund 2	UOBAM	158	0.0013	0.0261	-0.0893	0.0749
EQN039	Krungsri-Primavest Value Fund	PRIMAVEST	174	0.0004	0.0238	-0.0958	0.0646
EQN040	K SET 50 Index Fund	KASSET	121	0.0020	0.0275	-0.0871	0.0790
EQN041	Krung Thai Dividend Selected Fund	KTAM	368	0.0003	0.0243	-0.1039	0.0731
EQN042	Krung Thai-Trinity Fund	KTAM	197	0.0011	0.0312	-0.1553	0.0880
EQN043	K Valued Stock Fund	KASSET	11	0.0029	0.0564	-0.1362	0.0697
EQN044	Max Equity Fund	SCIA	156	0.0019	0.0259	-0.0911	0.0727
EQN045	MFC Global Equity Fund	MFC	268	0.0004	0.0185	-0.0661	0.0605
EQN046	MFC Set 50 Fund	MFC	166	0.0017	0.0278	-0.0907	0.0780
EQN047	Thanachart Fundamental Plus	THANACHART	181	0.0015	0.0256	-0.0927	0.0713
EQN048	NPAT Progressive Fund	ONEAM	185	0.0037	0.0342	-0.1186	0.1016
EQN049	N-SET Fund	THANACHART	202	0.0029	0.0270	-0.0798	0.0783
EQN050	One Plus One Fund	ONEAM	373	0.0026	0.0313	-0.1187	0.1018
EQN051	One High Yield Fund	ONEAM	185	0.0037	0.0348	-0.1200	0.1021
EQN052	One FAS Prosperity Fund	ONEAM	373	0.0026	0.0311	-0.1190	0.1047
EQN053	One Fundamental Fund	ONEAM	1	0.0023	.	0.0023	0.0023

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
EQN054	One Multiple Growth Fund	ONEAM	373	0.0024	0.0310	-0.1191	0.1024
EQN055	ONE Prosperous Fund	ONEAM	85	-0.0014	0.0347	-0.1040	0.1009
EQN056	ONE Prime Fund	ONEAM	373	0.0026	0.0315	-0.1200	0.1027
EQN057	ONE Progressive Fund	ONEAM	300	0.0028	0.0321	-0.1226	0.1040
EQN058	ONE UB2 Fund	ONEAM	193	0.0037	0.0357	-0.1199	0.1044
EQN059	ONE UB3 Fund	ONEAM	373	0.0026	0.0317	-0.1213	0.1056
EQN060	ONE UB4 Fund	ONEAM	204	0.0029	0.0359	-0.1175	0.1056
EQN061	ONE UB Growth Fund	ONEAM	2	-0.0142	0.0235	-0.0308	0.0024
EQN062	ONE Wealth Builder Fund	ONEAM	204	0.0029	0.0353	-0.1157	0.1034
EQN063	Om Sin Provincial Development Capital Fund	THANACHART	122	0.0015	0.0209	-0.0620	0.0534
EQN064	Primavest Equity Dividend Fund	PRIMAVEST	21	0.0078	0.0341	-0.0550	0.0965
EQN065	Pi-Boon Sab Dividend Fund	THANACHART	373	0.0022	0.0308	-0.1426	0.0965
EQN066	Perm Poon Sab Dividend Fund	THANACHART	373	0.0019	0.0322	-0.1543	0.0961
EQN067	Ruang Khao Equity Class Fund	KASSET	373	0.0032	0.0330	-0.1669	0.1064
EQN068	Ruang Khao Equity Distribution Class	KASSET	367	0.0023	0.0327	-0.1622	0.1080
EQN069	Ruang Khao2 Fund	KASSET	373	0.0020	0.0347	-0.1658	0.1089
EQN070	Ruang Khao3 Fund	KASSET	373	0.0021	0.0334	-0.1668	0.1089
EQN071	Ruang Khao4 Fund	KASSET	373	0.0019	0.0347	-0.1928	0.1045
EQN072	Ruang Khao High Income Fund	KASSET	373	0.0022	0.0317	-0.1621	0.0983
EQN073	Ruang Khao High Income 2 Fund	KASSET	328	0.0023	0.0350	-0.1776	0.0978
EQN074	Ruam Pattana Two Open-Ended Fund	MFC	373	0.0024	0.0359	-0.1726	0.1342
EQN075	Roong Roj Open-Ended Fund	MFC	373	0.0024	0.0334	-0.1443	0.0980
EQN076	Sub Anan Open-End Fund	MFC	373	0.0019	0.0355	-0.1548	0.1309
EQN077	SCB Dhana Ananta Open-Ended Fund	SCBAM	373	0.0026	0.0322	-0.1463	0.1121
EQN078	SCB Dividend Stock Open End Fund	SCBAM	202	0.0008	0.0222	-0.0950	0.0777
EQN079	SCB Munkhong Open-Ended Fund	SCBAM	373	0.0029	0.0314	-0.1425	0.1106
EQN080	SCB Munkhong 2 Open-Ended Fund	SCBAM	373	0.0027	0.0318	-0.1474	0.1150
EQN081	SCB Munkhong 3 Open-Ended Fund	SCBAM	373	0.0028	0.0316	-0.1447	0.1107

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
EQN082	SCB Munkhong 4 Open-Ended Fund	SCBAM	373	0.0028	0.0314	-0.1440	0.1086
EQN083	SCB Munkhong 5 Fund	SCBAM	373	0.0027	0.0317	-0.1495	0.1129
EQN084	SCB Permpol Munkhong Open-Ended Fund	SCBAM	373	0.0029	0.0316	-0.1505	0.1098
EQN085	SCB Ruamtun Open-Ended Fund	SCBAM	172	0.0034	0.0350	-0.1422	0.1065
EQN086	SCB SET Index Open-Ended Fund	SCBAM	373	0.0024	0.0305	-0.1736	0.0871
EQN087	SCB Taweesub Open-Ended Fund	SCBAM	373	0.0029	0.0317	-0.1473	0.1098
EQN088	SCB Taweesub 2 Open-Ended Fund	SCBAM	373	0.0029	0.0321	-0.1486	0.1162
EQN089	SCB Taweesub 3 Open-Ended Fund	SCBAM	373	0.0029	0.0319	-0.1460	0.1121
EQN090	Sinchada Open-Ended Fund	MFC	373	-0.0024	0.0823	-1.3302	0.1075
EQN091	Siam City Fund	MFC	373	0.0013	0.0410	-0.3859	0.2320
EQN092	Siam City Two Fund	MFC	373	0.0005	0.0547	-0.8184	0.1410
EQN093	Sinpinyo Four Open-Ended Fund	MFC	373	0.0022	0.0361	-0.1438	0.1449
EQN094	Sinpinyo Five Open-Ended Fund	MFC	373	0.0025	0.0342	-0.1373	0.1162
EQN095	Sinpinyo Seven Open-Ended Fund	MFC	373	0.0018	0.0375	-0.3336	0.1155
EQN096	Sinpinyo Eight Open-Ended Fund	MFC	373	0.0019	0.0368	-0.2969	0.1205
EQN097	Sinpattana Open-Ended Fund	MFC	373	0.0010	0.0378	-0.2770	0.1080
EQN098	Sin Paitoon Open-End Fund	THANACHART	373	0.0019	0.0328	-0.2012	0.0995
EQN099	Siam City Ruam Thoon Open-Ended Fund	MFC	172	-0.0079	0.1772	-2.2429	0.2787
EQN100	Sub Somboon Fund	MFC	373	0.0027	0.0349	-0.1482	0.1275
EQN101	Stang Daeng Open-Ended Fund	MFC	373	0.0019	0.0371	-0.3096	0.1069
EQN102	Stang Daeng Two Open-Ended Fund	MFC	373	0.0022	0.0340	-0.1534	0.1044
EQN103	Sintawee Kamrai Open End Fund	AYF	316	0.0034	0.0329	-0.1660	0.0998
EQN104	Sub Thawee Two Fund	MFC	172	0.0029	0.0377	-0.1402	0.1036
EQN105	Syrus Momentum Fund	ONEAM	373	0.0025	0.0313	-0.1201	0.1036
EQN106	TCM Equity Fund	TISCOASSET	373	0.0006	0.0377	-0.3108	0.1112
EQN107	TCM Equity 2 Fund	TISCOASSET	50	-0.0008	0.0355	-0.0920	0.1115
EQN108	Thai Dragon Fund	UOBAM	373	0.0018	0.0340	-0.2094	0.0851
EQN109	Thai-Euro Open-End Fund	ABERDEEN	62	0.0022	0.0209	-0.0794	0.0454

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
EQN110	TFAM Equity Fund	KASSET	246	0.0048	0.0287	-0.0832	0.0691
EQN111	Thana One Fund	ONEAM	373	0.0026	0.0313	-0.1186	0.1024
EQN112	Tisco Equity Dividend Fund	TISCOASSET	322	0.0000	0.0593	-0.8996	0.1088
EQN113	Tisco Equity Growth Fund	TISCOASSET	373	0.0024	0.0313	-0.1334	0.0965
EQN114	Thanaphum Open-Ended Fund	MFC	373	0.0028	0.0342	-0.1566	0.1091
EQN115	Theerasub Open-Ended Fund	MFC	373	-0.0002	0.0475	-0.6160	0.1064
EQN116	Thunvivatana Fund	KASSET	361	0.0010	0.0341	-0.2476	0.1013
EQN117	United Open-Ended Fund	MFC	373	0.0025	0.0340	-0.1385	0.1119
EQN118	UOB Smart Active 100	UOBAM	117	0.0024	0.0258	-0.0874	0.0764
EQN119	Udom Sab - Dividend Fund	THANACHART	373	0.0018	0.0328	-0.1515	0.0937
EQN120	Udom Sab - Dividend 2 Fund	THANACHART	373	0.0021	0.0319	-0.1417	0.0970
EQT001	1 A.M. Selective Growth Long Term Equity Fund	ONEAM	114	0.0015	0.0254	-0.0867	0.0783
EQT002	1 A.M. Selective Long Term Equity Fund	ONEAM	148	0.0015	0.0249	-0.0858	0.0789
EQT003	1 A.M. Smart Long Term Equity Fund	ONEAM	6	-0.0009	0.0021	-0.0052	0.0003
EQT004	Aberdeen Long Term Equity Fund	ABERDEEN	145	0.0037	0.0196	-0.0588	0.0521
EQT005	ABN Amro Equities RMF	UOBAM	106	0.0068	0.0300	-0.0854	0.0699
EQT006	Aberdeen Smart Capital RMF	ABERDEEN	245	0.0047	0.0200	-0.0577	0.0649
EQT007	AJF Set50 Long Term Equity Fund	AYF	96	0.0014	0.0252	-0.0816	0.0600
EQT008	Asset Plus Equity RMF	ASSETFUND	137	0.0017	0.0193	-0.0593	0.0725
EQT009	Asset Plus Long-Term Equity Fund	ASSETFUND	141	0.0015	0.0206	-0.0829	0.0713
EQT010	AYF Equity RMF	AYF	56	0.0041	0.0220	-0.0737	0.0605
EQT011	AYF Dividend Stock Long Term Equity Fund 70/30	AYF	7	0.0015	0.0138	-0.0199	0.0244
EQT012	AYF Dividend Stock Long Term Equity Fund	AYF	142	0.0020	0.0178	-0.0695	0.0383
EQT013	AYF Equity LTF	AYF	56	0.0041	0.0217	-0.0720	0.0606
EQT014	Bualuang Equity RMF	BBLAM	244	0.0048	0.0255	-0.1024	0.0890
EQT015	Bualuang Long-Term Equity Fund	BBLAM	143	0.0023	0.0227	-0.1012	0.0731
EQT016	Bualuang Long-Term Equity Fund 75/25	BBLAM	12	0.0075	0.0251	-0.0293	0.0606
EQT017	Equity Pro LTF	SEAMICOASSET	4	-0.0054	0.0450	-0.0510	0.0559
EQT018	K Equity 70:30 LTF	KASSET	88	0.0024	0.0198	-0.0599	0.0514

Code	Name	Company	OBS	Mean	SD	Min	Max
EQT019	K Equity Dividend LTF	KASSET	146	0.0018	0.0261	-0.0839	0.0687
EQT020	K Equity LTF	KASSET	146	0.0024	0.0258	-0.0849	0.0686
EQT021	K Equity RMF	KASSET	33	0.0064	0.0195	-0.0412	0.0570
EQT022	Krungsri-Primavest Long Term Equity Fund	PRIMAVEST	144	0.0019	0.0246	-0.0849	0.0721
EQT023	Krungsri-Primavest LTF Dividend 70/30	PRIMAVEST	36	0.0023	0.0197	-0.0540	0.0491
EQT025	Krung Thai Shariah Long-Term Equity Fund	KTAM	32	0.0069	0.0173	-0.0330	0.0529
EQT026	Krung Thai Shariah Retirement Mutual Fund	KTAM	32	0.0068	0.0175	-0.0331	0.0532
EQT027	Krung Thai Long-Term Equity Fund	KTAM	142	0.0014	0.0245	-0.0878	0.0762
EQT028	Krung Thai Long-Term Equity Fund70/30	KTAM	27	0.0102	0.0209	-0.0249	0.0563
EQT029	MFC Activity Long Term Equity Fund	MFC	106	0.0018	0.0246	-0.0803	0.0747
EQT030	Max Dividend Long Term Equity Fund	SCIA	146	0.0013	0.0132	-0.0448	0.0294
EQT031	Max Equity Retirement Mutual Fund	SCIA	140	0.0018	0.0262	-0.0906	0.0712
EQT032	Max Long Term Equity Perfect	SCIA	71	0.0004	0.0276	-0.0907	0.0576
EQT033	MFC Value Long Term Equity Fund	MFC	144	0.0020	0.0239	-0.0778	0.0761
EQT034	Nasset Equity Retirement Mutual Fund	THANACHART	279	0.0035	0.0245	-0.0819	0.0740
EQT035	The Retire Equity RMF	KASSET	9	0.0061	0.0325	-0.0419	0.0657
EQT036	SCB Dividend Stock 70/30 Long Term Equity Fund	SCBAM	146	0.0014	0.0158	-0.0528	0.0491
EQT037	SCB Stock Plus Long Term Equity Fund	SCBAM	146	0.0022	0.0218	-0.0742	0.0680
EQT038	SCB Mai Stock Long Term Equity Fund	SCBAM	95	0.0036	0.0229	-0.0700	0.0562
EQT039	SCB Inter Long Term Equity Fund	SCBAM	6	0.0000	0.0275	-0.0449	0.0371
EQT040	SCB Smart Long Term Equity Fund	SCBAM	6	0.0061	0.0214	-0.0187	0.0453
EQT041	SCB Target Long Term Equity Fund	SCBAM	6	-0.0012	0.0292	-0.0499	0.0386
EQT042	SCB Equity RMF	SCBAM	285	0.0032	0.0230	-0.0761	0.0695
EQT043	Tisco Equity Growth Retirement Fund	TISCOASSET	252	0.0036	0.0285	-0.0956	0.0924
EQT044	UOB Equities RMF	UOBAM	159	0.0023	0.0246	-0.0816	0.0753
EQT045	Valued Stock Retirement Mutual Fund	ONEAM	292	0.0039	0.0252	-0.0823	0.0780
EQT046	Wealth Dividend LTF 70:30	KASSET	9	0.0063	0.0265	-0.0307	0.0533
EQT047	Wealth LTF	KASSET	9	0.0075	0.0346	-0.0418	0.0671
FLN001	Aberdeen Privilege Fund	ABERDEEN	212	0.0002	0.0220	-0.1386	0.0347

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
FLN002	Amnuay Sab - Dividend Fund	THANACHART	340	0.0018	0.0286	-0.1200	0.0840
FLN003	Asset Plus Growth Dividend Fund	ASSETFUND	137	0.0004	0.0267	-0.0876	0.0680
FLN004	AYF Star Multiple Fund	AYF	45	0.0014	0.0022	-0.0061	0.0068
FLN005	AYF Tuntawee Fund 2	AYF	45	0.0040	0.0224	-0.0701	0.0612
FLN006	AYF Tuntawee Fund 3	AYF	45	0.0027	0.0164	-0.0478	0.0449
FLN007	AYF-Primavest Flexible Fund	PRIMAVEST	200	0.0008	0.0282	-0.1185	0.0858
FLN008	B-Active Open-End Fund	BBLAM	166	0.0014	0.0177	-0.0871	0.0795
FLN009	B-Flex Open-End Fund	BBLAM	269	0.0012	0.0308	-0.3436	0.3558
FLN010	Charoen Sab - Dividend Fund	THANACHART	373	0.0016	0.0299	-0.1325	0.0945
FLN011	1 A.M. Flexible Auto Redemption Fund	ONEAM	217	0.0032	0.0272	-0.0883	0.0802
FLN012	MFC Happy Dee Five Fund	MFC	41	-0.0008	0.0244	-0.0720	0.0597
FLN013	K Flexible Equity Fund	KASSET	11	0.0115	0.0352	-0.0422	0.0691
FLN014	Kiatnakin - K-Asset Equity Fund	KASSET	96	0.0019	0.0245	-0.0450	0.0597
FLN015	Kasem Sab - Dividend Fund	THANACHART	373	0.0020	0.0289	-0.1180	0.1019
FLN016	Krung Thai Flexible Auto-Redemption Fund	KTAM	88	0.0028	0.0231	-0.0422	0.0604
FLN017	Krung Thai Thana Wattana Fund	KTAM	249	0.0019	0.0272	-0.1242	0.0830
FLN018	Lum-Ka Fund	KTAM	337	0.0002	0.0136	-0.0585	0.0421
FLN019	Max Balance Fund	SCIA	156	0.0006	0.0099	-0.0386	0.0274
FLN020	MFC-Bt Income Growth Fund	MFC	198	0.0022	0.0293	-0.0834	0.1732
FLN021	MFC Flexible Fund	MFC	373	0.0026	0.0234	-0.0822	0.0711
FLN022	MFC Islamic Fund	MFC	137	0.0003	0.0186	-0.0585	0.0439
FLN023	Nasset Great Fortune Fund	THANACHART	312	0.0001	0.0103	-0.0550	0.0238
FLN024	One Flexible Fund	ONEAM	373	0.0008	0.0330	-0.1454	0.0958
FLN025	Primavest Flexible Fund	PRIMAVEST	274	0.0010	0.0284	-0.1410	0.0749
FLN026	Primavest Flexible Fund 2	PRIMAVEST	183	-0.0002	0.0385	-0.2989	0.0824
FLN027	Ruang Khao Flexible Equity Fund	KASSET	361	0.0030	0.0466	-0.4869	0.4350
FLN028	Krung Thai Tax Planning RMF 1	KTAM	254	0.0031	0.0238	-0.0791	0.0775
FLN029	Ruang Khao Target 1 Fund	KASSET	157	0.0005	0.0270	-0.0851	0.0649
FLN030	Sicco Flexible Portfolio Open End Fund	AYF	60	0.0009	0.0008	-0.0009	0.0043

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
FLN031	SCB Capital Stable Protection 1 Open End Fund	SCBAM	57	0.0016	0.0057	-0.0223	0.0163
FLN032	SCB Prime Open-Ended Fund	SCBAM	373	0.0030	0.0279	-0.1428	0.1024
FLN033	SCB Prime Growth Fund	SCBAM	373	0.0029	0.0293	-0.1521	0.1069
FLN034	Sinwattana Fund	KASSET	187	0.0005	0.0025	-0.0093	0.0067
FLN035	TCM Flexible Portfolio Fund	TISCOASSET	373	0.0023	0.0607	-0.7309	0.7053
FLN036	Thanachart Flexible Fund-2	THANACHART	6	0.0111	0.0272	0.0000	0.0665
FLN037	Thanachart Flexible Fund-2 Series 2	THANACHART	1	0.0000		0.0000	0.0000
FLN038	Tisco Flexible Fund	TISCOASSET	373	0.0021	0.0300	-0.1248	0.0854
FLN039	Thai Opportunity Fund	KTAM	284	0.0020	0.0267	-0.1427	0.0777
FLN040	UOB Select Fin4cast/1	UOBAM	33	-0.0003	0.0059	-0.0215	0.0203
FLN041	UOB Select Set 50/1	UOBAM	50	0.0012	0.0021	-0.0066	0.0067
FLN042	Buakwan Open-End Fund	BBLAM	352	0.0021	0.0317	-0.3393	0.3593
FLN043	ING Thai Balanced Fund	ING FUNDS	373	0.0007	0.0562	-0.5460	0.5197
FLN044	Karnchana Anan Open-End Fund	MFC	373	0.0014	0.0212	-0.1367	0.0558
FLN045	Pai-Boon Sab Dividend Fund	THANACHART	354	0.0016	0.0207	-0.0983	0.0642
FLN046	Ruang Khao Balanced Class	KASSET	373	0.0022	0.0204	-0.0973	0.0644
FLN047	Ruang Khao Balanced Distribution Class	KASSET	345	0.0012	0.0207	-0.0975	0.0647
FLN048	Ruang Khao Balanced Fund	KASSET	373	0.0008	0.0216	-0.1033	0.0613
FLN049	Sa-Thien Sab Dividend Fund	THANACHART	373	0.0013	0.0209	-0.1254	0.0658
FLN050	Tisco Balanced Growth Fund	TISCOASSET	211	0.0023	0.0194	-0.0637	0.0457
FLT001	Asset Plus Mixed RMF	ASSETFUND	137	0.0016	0.0253	-0.0807	0.0833
FLT002	Bualuang Flexible RMF	BBLAM	244	0.0034	0.0200	-0.0980	0.0765
FLT003	Finansa Retirement Mutual Fund	FAM	62	0.0019	0.0165	-0.0489	0.0404
FLT004	Finansa Mixed Retirement Mutual Fund	FAM	73	0.0010	0.0145	-0.0331	0.0392
FLT005	Ruang Khao Flexible Balanced RMF	KASSET	281	0.0018	0.0114	-0.0312	0.0363
FLT006	Ruang Khao Flexible Equity RMF	KASSET	281	0.0042	0.0303	-0.0870	0.0963
FLT007	Flexible Plus Retirement Mutual Fund	ONEAM	191	0.0015	0.0253	-0.0839	0.0643
FLT008	K Balanced RMF	KASSET	11	0.0034	0.0122	-0.0142	0.0251
FLT009	K Flexible Equity RMF	KASSET	11	0.0115	0.0350	-0.0419	0.0692

Code	Name	COMPANY	Obs	Mean	SD	Min	Max
FLT010	Max Balance Retirement Mutual Fund	SCIA	148	0.0003	0.0096	-0.0344	0.0229
FLT011	MFC Retirment Value Fund	MFC	258	0.0038	0.0259	-0.0791	0.0778
FLT012	Primavest Flexible Retirement Mutual Fund	PRIMAVEST	250	0.0033	0.0264	-0.0848	0.0765
FLT013	SCB Flexible Fund RMF	SCBAM	285	0.0022	0.0162	-0.0551	0.0516
FLT014	Tisco Flexible Portfolio Retirement Fund	TISCOASSET	252	0.0032	0.0278	-0.0975	0.0815